STANNARDS MARINE PTY LTD V NORTH SYDNEY COUNCIL L&E 63136/2021

MARINE ECOLOGY IMPACT ASSESSMENT

Paul Anink
Principal Scientist
Marine Pollution Research Pty Ltd

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1 REQUEST FOR EXPERT OPINION

1. I have been retained by Alice Spizzo Advisory to provide an opinion on matters concerning possible marine ecological environmental harm in relation to an appeal in the Land and Environment Court relating to the refusal by North Sydney Council (NSC) for the Stannards Marine Pty Ltd (Stannards) Development Application to use a floating dry dock (FDD) in Berrys Bay as part of Noakes Boat Repair Yard. Specifically, I have been asked to address the potential marine ecological harm arising from disturbance of marine sediments due to the FDD operation.

2 QUALIFICATIONS

2. I am an environmental scientist specialising in the investigation of marine and freshwater aquatic pollution effects (aquatic ecology). I have more than 40 year experience in the fields of water pollution and environmental studies, gained whilst undertaking and managing marine and freshwater environmental research for James Cook University, North Queensland, as a Marine Ecology Scientist at NSW State Pollution Control Commission (now NSW Environment Protection Authority), and as Managing Director and Principle Scientist of a Sydney-based aquatic environmental consultancy, Marine Pollution Research Pty Ltd (MPR), formed in June 1988.

3. I am an aquatic ecologist by training having gained my B.Sc. (Zool) from the University of NSW in 1974, specialising in aquatic invertebrate ecology. In 1980 I completed an M.Sc. (Prelim) course at the University of Sydney in order to undertake studies towards a higher degree. I have been employed full time in aquatic environmental research since 1970.

4. I have broad practical expertise plus extensive consulting and management experience in the fields of freshwater and marine aquatic biological environmental sciences and I have specialised in studying the effects of water borne pollutants and of developments on freshwater, estuarine and near-shore marine ecosystems in a range of tropical to temperate coastal environments.

5. I have produced an extensive list of reports covering freshwater and marine biological environments, pollution assessment and control, environmental impact assessment and planning, including production of expert witness statements for the NSW Land and Environment Court (see **Annexure B**).

6. With regard to my familiarity with potential impacts from demolition of marine structures and from the use of commercial marine facilities on the marine ecology of Sydney Harbour, the majority of my marine pollution related work practice over the years has been

undertaken in Sydney Harbour with four projects in Berrys Bay, two marine ecology impact assessments for NSW RMS (now TfNSW) demolition proposals for disused BP wharves on the northern side of Berrys Bay (2012) and for part demolition of wharves and structures associated with the Woodleys Shipyard at Berrys Bay (2013), and two Marine Ecology Impact Assessments for Berrys Bay Marina Proposals (2015 and 2017). I have also undertaken a number of sediment contamination studies in Sydney Harbour bays from Neutral Bay upstream for the purposes of assessing potential marine ecologic impact arising from the disturbance of contaminated sediments in relation to proposed developments or for water land lease renewal purposes.

3 IMPACTS ON WATER QUALITY

8. In order to make my assessment I have relied on the following hydrographic information:
    a. Map 1 in the Royal HaskoningDHV, 2019 report *Noakes FDD Navigation Impact Assessment* provides a portion of the AUS202 Hydrographic Chart for Berrys Bay that indicates the overall shape and slopes for Berrys Bay sufficient to infer directional details of sub-surface bottom plumes. The chart also shows depths all below -10m chart datum immediately east of the old BP wharf berthing box.
    b. The detailed hydrographic data provided for the project on the Hydrographic Survey Plan dated 29 Nov 2017, was prepared by *Harvey Hydrographic Services* and undertaken by a registered and accredited Hydrographic Surveyor.
    c. Map 2 in the Royal HaskoningDHV, 2019 report provides a clear diagram of *all areas affected by the proposed development*, including the FDD footprints and the swing basin for vessels accessing the FDD. This map shows the main *Harvey Hydrographic* contours at half metre intervals sloping west from the eastern shore to towards the deepest part of Berrys Bay (as known from Map 1).
    d. Map 3 in the Royal HaskoningDHV,2019 report provides a colour coding of the half metre depth intervals that indicate the additional detailed *Harvey Hydrographic* survey data that is available west of the -10m contour and for depths between -10m and -10.5m chart datum.
    e. As it is known from the AUS202 chart that the -10m contour on the eastern side of the bay is located approximately along the old BP Wharf outer berthing box limit line, it can be inferred that the bay bed is all below the -10m contour for the small western portion of the Swing Basin not directly covered by the *Harvey Hydrographics* detailed survey.

9. In regard to available information of wave climate and currents:
    a. The Royal Haskoning DHV, 2019 report provided assessments of tides, depths and wave climate in Sections 3.4 to 3.7 and discussed impacts in Sections 5.1.4 and 5.1.5.

b. Tidal currents are adequately described in the Royal Haskoning DHV, 2019 report section on tides and there is no indication that tidal currents would be impacted in any significant way by the proposal.
c. Flows from FDD Ballasting operations are provided in Section 5.1.6 of the Royal Haskoning DHV, 2019 report which also concluded no impact.
d. In regard to stormwater flow currents, the main stormwater flows to the bay are discharged from two large stormwater drains at Waverton Park with flow directed due south alongside the proposal and I conclude that these flows would not be impacted by the proposal.
e. In regards to local smaller sub-catchment stormwater drainages there is a small outlet immediately north of the Noakes property slipway and boundary that discharges west from John Street and there is another immediately south of the property boundary discharging west from Munro Street. Neither of these two drains are obstructed by the proposed FDD so that local stormwater flows would still be directed west to eventually be entrained and directed south in the main south-flowing stormwater current from Waverton Park.

7. In regard to the likelihood of the FDD itself plus of vessels accessing and exiting the FDD physically impacting the seabed and how the FDD can be operated to minimise and mitigate this impact are discussed in the Sections 4.3.2, 5.1.3 and 5.1.5 of the Royal Haskoning DHV, 2019 report:
   a. I note that the Royal Haskoning DHV 2019 report does conclude at *Section 5.4* that *water depths in the proposed area of operation of the FDD (for loading and unloading vessels), which is located within Noakes seabed lease area is insufficient for the maximum FDD draught. Thus, the FDD cannot be submerged for Phase 1 operations (refer Section 4.3). This limits the maximum draught of vessels that could be docked.*
   b. On this basis of this known and detailed limitation, the report concludes that the FDD is to be operated so that the *minimum keel clearance would be 300mm at all tides* (Section 5.1.5), and this would be achieved by adherence to a *Safety Management System* that has been *prepared for the operation and slewing of the FDD in accordance with requirements outlined in the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 and guidelines provided by AMSA* (Royal Haskoning DHV 2019 Section 4.3.1).
   c. I conclude that this possible impact has been adequately addressed, that there is an operational mechanism available to ensure that this impact can be satisfactorily managed (i.e., the Safety Management System), and that adherence to this Management System can be made a Condition of Consent.

8. In regard to the possibility of there being marine vegetation at the site, I note that the marine ecological assessment prepared by Bia-Analysis Pty Ltd (Appendix B to Appendix 8 for the EIS) noted that other than two small sparse patches of *Halophila ovalis* seagrass located in shallows close to shore no other seabed marine vegetation was found or reported:
   a. This is in line with my own experience in Berrys Bay and many of the other bays in Sydney Harbour west of the Harbour Bridge, i.e., that seagrass growing in marine sediments (and algae attached to hard substrata on the seabed are severely limited in depth due primarily to insufficient light penetration to depth to sustain plants plus the added limitation of siltation cover on plant leaves and algae stipes that further limit a plant's ability to photosynthesise.
   b. Our own additional seabed surveys undertaken for the purposes of obtaining additional sediment core samples (see below) confirmed that there is no seabed marine vegetation in the study area and further, we could not find the two small *Halophila* patches reported from November 2017. Given the overall wetter conditions in the catchment through 2019 to the present - which would have resulted in overall lower mean light penetration in Berry's Bay, this loss is not unexpected. Further, *Halophila ovalis* is an opportunistic colonising species that shows rapid variations in seabed cover in response to variable environmental conditions (light, temperature, wave action).
   c. Accordingly, I conclude that the project has no meaningful possibility of impact for seabed sediment marine vegetation by virtue of the lack of marine vegetation on the seabed in the study area, particularly at the depths under the FDD

9. In regard to impact assessment for the demolition phase of the project. this has been considered in the Bio-Analysis report that recommended the use of silt curtains and floating booms to limit potential sediment plumes from the seabed during pile removal works, with further recommendations made in Appendix 9 to the EIS:
   a. Routine maintenance and construction of marine facilities in Sydney Harbour embayments with similar or worse sediment contamination are assessed and underway at multiple sites all year round, and in the normal course of events, marine ecology impact assessment would make recommendations for protecting marine habitats and water quality from proposed construction and operation that would then be recommended to be included in the project Construction and Operational Environmental Management Plans (CEMP) and OEMP). These can be set-out either at the Assessment phase or may be required during approval via Conditions of Consent.
   b. For this project, it is recommended that Conditions of Consent can be set requiring the project CEMP and OEMP include specific measures to protect marine habitats, ecology and water quality.

10. In regard to the possibility of dredging requirements for the project I note that this has been considered in the Royal Haskoning DHV 2019 report and that the first paragraph of Section 5.1.5 of the Royal Haskoning DHV 2019 report states that *No dredging is proposed for the operation of the FDD.* This is repeated again in Section 5.1.5 and in Section 5.2.

11. In regard to available water quality management planning, I note that the EIS and Water Quality Assessment Appendix 9 make reference to water quality monitoring in relation to the project OEMP, and it would appear that the intention is that this could be made a Condition of Consent, as outlined in Paragraph 10 above.

4 SEDIMENT CONTAMINATION ASPECTS

12. In regard to the consideration of impacts from disturbance of marine sediments arising from the proposed FDD operations, my consideration is limited to the marine ecological impacts of disturbing marine sediments.

13. In regard to the available marine sediment contamination data I determined that (i) additional desk-top analysis should be undertaken on the original Jacobs sampling results - as supplied in the EIS Appendix 6, and that (ii) additional cored sediment sampling should be undertaken to better describe the sediment contamination at and around the project site:
    a. The field work for (ii) was undertaken under my direct supervision using MPR scientific staff on 9 September 2021, and final laboratory analysis results were supplied by the preferred analytical laboratory (Australian Laboratory Services ALS) on 28 September 2021.
    b. These additional considerations are provided in **Annexure A** to this report.

14. In regard to the information and description of the FDD operation provided in the *Appendix 14 Royal Haskoning DHV* 2019 report I conclude that the FDD can be operated to achieve the minimum 300mm clearance over all tides and during all operational phases for the FDD, provided the FDD is operated according to agreed operating procedures that are or would eventually be determined or agreed for the *Safety Management System*):
15. As noted in Section 4.3.2 of the *Royal Haskoning DHV* 2019 report, Section 4.3.2, the 300mm clearance is a recommended clearance for fairways in marinas to prevent disturbance of soft sediments arising from propelled vessels transiting over these sediments and is derived from *AS3962, Guidelines for Design of Marinas*.
16. From my own experience based on a three-year study that we undertook at the Sydney Superyacht Marina in Rozelle Bay using dissolved copper and turbidity as the prime determinants of sediment, stormwater or vessel antifoul paint sources for dissolved copper in surface and bottom waters, we did not encounter any measurable increased copper concentrations that we could attribute to sediment mobilisation due vessel movements.

17. Given that the FDD will be operated by surface winches with no underwater propulsion the risk of sediment disturbance due to FDD operations must be considered low.
18. Further, the consequent risk that small amounts of disturbed surface sediment potentially arising from FDD operation would be mobilised for sufficient time to increase the concentrations of dissolved contaminants in the water column such that marine biota would be placed at risk is also considered low.
19. This conclusion is also based on the fact that the sediments in the marine waters are saline and these settle much more rapidly following disturbance than freshwater suspended sediments.
20. In summary, there are sufficient sediment samples collected for the study to demonstrate that the seabed sediments are similar to other seabed sediments in Parramatta River and Port Jackson in terms of overall metal and organic contaminant presence and distribution arising from both historic local shoreline industries plus from continuing industrial and urban stormwater related inputs, and that the patterns of distribution also relate to these factors.
21. It is further concluded that if the FDD was to list or bottom out arising from either malfunction or from incorrect operation procedures such that seabed sediments would be mobilised, the risks to the aquatic marine biota locally over or in the surrounding seabed from sediment smothering or from increased dissolved contaminants in the water column are low and would not be measurable.

ANNEXURE A

STANNARDS MARINE PTY LTD V NORTH SYDNEY COUNCIL L&E 63136/2021

MARINE ECOLOGY IMPACT ASSESSMENT - POTENTIAL DISTURBANCE OF SEDIMENTS

Paul Anink
Principal Scientist
Marine Pollution Research Pty Ltd

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A - ASSESSMENT OF CONTAMINATION DATA & POTENTIAL FOR MARINE BIOTA IMPACT

22. In regard to the available sediment contamination data the following provides additional desk-top analysis of the original EIS sampling results - as supplied in the EIS Appendix 6 (here after referred to as the Jacobs Report) for sediment sampling ion 29 November 2017, and that of the additional cored sediment sampling data from sampling undertaken under my direct supervision using MPR scientific staff on 9 September 2021, with final laboratory analysis results supplied by the preferred analytical laboratory (Australian Laboratory Services ALS) on 28 September 2021. These data have also been provided to the Respondent.

23. **Annexure B** to this report provides the following material and I contend that the combined sediment contamination data now available are adequate for assessment of project impacts on marine ecology arising from potential disturbance of contaminated sediments:
    a. A description of the September 2021 field sediment sampling study including a figure showing sample sites in relation to the original Jacobs Appendix 6 sampling sites,
    b. Tables of additional analysis of the original *Appendix 6 (Jacobs Report)* sediment results compared against the Australia/New Zealand Guidelines (ANZG 2018) Default Guideline Values (DGV) for protection of marine aquatic life,
    c. Tables of the MPR September 2021 sediment analysis results also compared against the ANZG (2018) DGVs,
    d. Copies of the November 2017 and September 2021 ALS laboratory reports.

A.1 Assessment of 2017 Sediment Contamination Report Results against Updated Guidelines

24. In terms of the consideration of the contamination status of the sediments of Berrys Bay at and surrounding the Noakes Shipyard and proposed FDD operational areas, and based on the following analysis of the available data provided in **Annexure A**, I make the following conclusions regarding the 2017 Sediment Contamination Results and Conclusions:
    a. Jacobs sampled nine sites using a remote operated grab that took what is considered to be a sample of surface sediments. Note also that results for site 10 are actually results for a duplicate sample taken from the site 6 grab sample by the samplers, i.e., it is a laboratory analysis duplicate and not an additional field sample.
    b. A number of the original 2017 Sediment Contamination Report analyses were undertaken against laboratory analysis procedures that provided results with laboratory detection limits orders of magnitude greater than relevant DGVs and as a result there were understatements of potential DGV exceedances for many organic contaminants.

c. For the 2017 Data Report where results were at suitable detection limits for comparison to DGVs, conclusions regarding exceedances of DGVs compared total sediment analysis results against the relevant listed DGVs for the protection of marine aquatic life need to follow the guidance notes of the Guidelines (and also as outlined in Simpson et al 2013), in regard to normalising total sediment organic contaminant results against Total Organic Carbon (TOC) results. This has been done for the present report (see **Annexure B** modified 2017 Sediment Contamination Results tables).
d. The original 2017 Data Report did not report on the breakdown butyl-tin compounds (i.e., Di- and Mono-butyl-tin). This has been remedied for the present **Annexure B** modified 2017 Sediment Contamination Results Tables.
e. Petroleum Hydrocarbon analysis results were not normalised for TOC and the results of TRH (sum C10 to C40 fraction) were compared to the DGVs for TPH (sum C6 to C36 fraction). This has been remedied for the present **Annexure A** 2017 Sediment Contamination tables.
f. The 2017 data Report did not address the PAH compounds nor PAH Total results against the DGVs. This has been remedied for the present **Annexure B** 2017 Sediment Contamination tables of Jacob results.

25. On the basis of the above, the following conclusions are provided for the 2017 sampling results:
a. Tributytin (TBT) sampled from sites 1, 2 3 exceeded the DGV, and for sites 4 to 10 they exceeded the DGV-High for the protection of marine aquatic life.
b. Comparisons of the ratios between the butyl-tin compounds indicate a relatively stable breakdown rate over the sample sites with Tributyltin (TBT) accounting for about 50 to 60% of the total, and Dibutyltin (DBT) in the range 30 to 38%. Sites 7 and 9 were outliers with proportionally more TBT and lower MBT proportions.
c. TPH results did not exceed the DGV at sites 1,3, 9 and 10, were above the DGV at sites 2, 4, 6 and 7 and exceeded GV-High at Sites 5 and 8.
d. For PAH compounds ANZG (2108) only provides guideline values for Total PAH. Total PAH results for Jacobs sites 5, 6, 9 were below the DGV, and the remaining results were within the DGV to GV-High range.

A.2 Analysis of Combined 2017 and 2021 Sediment Contamination Results

26. **Figure 1** below shows the location of the combined 2017 and 2021 sampling sites in relation to bathymetry and proposed FDD inner and outer operational positions. The base figure is Map 3 from the Royal Haskoning DHV 2019 report for the original EIS and sample sites 1 to 10 are for the November 2017 sampling, with sites 11 to 20 for September 2021 sampling. Note Site 11 is positioned to the north of the Royal Haskoning DHV2019 report base aerial photograph below the Elevation Table. This figure indicates that the 2017 sample results are clustered at and around the FDD Inshore position. The 2021 sampling provides additional sample results for the FDD outer position and further offshore.

27. **Annexures A1 and A2** provide the results of the two sediment sampling programs with calculated normalised results as required for ANZG (2018). From these tables there are ANZC (2018) exceedances for the following analytes:
    a. For metals, metalloids and organotin, Arsenic and Mercury in 2017, Copper, Lead, Zinc and TBT for both 2017 and 2021 samples.
    b. For organics; TPHs, some individual plus total PAH for both data sets and DDE plus DDD (breakdown products of DDT) in 2021.

28. **Table 1** below provides summary means of the total data sets in relation to the data identified in Paragraph 12 above and includes the physical attributes of the sediments that influence contamination status (% silt fraction of the sediments and the % Total Organic Carbon). The Table also provides some general mean concentration statistics for Port Jackson sediments, from a sediment core study in Neutral Bay (MPR 2011) that has a similar industrial history to Berrys Bay where there is a commercial vessel marina located over similar seabed depths as the proposed FDD, plus from a sediment core study at Gladesville Bridge Marina in 2020 (MPR 2020) that included both seabed sampling from under a marina and immediately offshore from a deactivated slipway.

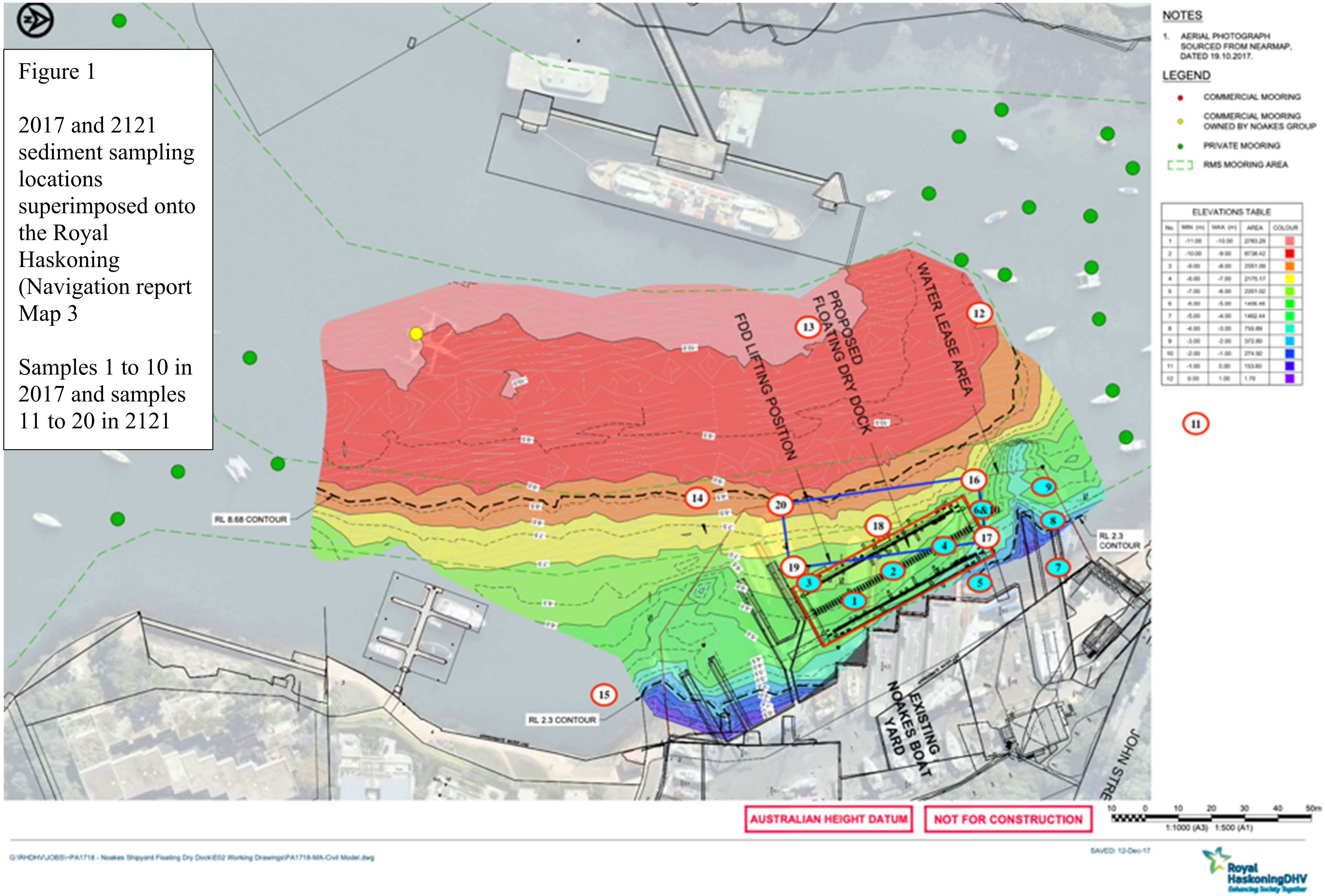

Figure 1

2017 and 2121 sediment sampling locations superimposed onto the Royal Haskoning (Navigation report Map 3

Samples 1 to 10 in 2017 and samples 11 to 20 in 2121

Table 1 2017 to 2021 Study Mean Comparisons with Port Jackson Data

	Sample Means			ANZG (2018)		Port Jackson Birch &Taylor 2004			Neutral Bay 11	GBM Slipway & Marina 2020		
Analyte	Surf 17	Surf 21	Deep 21	DGV	GVhi	Min	Mean	Max	Mean	Slip Mean	Marina Mean	Marina Max
%silt	17	71	55						33			
TOC	2.3	3.3	2.7						3.1			
As	22	4.4	3.7	20	70					13	3.2	5.4
Hg	4.4	<0.10	<0.10	0.15	1				2.3			
Cu	748	127	91	65	270	9.3	188	1053	611	9857	48.2	84
Pb	321	282	236	50	220	37.9	364	3604	262	443	118.3	240
Zn	670	648	478	200	410	108	651	7622	407	4687	227.2	436
TBT	245	25	37	9	70				140	31.0		
TPH	336	597	579	280	550				1660	1279		
PAH	13	9	12	10	50			380	97	8.9		

29. Other than limitations of high Detection Limits for the November 17 sampling results discussed in **Section 3.1** above, direct comparison of the two sets of Stannard's sample results in terms of sediment soil classification, Total Organic Carbon (TOC) concentrations and total sediment contamination results indicate the following:
    a. For the most part the 2017 and 2021 data are compatible and differences can be accounted for by site locations in relation to distance offshore east to west (which is also distance down-slope), distance downstream north to south and for some contaminants, distance away from historical slipway activities (see further analysis below).
    b. The 2021 cored data indicate that for the most part the deeper (>0.25m) core depth sample results were either similar or less than the surface core (0 to 0.25m) sample results, and as the surface samples coincide with the benthic zone (i.e, the portion of the seabed that supports burrowing fauna) plus as there were no deep samples collected for the 2017 sampling, further spatial analysis is confined to the combined 2017 and 2021 surface sample results.
    c. The data, as summarised in **Table 1** also indicate that sediment contamination in Berrys Bay is in line with the general levels of sediment contamination known to be widespread in Parramatta River and Port Jackson.

30. Surface sample means for this study are skewed by elevated inshore contamination results indicating a strong inshore to offshore gradient, and this was analysed using site data grouped from inshore to offshore (**Table 2 below**) and from site data grouped inshore to offshore away from the slipway (**Table 3 below**).

31. In terms of distance offshore from the eastern (Noakes) shore, sites are grouped as follows;
    a. Within 10m offshore from Noakes Facility - Sites 5 and 7.
    b. Between 10 m and 20m offshore, Sites 1, 2, 4, 8, 11, 15, 17.

c. Between 20 to 30m offshore, Sites 3, 6, 9 and 10.
d. Between 30 to 40m offshore, Sites 16, 18, 19.
e. Between 40 and 70m offshore, Sites 14 and 20
f. Sites Mid Channel, Sites 12 and 13.

32. In terms of distance from the slipway the sites are grouped as follows (East to West):
   a. Inshore or at slipway, sites 5 and 7
   b. About 20m off slipway, sites 8,17.
   c. About 30m off slip, sites 4, 6/10, 9.
   d. Site 16, about 40m offshore from slipway.

Table 2 Contamination Gradient West from Shore
Sites Grouped wrt Distance from Shore E to W

Sites No samples	7,5 2	0thers 7	9, 6/10, 3 4	16, 18, 19 3	20, 14 2	12, 13 2
%fines	27.0	49.7	35.3	43.0	98.5	98.5
TOC	2.6	3.2	2.0	2.2	3.3	3.4
As	22.0	11.8	26.8	3.9	4.5	5.1
Hg	8.6	3.9	2.9			
Cu	1920.0	401.6	338.3	104.7	100.1	111.0
Pb	582.0	338.9	213.0	167.7	295.0	276.0
Zn	1082.0	800.3	479.8	357.7	644.5	567.0
TBT	630.8	184.2	89.6	10.3	5.5	
TPH	500.0	483.4	145.0	522.0		
PAH	16.6	13.7	8.6	10.5	7.7	

Table 3 Contamination gradient from Slipway
Sites Grouped wrt Distance from Slipway E to W

Sites No samples	5,7 2	8,17 2	9. 6/10,4 3	16 1
%fines	27	46	37	26
TOC	2.6	4.0	2.1	2.2
As	22	12	25	3
Hg	8.6	9.2	3.1	<0.10
Cu	1920	785	383	81.1
Pb	582	370	250	128
Zn	1082	776	555	255
TBT	631	333	119	20
TPH	500	729	273	387
PAH	16.6	13.4	11.1	9.9

33. From **Table 2** it is clear that there are distinct gradients from shallow inshore sites out to the two Bay channel bed sites (12 & 13) for heavy metals (Copper, Lead and Zinc) Mercury, Organotin and PAH:
    a. Whilst Percent fines and TOC generally increase offshore, they also show a spike for the 10 to 20m range probably related to the north to south spread of the samples for that range that indicate another north to south gradient (higher silt and lower TOC content north).
    b. Most results also show slight increases for the deeper sites that are most likely related to the much higher silt content of samples beyond 40m offshore.

34. As noted above, some of the East to West results are also confounded by a gradient radiating out from the slipway, as indicated by the site-group analysis presented in **Table 3** with the heavy metals, Copper, Lead and Zinc, organotin TBT and total PAH all decreasing away from the slipway, whilst TOC, %fines, Mercury and TPH spike about 20m offshore from the slipway before decreasing offshore.

35. Based on the above analysis it is concluded that the contamination results and the patterns of change away from both historic shoreline industrial activities and from historic plus continuing stormwater drainage are in line with the observations of similar patterns of contamination throughout the industrialised Parramatta River and Port Jackson, as described in Birch and Taylor (2004), Beck and Birch (2014) and others (see **Section 4** References).

A.3 Impact Assessment for Marine Sediment Disturbance from FDD operation

36. The following assessment is based on the premise that whilst normal operation of the FDD would be managed to minimise potential contact of the FGDD with the seabed, there remains a residual risk of both operational FDD impacts with the seabed plus a residual risk of impact arising from operational failures leading to out of specification loads or listing leading to FDD impact with the seabed along the FDD edges (listing impact) or bottoming out (load related impacts).

37. Given that the area of operation of the FDD is highly constrained by the manner of its operation, the only seabed sediments that could be disturbed and mobilised into the water column by FDD malfunction are the sediments within the arc of the FDD outer (loading) position and the inner (working) position as indicated in **Figure 1** above, and the manner of potential seabed impact would be from listing (putting FDD edges into seabed sediments) or settling further than operational limits (bottoming out).

38. Whilst turbidity plumes generated by ships propulsion are able to raise to the surface due to the momentum of the propulsion and can then be dispersed over a greater area (see **Figure 2** from Knott and Johnston (2010), FDD bottoming out or listing would not provide sufficient momentum to result in surface plumes but rather would result in highly localised lateral pulses of mobilised surface sediments around the sides of the FDD that would be confined to bottom waters and that would rapidly re-settle close to the FDD footprint. Accordingly, the risk of mobilised sediment plumes raising to the surface from FDD bottoming out and being dispersed over a large area is considered small (low).

39. **Table 4** below provides an assessment of site sediment contamination based on the means of samples located within the total footprint of the FDD compared to adjacent sediments not under the footprint.

Figure 2 Cruise Ship Propeller plume at Circular Quay (from Knott and Johnston 2010).

Table 4 Mean Surface Contamination for Sites grouped in relation to FDD footprint										
Physical & Organic	Percent Fines		TOC		PAH		TPH		TBT	
Group	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
FDD IN Edges	55.3	8.4	3.1	1.0	9.6	1.1	439.0	207.1	40.0	25.9
FDD IN Bottom	42.7	4.9	2.2	0.3	13.9	2.6	320.0	124.2	85.0	21.0
FDD OUT Edges	50.3	10.5	2.9	0.5	9.1	0.8	477.0	90.6	54.8	19.9
FDD OUT Bottom	58.0	9.0	2.6	0.0	14.0	5.0	592.5	62.5	65.4	61.2
Sites north of FDD	20.0	6.4	1.8	0.5	16.8	5.7	415.0	229.6	495.5	194.3
Sites inshore FDD	27.0	18.0	2.6	1.3	16.6	9.0	500.0	100.0	630.8	153.8
Sites Offshore FDD	98.7	0.3	3.4	0.1						
Site 15 Inshore south	55		4.12							
FDD Total	48.7	7.6	2.57	0.3	9.8	1.8	397.2	75.1	48.7	74.8
Surrounding Total	55.7	14.5	2.8	0.4	11.1	4.0	317.1	113.6	374.6	124.1
Metals	Arsenic		Merrcury		Copper		Lead		Zinc	
Group	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
FDD IN Edges	7.7	3.1	1.5		181.3	32.4	250.7	57.8	572.0	117.2
FDD IN Bottom	16.7	2.7	2.1	0.3	314.3	36.1	273.3	29.3	623.3	92.6
FDD OUT Edges	16.3	9.5	3.4	0.2	223.7	58.5	247.3	36.1	540.7	79.5
FDD OUT Bottom	13.3	8.7	2.6		252.0	132.0	266.0	66.0	603.5	192.5
Sites north of FDD	15.3	2.4	5.3	1.9	1103.0	374.6	277.0	60.1	639.0	160.8
Sites inshore FDD	22.0	8.0	8.6	5.1	1920.0	320.0	582.0	292.0	1082.0	238.0
Sites Offshore FDD	4.7	0.9			98.0	21.2	275.3	19.6	577.7	29.2
Site 15 Inshore south	4.6		<0.10		204		561		1720	
FDD Total	14.43	2.2	2.36		221.51	142.3	235.8	20.3	523.4	52.1
Surrounding Total	13.1	3.1	7.5	1.6	1010.6	304.0	379.1	77.3	784.6	104.8

40. For the FDD to Surrounding footprint sediment comparisons provided in **Table 4** it is evident that for the most part mean concentrations of contaminants in the FDD footprint are less than means in surrounding areas. and for TPH and Arsenic Means ± SE overlap markedly, indicating sufficient variability in the data to assume similar concentrations.

41. Inspection of the **Table 4** FDDIn and FDDOut locations with respect to listing (FDD edge data) and Bottoming Out (FDD bottom) data, also indicate that for the most part sediments potentially mobilised by bottoming-out or listing have similar of less contaminants to surrounding areas which, when settled, would not result in any measurable change in the overall surface sediment contamination status of the surrounding seabed.

42. In terms of what the actual biological risk arising from FDD bottoming out is, the physical crushing of sediments from FDD contact would compress and displace surface sediments that contain benthic (burrowing) organisms, killing or injuring some with others displaced laterally with the displaced sediments. Given the ubiquity of the benthic environment throughout the estuary these direct losses of benthic fauna cannot be considered significant.

43. The remaining potential biological risks are associated with sediment mobilisation to the water column arising from possible FDD seabed contact:
    a. The potential for smothering of surrounding seabed marine vegetation is considered negligible, as there is no seabed marine vegetation close to the FDD operational site, with the closest being the rocky reef algae beds along the western shores and *Zostera* seagrass beds along the inner north western shore of Berrys Bay (MPR 2013).
    b. In relation to potential for mobilisation of contaminants from the sediments into the water column becoming available for ingestion by mobile organisms, resuspension of anoxic seabed sediments releases sulfides and exposes anoxic sediments to the water-column which may cause the dissociation of heavy metal ions (and also organic contaminants) from bonds with organic material (TOC) resulting in free ionic forms of contaminants that are more toxic or biologically available to marine fauna. However, the potential for this to occur is dependent on mobilising anoxic sediments and the top 100 to 200mm of harbour sediment is generally not anoxic as it is continually being reworked by burrowing habitat for benthic organisms (as evidenced by the abundance of burrows noted for every Stannard's sampling site in 2021, and more generally for previous MPR Berrys Bay studies). Accordingly, the probability of there being enhanced labile contaminants in the waters surrounding the FDD during any tilt or bottoming out incident is considered low and therefore the risk to mobile fauna is also low.
    c. This conclusion is consistent with experimental results from a study by Knott and Johnston (2010) who assessed whether repeated short-term resuspension of contaminated sediments would affect the diverse assemblages of rocky reef sessile

invertebrates (e.g. sea-squirts, barnacles and sponges) in Sydney Harbour. They predicted that soft bodied invertebrates (e.g. colonial sea-squirts and sponges) would shrink or decompose rapidly if the resuspensions lethally stressed these organisms and that the densities of live invertebrates with hard bodies (e.g. barnacles and polychaete tube worms would decrease. Their study found that a diverse range of Sydney Harbour sessile invertebrates showed no short-term ecological effects. The abundances and area that the invertebrates covered did not differ among the assemblages exposed to the resuspension and control treatments indicating that there were no immediate impacts of the resuspension of contaminated sediments.

d. In relation to the potential for impact to the benthic fauna in the sediments surrounding the FDD site arising from deposition of mobilised sediments from possible listing and bottoming-out it is considered that the benthic assemblages of the seabed sediments in Berrys Bay will already be a sub-set of the benthos that would be expected in a pristine (i.e., not contaminated) harbour shallow bay. That is, the ubiquity of seabed contamination throughout Parramatta River/Port Jackson is such that the benthos is generally similar in terms of the taxa that may occur , as demonstrated in studies by AHL (2018) who comparing the benthic assemblages of the declared Kendall Bay Remediation Project area with assemblages in other Parramatta River Bays up- and down-stream of Kendell Bay and found that there were no strong and clear links between the physio-chemical data and observed biological patterns. Instead, the differences amongst the Sites were typically related to small-scale differences in the number of animals rather than substantial differences in the number of animals and / or taxa. These small-scale differences were reflected in communities being spatially heterogeneous within and among bays, with both abundance and diversity varying.

A.4 Summary and Conclusions

44. There are sufficient sediment samples collected for the study to demonstrate that the seabed sediments are similar to other seabed sediments in Parramatta River and Port Jackson in terms of overall metal and organic contaminant presence and distribution arising from both historic local shoreline industries plus from continuing industrial and urban stormwater related inputs, and that the patterns of distribution also relat to these factors.

45. It is concluded that if the FDD was to list or bottom out arising from either malfunction or from incorrect operation procedures such that seabed sediments would be mobilised, the risks to the aquatic marine biota locally over or in the surrounding seabed from sediment smothering or from increased dissolved contaminants in the water column are low and would not be measurable.

A.5 References

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Annexure B.1

Normalised November 2017 Sediment Contamination Results for the Original EIS Appendix 6 Results

JACOBS Contamination Sed Results ES1730018				ANZG 18		Site										
Compound		LOR	Unit	DGV	GV Hi	1	2	3	4	5	6	6dup (10)	7	8	9
Moisture content	Moisture content	1	%			39.1	41.2	38.2	48.5	50.6	40	41.3	32.3	42.7	28.2
Organic Matter	Total Organic Carbon	0.5	%			1.7	2.4	1.6	2.6	3.9	2.6	2.4	1.3	2.9	1.3
Particle Sizing	75µm ----	1	%			67	54	61	51	55	59	59	91	69	80
	+150µm ----	1	%			58	47	52	38	42	47	46	84	48	75
	+300µm ----	1	%			35	25	24	19	21	26	26	50	16	58
	+425µm ----	1	%			17	12	9	10	13	19	19	28	6	50
	+600µm ----	1	%			6	5	2	7	8	15	14	16	3	46
	+1180µm ----	1	%			2	2	<1	4	5	8	8	9	1	38
	+2.36mm ----	1	%			<1	2	<1	2	4	4	4	6	<1	27
	+4.75mm ----	1	%			<1	<1	<1	<1	2	2	1	3	<1	6
	+9.5mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	+19.0mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	+37.5mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	+75.0mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Soil Class	Fines (<75 µm) ----	1	%			33	46	39	49	45	41	41	9	31	20
	Sand (>75 µm) ----	1	%			66	52	61	48	51	54	54	84	68	50
	Gravel (>2mm) ----	1	%			1	2	<1	3	4	5	5	7	1	30
	Cobbles (>6cm) ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Metals	Cobalt 7440-48-4	2	mg/kg			4	4	4	8	8	10	6	4	5	4
	Selenium 7782-49-2	5	mg/kg			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	Arsenic 7440-38-2	5	mg/kg	20	70	15	13	14	22	30	62	19	14	20	12
	Cadmium 7440-43-9	1	mg/kg	1.5	10	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Chromium 7440-47-3	2	mg/kg	80	370	35	39	38	50	61	36	43	27	47	24
	Copper 7440-50-8	5	mg/kg	65	270	296	263	194	384	2240	363	427	1600	1340	369
	Lead 7439-92-1	5	mg/kg	50	220	243	245	186	332	874	228	271	290	374	167
	Nickel 7440-02-0	2	mg/kg	21	52	7	8	7	15	20	13	14	9	13	9
	Zinc 7440-66-6	5	mg/kg	200	410	595	479	505	796	1320	531	561	844	751	322
	Mercury 7439-97-6	0.1	mg/kg	0.15	1	1.6	2	1.5	2.6	13.6	3	3.7	3.5	9.2	3.3
Organotin Compounds	Tributyltin	0.5	µgSn/kg			118	142	41	329	1860	265	251	1020	1670	164
	TBT @ 1%TOC	0.5	µgSn/kg	9	70	69.4	59.2	25.6	126.5	476.9	101.9	104.6	784.6	575.9	126.2

Dibutyltin	1	µgSn/kg			40	40	13	86	344	72	53	170	378	49
Monobutyltin	1	µgSn/kg			20	21	6	26	78	18	9	37	75	17

JACOBS Contamination Sed Results ES1730018

	Compound	LOR	Unit	ANZG 18 DGV	ANZG 18 GV Hi	Site 1	2	3	4	5	6	6dup (10)	7	8	9
Moisture content	Moisture content	1	%			39.1	41.2	38.2	48.5	50.6	40	41.3	32.3	42.7	28.2
Organic Matter	TOC	0.5	%			1.7	2.4	1.6	2.6	3.9	2.6	2.4	1.3	2.9	1.3
Polychlorinated Biphenyls (PCB)		0.1	mg/kg			0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.8	<0.1
	Total PCB 1% TOC	0.1	mg/kg	0.034	0.08	?	?	?	?	?	?	?	?	0.3	?
Organochlorine Pesticides (OCPs)	alpha-BHC	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Hexachlorobenzene	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Note that	beta-BHC	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
ANZG limits	gamma-BHC	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
are shown as	delta-BHC	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
µg/kg	Heptachlor	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Aldrin	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Heptachlor epoxide	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Sum Chlordane	0.05	mg/kg	0.45	9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	trans-Chlordane	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	alpha-Endosulfan	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	cis-Chlordane	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Dieldrin	0.05	mg/kg	2.8	7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	4.4`-DDE	0.05	mg/kg	1.4	7	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Endrin 7	0.05	mg/kg	2.7	60	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	beta-Endosulfan	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Endosulfan (sum)	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	4.4`-DDD	0.05	mg/kg	3.5	9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Endrin aldehyde	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Endosulfan sulfate	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

	4.4`-DDT	0.2	mg/kg	1.2	5Ω	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Endrin ketone	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	Methoxychlor	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Aldrin + Dieldrin	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	DDD+DDE+DDT	0.05	mg/kg			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

JACOBS Contamination Sed Results ES1730018				ANZG 18		**Site**									
Compound		LOR	Unit	DGV	GV Hi	**1**	**2**	**3**	**4**	**5**	**6**	**6dup (10)**	**7**	**8**	**9**
	Moisture content	1	%			39.1	41.2	38.2	48.5	50.6	40	41.3	32.3	42.7	28.2
Organic Matter	Total Organic Carbon	0.5	%			1.7	2.4	1.6	2.6	3.9	2.6	2.4	1.3	2.9	1.3
Polynuclear Aromatic Hydrocarbons	Naphthalene	0.5	mg/kg	0.16	2.1	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthylene 208-96-8	0.5	mg/kg	0.044	0.64	<0.5	<0.5	<0.5	<0.5	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5
	Acenaphthene	0.5	mg/kg	0.016	0.5	<0.5	<0.5	<0.5	0.31	<0.8	<0.5	<0.5	<0.5	0.21	<0.5
	Fluorene	0.5	mg/kg	0.019	0.54	<0.5	<0.5	<0.5	0.19	<0.8	<0.5	<0.5	<0.5	<0.5	<0.5
	Phenanthrene	0.5	mg/kg			2.3	2.2	1.7	4.2	1.9	1.6	1.5	3.6	4.9	0.9
	Phenanthrene@1%TOC	0.5	mg/kg	0.24	1.5	1.4	0.9	1.1	1.6	0.5	0.6	0.6	2.8	1.7	0.7
	Anthracene	0.5	mg/kg	0.085	1.1	<0.5	<0.5	<0.5	0.3	<0.8	<0.5	<0.5	0.5	0.3	<0.5
	Fluoranthene	0.5	mg/kg			4	4.5	3.5	8.5	4.3	3.8	3.3	5.3	9.4	1.6
	Fluoranthene Normalised	0.5	mg/kg	0.6	5.1	2.4	1.9	2.2	3.3	1.1	1.5	1.4	4.1	3.2	1.2
	Pyrene	0.5	mg/kg			4	4.7	3.6	8.8	5	4	3.3	6.7	9.3	1.6
	Pyrene Normalised	0.5	mg/kg	0.665	2.6	2.4	2.0	2.3	3.4	1.3	1.5	1.4	5.2	3.2	1.2
	Benz(a)anthracene	0.5	mg/kg			1.5	1.8	1.4	3.7	2.3	1.7	1.5	2.2	4.3	0.8
	Benz(a)anthracene	0.5	mg/kg	0.261	1.6	0.9	0.8	0.9	1.4	0.6	0.7	0.6	1.7	1.5	0.6
	Chrysene	0.5	mg/kg			1.6	1.8	1.4	3.7	2.3	1.9	1.6	2.2	4.2	0.8
	Chrysene	0.5	mg/kg	0.384	2.8	0.9	0.8	0.9	1.4	0.6	0.7	0.7	1.7	1.4	0.6
	Benzo(b+j)fluoranthene	0.5	mg/kg			2.2	2.9	2.2	5.7	4.1	3	1.6	4.2	6.3	1.1
	Benzo(k)fluoranthene	0.5	mg/kg			1.1	1.1	0.8	2.1	1.7	1.1	0.7	1.7	2.5	<0.5
	Benzo(a)pyrene	0.5	mg/kg	0.43	1.6	2	2.5	1.9	4.8	3.7	2.5	2.2	3.5	5.9	1
	TEQ (zero)	0.5	mg/kg			2.6	3.2	2.5	6.8	4.7	3.2	2.7	4.5	8.1	1.2
	TEQ (half LOR)	0.5	mg/kg			2.9	3.5	2.7	6.8	5	3.5	3	4.8	8.1	1.5
	TEQ (LOR)	0.5	mg/kg			3.1	3.8	3	6.8	5.2	3.7	3.2	5	8.1	1.8
	Benzo(a)pyrene	0.5	mg/kg	0.43	1.6	1.2	1.0	1.2	1.8	0.9	1.0	0.9	2.7	2.0	0.8
	Indeno(1.2.3.cd)pyrene	0.5	mg/kg			1.1	1.4	1	2.3	1.8	1.2	1.3	1.5	2.4	<0.5

Dibenz(a.h)anthracene	0.5	mg/kg	0.063	0.26	<0.5	<0.5	<0.5	0.21	<0.8	<0.5	<0.5	<0.5	0.21	<0.5
Benzo(g.h.i)perylene	0.5	mg/kg			1.4	1.8	1.3	2.9	2.3	1.6	1.9	1.8	2.9	<0.5
Sum of PAHs	0.5	mg/kg			21.2	24.7	18.8	49.5	29.4	22.4	18.9	33.3	54.3	7.8
Sum of PAHs @1%	0.5	mg/kg	10	50	12.5	10.3	11.8	19.0	7.5	8.6	7.9	25.6	18.7	6.0

JACOBS Contamination Sed Results ES1730018				ANZG 18		**Site**									
						1	**2**	**3**	**4**	**5**	**6**	**6dup (10)**	**7**	**8**	**9**
Compound		LOR	Unit	DGV	GV Hi										
Moisture content	Moisture content	1	%			39.1	41.2	38.2	48.5	50.6	40	41.3	32.3	42.7	28.2
Organic Matter	Total Organic Carbon	0.5	%			1.7	2.4	1.6	2.6	3.9	2.6	2.4	1.3	2.9	1.3
Total Petroleum Hydrocarbons ANZGVs are for sum C6 to C36	C6 - C9 Fraction	10	mg/kg			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C10 - C14 Fraction	50	mg/kg			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	C15 - C28 Fraction	100	mg/kg			100	170	<100	280	290	190	<100	190	420	<100
	C29 - C36 Fraction	100	mg/kg			<100	160	<100	250	310	190	150	210	400	<100
	C10 - C36 (sum)	50	mg/kg	280	550	100	330	<50	530	600	380	150	400	820	<50
Total Recoverable Hydrocarbons	C6 - C10 Fraction	10	mg/kg			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	C6 to C10 - BTEX	10	mg/kg			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	>C10 - C16	50	mg/kg			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
	>C16 - C34	100	mg/kg			170	290	110	460	550	320	240	370	700	130
	>C34 - C40	100	mg/kg			<100	<100	<100	140	210	110	<100	160	250	<100
	>C10 - C40	50	mg/kg			170	290	110	600	760	430	240	530	950	130
	C10 toC16-Naphthalene	50	mg/kg			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
EP080: BTEXN	Benzene 71-43-2	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Toluene 108-88-3	0.5	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Ethylbenzene 100-41-4	0.5	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	meta- & para-Xylene	0.5	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	ortho-Xylene	0.5	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	^ Sum of BTEX	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	^ Total Xylenes	0.5	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Naphthalene	1	mg/kg			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Annexure B.2

Summary of September 2021 Additional Sediment Core Sampling Program

plus

Sediment Contamination Results.


Sediment Sampling Sites
Yellow =MPR Sites Sep 2021
Red = Jacobs Sites Nov 2017
N
11
12
9
8
7
6
16
17
5
4
18
2
13
1
3
20
19
14
100 m
15
Google Earth

MPR Sediment Sample Notes Noakes 9 Sept 2021						
Site	Time	Core Depth (cm)	Sample Depth m ISLW	Easting	Northing	Sampling notes
13	09:20	50	11	333369	6253826	Located on Bay valley flat. Uniform dark grey throughout, soft oozy (sticky) mud. Consistent grain size throughout core length. Burrows in seabed floor around core site. Very little shell material or other coarse fragments. Easy core to extract.
14	09:30	40 to 45	10.3	3333408	6253778	Located on bay lower slope. Sample similar in consistency to Site 13. Uniform dark grey-black coloured throughout, soft oozy (sticky) mud. Consistent grain size throughout core length. Burrows in seabed floor around core site. Very little shell material or other coarse fragments. Easy core to extract.
12	09:50	45	10.5	333369	6253881	10m south of GPS, Sample similar in consistency to Sites 13 and 14. Uniform black coloured throughout, soft oozy (sticky) mud. Consistent grain size throughout core length. Burrows in seabed floor around core site, blue green algal coverage on seabed surface. Very little shell material or other coarse fragments in sample. Easy core to extract.
11	10:25	45 to 50	5.9	333391	6253918	Sample about 4m away from mooring block and no swing disturbance as mooring is fore and aft. Sample similar in consistency to previous sites. Some nodules in core and some plastics and rock fragments. Uniform dark grey coloured throughout with brown silty, soft oozy (sticky) mud at surface. Consistent grain size throughout core length. Burrows in seabed floor around core site and smaller amounts of blue green algal coverage on seabed surface. Very little shell material or other coarse fragments in sample. First two attempts hit rock or other impenetrable surface, third attempt sampled. Some nodules in core and some plastics and rock fragments
17	10:35	40	6.5	333430	6253867	Greater amounts of sand and shell fragments than previous samples, uniform grey-brown in colour, sticky. Plastic bag and cup lid at bottom of core. First two attempts hit rock or another impenetrable surface, third attempt sampled.
16	11:05	45	6.6	333410	6253865	As for Site 17, sandier than previous samples with moderate amounts of small shell fragments. Brown layer on top becoming gradually greyer with depth. Tyre on seabed, and Burrows in seabed floor around core site. First attempt hit rock or other impenetrable surface, second attempt sampled. Thin brown layer (biofilm-like) on seabed surface.

18	11:15	40	7.9	333425	6253837	Surface 5-10cm layer browner with finer grain size, remainder of core sticky mud, consistent in colouration and grain size (sandier and darker grey). Moderate amounts of small to large size shell fragments in sample. Burrows in seabed surface.
19	11:40	45	7.5	333439	6253809	Surface 5-10cm layer browner with finer grain size, remainder of core comprised of sticky mud (had to push out core from corer due to sticky nature of mud), consistent in colouration and grain size (sandy mud, darker grey). Moderate amounts of small to large size shell fragments in sample. Burrows in seabed surface.
20	12:10	45 to 50	9.6	333420	6253806	Very soft oozy (sticky) mud, dark grey and consistent grain size throughout, brown layer at surface of core. Minimal to no shell material or sandy sediments.
15	12:35	45 to 50	6.0	333461	6253762	Slightly browner at top of core (top 5 to 10cm), then uniform grey throughout remainder of core. Soft, sticky mud. Coarse shell fragments present in small amounts.

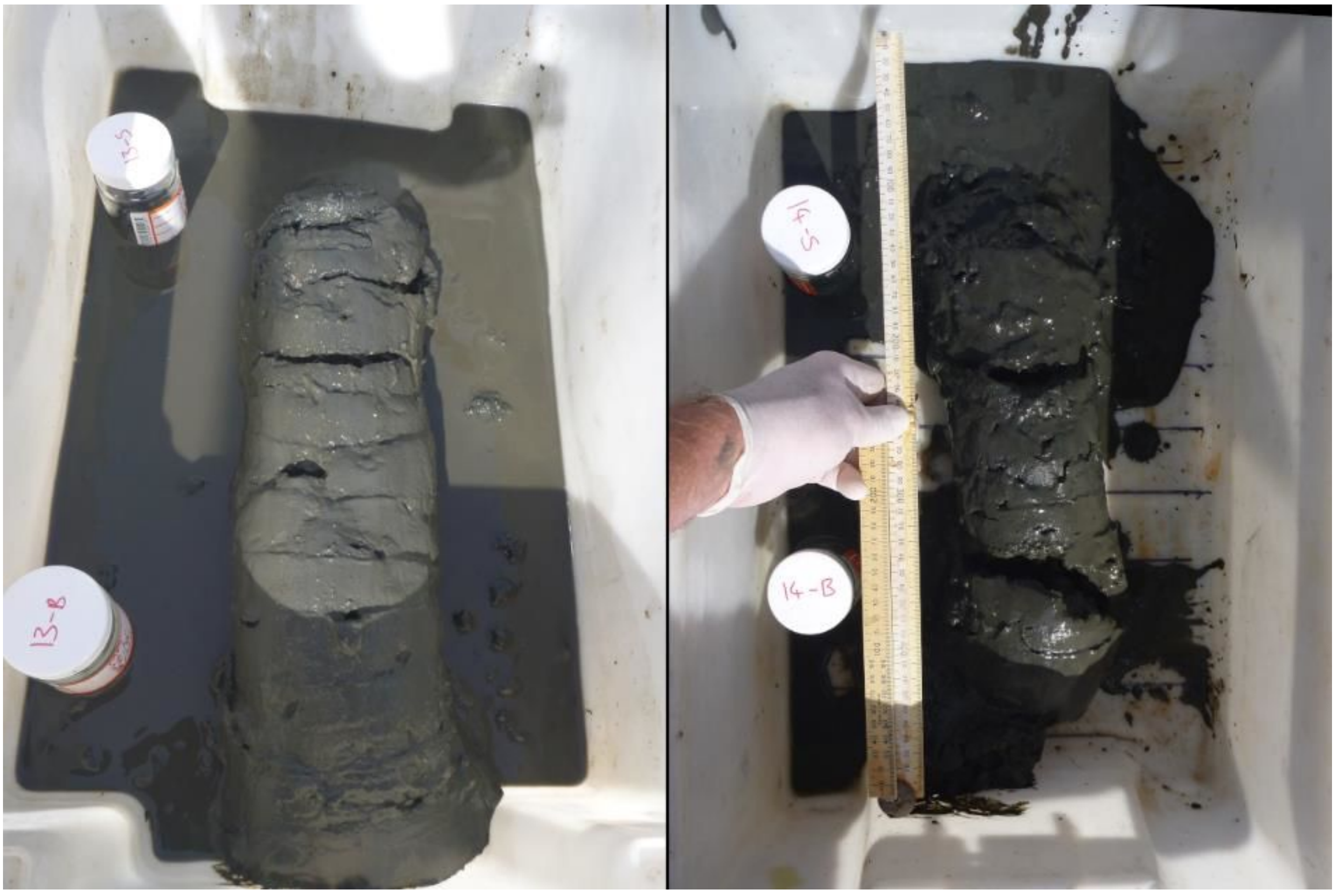

Plate 1: Sediment core samples from Sites 13 (left) and 14 (right).

Plate 2: Sediment core samples from Sites 12 (left) and 11 (right).

Plate 3: Sediment core samples from Sites 17 (left) and 16 (right).

Plate 4: Sediment core samples from Sites 18 (left) and 19 (right).

Plate 5: Sediment core samples from Sites 20 (left) and 15 (right).

MPR Contamination Sed Results ES2132764				ANZG 18		Site														
Compound	Analyte	LOR	Unit	DGV	GV Hi	11 Surf	12 Surf	13 Surf	14 Surf	15 Surf	16 Surf	16 Bot	17 Surf	17 Bot	18 Surf	18 Bot	19 Surf	19 Bot	20 Surf	20 Bot
Moisture content		1	%			47.9	64	66.2	61.1	45.8	29	32.5	51.3	52	54.7	44.2	35.4	32.9	63.6	57.4
Organic Matter	TOC	0.02	%			3.53	3.61	3.2	3.28	4.12	2.16	1.6	5.02	5.32	2.66	1.5	1.9	1.9	3.26	3.1
Particle Sizing	75µm ----	1	%			26	2	1	1	45	74	72	40	40	33	50	64	61	2	3
	+150µm ----	1	%			13	<1	<1	<1	30	68	66	28	28	24	38	50	47	1	2
	+300µm ----	1	%			6	<1	<1	<1	14	51	46	14	14	13	23	21	19	<1	1
	+425µm ----	1	%			3	<1	<1	<1	7	41	31	9	8	7	13	8	8	<1	<1
	+600µm ----	1	%			2	<1	<1	<1	4	35	21	7	6	4	7	4	4	<1	<1
	+1180µm ----	1	%			<1	<1	<1	<1	2	28	12	5	3	2	4	1	2	<1	<1
	+2.36mm ----	1	%			<1	<1	<1	<1	<1	22	6	3	2	<1	1	<1	1	<1	<1
	+4.75mm ----	1	%			<1	<1	<1	<1	<1	18	3	2	1	<1	<1	<1	<1	<1	<1
	+9.5mm ----	1	%			<1	<1	<1	<1	<1	14	1	<1	<1	<1	<1	<1	<1	<1	<1
	+19.0mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	+37.5mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	+75.0mm ----	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Soil Class	Fines (<75 µm)	1	%			74	98	99	99	55	26	28	60	60	67	50	36	39	98	97
	Sand (>75 µm)	1	%			26	2	1	1	44	50	64	36	38	32	48	63	60	2	3
	Gravel (>2mm)	1	%			<1	<1	<1	<1	1	24	8	4	2	1	2	1	1	<1	<1
	Cobbles (>6cm)	1	%			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Metals	Antimony	1	mg /kg			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Arsenic	1		20	70	3.7	6.4	3.8	3.8	4.6	3.2	2.8	4.6	4.6	4.6	3.6	3.8	2.9	5.1	4.5
	Cadmium	0.1		1.5	10	0.2	0.1	<0.1	<0.1	0.3	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	0.1	<0.1	<0.1
	Chromium	1		80	370	30.1	42	37.1	38.9	36.2	25.8	9	32.2	39.6	24.6	15.9	16.4	15.6	41.9	30.4
	Copper	1		65	270	94.5	140	82	72.1	204	81.1	43.6	230	194	120	59.3	113	61.5	128	97.4
	Lead	1		50	220	251	310	242	274	561	128	122	366	443	200	130	175	180	316	304
	Nickel	1		21	52	5	8.2	5.4	5.7	7.1	2.2	2.2	6.9	8.7	3.9	3.2	2.8	3	6.5	5.2
	Silver	1				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Zinc	1		200	410	461	614	520	599	1720	255	190	800	923	411	316	407	335	690	628
Total Recoverable mercury		0.1		0.15	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Organotin Compounds	Monobutyltin	1	µgSn /kg								5	2	16	81	2	3	2	<1	2	3
	Dibutylin	1									11	4	94	421	6	6	6	3	5	10
	Tributyltin	0.5									43.6	10.1	453	892	11.1	6.4	12.2	5.2	17.8	17.3
	TBT @ 1%	0.5		9	70						20.2	6.3	90.2	167.7	4.2	4.3	6.4	2.7	5.5	5.6

MPR Contamination Sed Results ES2132764				ANZG 18		**Site**									
Compound	Analyte	LOR	Unit	DGV	GV Hi	**16** Surf	**16** Bot	**17** Surf	**17** Bot	**18** Surf	**18** Bot	**19** Surf	**19** Bot	**20** Surf	**20** Bot
Moisture content		1	%			29	32.5	51.3	52	54.7	44.2	35.4	32.9	63.6	57.4
Organic Matter	TOC	0.02	%			2.16	1.6	5.02	5.32	2.66	1.5	1.9	1.9	3.26	3.1
Total Petroleum Hydrocarbons Note ANZGVs are for sum C6 to C36	C6 - C9	3	mg/kg			<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
	C10 - C14	3	mg/kg			<3	<3	<6	<6	<6	<3	<3	<3	<6	<6
	C15 - C28	3	mg/kg			194	112	312	479	305	115	258	341	366	370
	C29 - C36	5	mg/kg			193	124	325	466	350	142	266	328	418	419
	C10 - C36 (sum)	3	mg/kg	280	550	387	236	637	945	655	257	524	669	784	789
Total Recoverable hydrocarbons	>C10 - C16	3	mg/kg			<6	<6	<12	<12	<12	<6	<6	<6	<12	<12
	>C16 - C34	3	mg/kg			317	193	512	771	526	205	425	556	631	638
	>C34 - C40	5	mg/kg			137	91	243	335	264	115	196	221	311	304
	C10 - C40 (sum)	3	mg/kg			454	284	755	1110	790	320	621	777	942	942
Sum >C10 - C16 - Naphthalene		3	mg/kg			<6	<6	<12	<12	<12	<6	<6	<6	<12	<12
TRH - NEPM 201	C6 - C10	3	mg/kg			<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
	C6 - C10 - BTEX	3	mg/kg			<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3	<3	<3	<3
BTEXN	Benzene	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Toluene	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Ethylbenzene	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	meta- & para-Xylene	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	ortho-Xylene	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Total Xylenes	0.5	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	Sum of BTEX	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
	Naphthalene	0.2	mg/kg			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

MPR Contamination Sed Results ES2132764				ANZG 18		Site									
Compound	Analyte	LOR	Unit	DGV	GV Hi	**16** Surf	**16** Bot	**17** Surf	**17** Bot	**18** Surf	**18** Bot	**19** Surf	**19** Bot	**20** Surf	**20** Bot
Moisture content		1	%			29	32.5	51.3	52	54.7	44.2	35.4	32.9	63.6	57.4
Organic Matter	TOC	0.02	%			2.16	1.6	5.02	5.32	2.66	1.5	1.9	1.9	3.26	3.1
OPPs (Ultra-trace)	Bromophos-ethyl	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Carbophenothion	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Chlorfenvinphos (E)	10	µg/kg			<10.0	<10.0	<12.0	<12.0	<12.0	<10.0	<10.0	<10.0	<12.0	<12.0
	Chlorfenvinphos (Z)	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Chlorpyrifos	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Chlorpyrifos-methyl	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Demeton-S-methyl	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Diazinon	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Dichlorvos	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Dimethoate	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Ethion	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Fenamiphos	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Fenthion	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Malathion	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Azinphos Methyl	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Monocrotophos	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Parathion	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Parathion-methyl	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Pirimphos-ethyl	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12
	Prothiofos	10	µg/kg			<10	<10	<12	<12	<12	<10	<10	<10	<12	<12

MPR Contamination Sed Results ES2132764				ANZG 18		Site									
Compound	Analyte	LOR	Unit	DGV	GV Hi	**16** Surf	**16** Bot	**17** Surf	**17** Bot	**18** Surf	**18** Bot	**19** Surf	**19** Bot	**20** Surf	**20** Bot
Moisture content		1	%			29	32.5	51.3	52	54.7	44.2	35.4	32.9	63.6	57.4
Organic Matter	TOC	0.02	%			2.16	1.6	5.02	5.32	2.66	1.5	1.9	1.9	3.26	3.1
EP131A: Organochlorine Pesticides	Aldrin 309-00-2	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	alpha-BHC 319-84-6	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	beta-BHC 319-85-7	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	delta-BHC 319-86-8	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	4.4`-DDD 72-54-8	0.5	µg/kg	3.50	9.00	<0.50	3.29	12	11.2	2.86	2.66	6.37	4.08	7.63	6.26
	4.4`-DDE 72-55-9	0.5	µg/kg	1.40	7.00	<0.50	1.56	9.34	9.29	3.51	1.52	3.84	2.62	4.87	5.13
	4.4`-DDT 50-29-3	0.5	µg/kg	1.20	5.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	^ Sum of DDD + DDE + DDT 72-54-8/72-55-9/5 0-2	0.5	µg/kg			<0.50	4.85	21.3	20.5	6.37	4.18	10.2	6.7	12.5	11.4
	Dieldrin 60-57-1	0.5	µg/kg	2.80	7.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	alpha-Endosulfan 959-98-8	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	beta-Endosulfan 33213-65-9	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Endosulfan sulfate 1031-07-8	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	^ Endosulfan (sum) 115-29-7	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Endrin 72-20-8	0.5	µg/kg	2.70	60.00	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Endrin aldehyde 7421-93-4	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Endrin ketone 53494-70-5	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Heptachlor 76-44-8	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Heptachlor epoxide 1024-57-3	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	Hexachlorobenzene (HCB) 118-74-1	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	gamma-BHC 58-89-9	0.25	µg/kg			<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	Methoxychlor 72-43-5	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
	cis-Chlordane 5103-71-9	0.25	µg/kg			<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	trans-Chlordane 5103-74-2	0.25	µg/kg			<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	^ Total Chlordane (sum) ----	0.25	µg/kg	0.45	9.00	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
	Oxychlordane 27304-13-8	0.5	µg/kg			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

MPR Contamination Sed Results ES2132764				ANZG 18		Site									
Compound	Analyte	LOR	Unit	DGV	GV Hi	**16** Surf	**16** Bot	**17** Surf	**17** Bot	**18** Surf	**18** Bot	**19** Surf	**19** Bot	**20** Surf	**20** Bot
Moisture content		1	%			29	32.5	51.3	52	54.7	44.2	35.4	32.9	63.6	57.4
Organic Matter	TOC	0.02	%			2.16	1.6	5.02	5.32	2.66	1.5	1.9	1.9	3.26	3.1
EP131B: Polychlorinated Biphenyls (as Aroclors)	^ Total Polychlorinated biphenyls ----	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1016 12674-11-2	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1221 11104-28-2	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1232 11141-16-5	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1242 53469-21-9	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1248 12672-29-6	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1254 11097-69-1	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2
	Aroclor 1260 11096-82-5	5	µg/kg			<15.6	<15.6	<31.2	<31.2	<31.2	<15.6	<15.6	<15.6	<31.2	<31.2

MPR Contamination Sed Results ES2132764				ANZG 18		Site									
						16	**17**	**18**	**19**	**20**	**16**	**17**	**18**	**19**	**20**
Compound	Analyte	LOR	Unit	DGV	GV Hi	Surf	Surf	Surf	Surf	Surf	Bot	Bot	Bot	Bot	Bot
Moisture content		1	%			29	51.3	54.7	35.4	63.6	32.5	52	44.2	32.9	57.4
Organic Matter	TOC	0.02	%			2.16	5.02	2.66	1.9	3.26	1.6	5.32	1.5	1.9	3.1
Polynuclear Aromatic Hydrocarbons	Naphthalene 91-20-3	5	µg/kg			98	185	103	113	118	69	380	80	183	144
	Naphthalene			160	2100	45	37	39	59	36	43	71	53	96	46
Results below Detection not normalised	2-Methylnaphthalene 91-57-6	5	µg/kg			50	96	51	48	59	30	294	34	74	82
	Acenaphthylene 208-96-8	4	µg/kg			386	920	632	569	656	378	1450	295	811	813
	Acenaphthylene			44	640	179	183	238	299	201	236	273	197	427	262
	Acenaphthene 83-32-9	4	µg/kg			95	217	53	76	55	34	654	30	93	76
DGVs from ANZECC 2000	Acenaphthene			16	500	44	43	20	40	17	21	123	20	49	25
	Fluorene 86-73-7	4	µg/kg			170	336	130	178	120	85	693	63	265	165
	Fluorene			19	540	79	67	49	94	37	53	130	42	139	53
	Phenanthrene 85-01-8	4	µg/kg			1000	2720	1260	1680	1220	838	6030	597	2640	1670
	Phenanthrene @ 1% TOC	4	µg/kg	240	1500	463	542	474	884	374	524	1133	398	1389	539
	Anthracene 120-12-7	4	µg/kg			440	1010	528	564	553	346	1810	253	866	726
	Anthracene			85	1100	204	201	198	297	170	216	340	169	456	234
	Fluoranthene 206-44-0	4	µg/kg			1550	4660	2760	2950	2840	1760	9480	1330	4400	3730
	Fluoranthene @ 1% TOC	4	µg/kg	600	5100	718	928	1038	1553	871	1100	1782	887	2316	1203
	Pyrene 129-00-0	4	µg/kg			3300	4800	2850	2960	2980	1800	9630	1380	4410	3920
	Pyrene @ 1% TOC	4	µg/kg	665	2600	1528	956	1071	1558	914	1125	1810	920	2321	1265
	Benz(a)anthracene 56-55-3	4	µg/kg			1960	2740	1550	1620	1650	1060	5470	754	2480	2230
	Benz(a)anthracene @1% TOC	4	µg/kg	261	1600	907	546	583	853	506	663	1028	503	1305	719
	Chrysene 218-01-9	4	µg/kg			1890	2530	1550	1530	1580	983	5400	700	2110	2030
	Chrysene 218-01-9 1% TOC	4	µg/kg	384	2800	875	504	583	805	485	614	1015	467	1111	655
	Benzo(b+j)fluoranthene	4	µg/kg			2100	3870	2460	2300	2440	1450	7400	1090	3150	3200
	Benzo(k)fluoranthene	4	µg/kg			859	1730	990	900	1240	834	3330	521	1450	1620
	Benzo(e)pyrene 192-97-2	4	µg/kg			1290	2500	1480	1350	1570	933	4640	691	1910	1970
	Benzo(a)pyrene 50-32-8	4	µg/kg			2160	4100	2470	2330	2590	1660	7730	1160	3470	3400
	Benzo(a)pyrene 50-32-8	4	µg/kg	430	1600	1000	817	929	1226	794	1038	1453	773	1826	1097
	Perylene 198-55-0	4	µg/kg			575	1100	612	601	617	395	2110	278	868	804
	Benzo(g.h.i)perylene	4	µg/kg			1510	2990	1830	1690	1980	1170	5480	853	2500	2540
	Dibenz(a.h)anthracene	4	µg/kg			324	649	382	348	411	251	1230	178	510	541
	Dibenz(a.h)anthracene @ 1% TOC			63	260	150	129	144	183	126	157	231	119	268	175
	Indeno(1.2.3.cd)pyrene	4	µg/kg			1180	2310	1440	1330	1540	926	4260	672	1960	1990
	Coronene 191-07-1	4	µg/kg			484	1080	636	626	741	422	1990	321	922	962
	^ Sum of PAHs	4	µg/kg			21400	40500	23800	23800	25000	15400	79500	11300	35100	32600
	^ Sum of PAHs @ 1% TOC	4	µg/kg	10000	####	9907	8068	8947	12526	7669	9625	14944	7533	18474	10516
	^ Sum of PAHs @ 1% TOC		mg/kg	10	50	9.9	8.1	8.9	12.5	7.7	9.6	14.9	7.5	18.5	10.5

MARINE POLLUTION RESEARCH PTY LTD

Marine, Estuarine and Freshwater Ecology, Sediment and Water Quality Dynamics

A.B.N. 64 003 796 576

25 RICHARD ROAD SCOTLAND ISLAND NSW 2105

PO BOX 279 CHURCH POINT NSW 2105

TELEPHONE (02) 9997 6541 E-MAILpanink@bigpond.com

DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

SUITE 17, 808 FOREST ROAD, PEAKHURST 2210   ABN 73 107 291 494
P. 02 9046 3800   ACOUSTICS@DAYDESIGN.COM.AU   WWW.DAYDESIGN.COM.AU

Acoustic Report

Stannards Marine – 6 John Street, McMahons Point

Land and Environment Court
Stannards Marine Pty Ltd v North Sydney Council
63136 of 2021

REPORT NUMBER
7281-1.1R Rev A

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Prepared For:
Stannards Marine Pty Ltd
PO Box 1644
North Sydney NSW 2059

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Final	05/10/2021	Stephen Gauld	Adam Shearer	For s34
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TABLES

1.0 EXECUTIVE SUMMARY

1. Day Design Pty Ltd has been engaged by Stannards Marine Pty Ltd to provide an acoustic report to assist in resolving the acoustic contentions in an appeal to the NSW Land and Environmental Court – Stannards Marine Pty Ltd v North Sydney Council, 63136 of 2021.

2. I, Stephen Gauld, am the Managing Director and Principal Acoustical Engineer at Day Design Pty Ltd, Consulting Acoustical Engineers, of Suite 17, 808 Forest Road, Peakhurst, NSW, 2210.

3. A review of the relevant material for these matters has been carried out and I have read the documents provided to me, as listed in Paragraph 19**.**

4. This report presents my findings on my site inspection, acoustic analysis and recommendations to address the Contentions and limit the noise emission from the items of plant and operations at 6 John Street, McMahons Point.

5. The property at 6 John Street, McMahons Point is located on the eastern shore of Berrys Bay and is surrounded by a mix of land uses including, a range of residential development, open space, rail infrastructure, environmental conservation areas and working waterfront.

6. A site visit was carried out by the author on Thursday 26 August 2021 to inspect the site and surrounds. Observations were made of the surrounding residential dwellings during the site visit.

7. The noise emission from the existing site has been assessed by SLR Consulting as detailed in their Noise Impact Assessment dated 23 April 2021. That report and a Noise Management Plan also dated 23 April 2021 detail the noise mitigation proposed to reduce the existing level of noise from the site.

8. An Environment Protection License (10893 dated 14 July 2021) incorporates the noise mitigation required to be installed progressively and prior to Jun 2022.

9. The issues raised in Contention 8, from the Amended Statement of Facts and Contentions filed 13 May 2021 and the Agreed Action List from Council dated 1 November 2021, regarding acoustics have been addressed in this report.

10. Recommendations are provided in Section 11.0 to ensure that the noise emission from the Floating Dry Dock (FDD) complies with the noise criteria as required by Council.

11. The noise emission from the existing site has been assessed by SLR Consulting and noise control recommendations have been incorporated into the EPA licence to achieve a reduction in noise emission over time.

12. Once the recommended noise controls to the FDD and the existing site are implemented, the noise emission from the FDD will comply with Council's noise criteria and the noise emission from the whole site will comply with the noise criteria as assessed in accordance with the EPA's Noise Policy for Industry.

2.0 FURTHER ISSUES RAISED BY RESPONDENT

13. Further issues were raised by North Sydney in an effort to resolve the Contentions in the matter Stannards Marine Pty Ltd v North Sydney Council LEC 63136/2021.

14. A without prejudice document was circulated on 1 November 2021 that summarised the issues.

15. The acoustic issues arising are listed in the Table below.

16. The Sections in this report where those issues have been addressed are also listed in the Table below.

Table 1 Further Acoustic Issues

Item	Issue Description	Section
2.1.1	Model 4 m^2 opening in acoustic curtain	10.5
2.1.2	Model two concurrent sandblasting operations in the FDD	10.5
2.1.3	Confirm whether any other activities are proposed concurrently with sandblasting	10.5
2.1.4	Provide further information on use of Tug and pumps.	10.5
2.1.5	Noise Criteria to be applied to the FDD	9.0

3.0 INTRODUCTION

17. The Contentions relating to acoustics in the NSW Land and Environmental Court proceedings that I have considered are:

- Stannards Marine Pty Ltd v North Sydney Council, 00063136 of 2021
    - Contention 8 – Acoustic Impacts.

18. In this report, I present my findings on the site inspection, acoustic measurements and recommendations made to address the Contention and limit the noise emission from the boat repair and maintenance facility to acceptable limits.

19. I have read the documents provided to me, as listed below:

- **Noise and Vibration Assessment,** prepared by Jacobs dated 19 July 2019;
- **Noise Impact Assessment (SLR, U1),** prepared by SLR Consulting EPL 10893 – Condition U1, for Hamptons Property Services, at 6 John Street, McMahons Point, dated 23 April 2021;
- **Noise Impact Assessment (SLR, U2),** prepared by SLR Consulting, EPL 10893 – Condition U2, for Hamptons Property Services, at 6 John Street, McMahons Point, dated 23 April 2021;
- **Statement of Facts and Contentions**, Stannards Marine Pty Ltd v North Sydney Council, 00063136 of 2021, filed 13 May 2021;
- **EPL, 10893**, for Noakes Boatyard at 6 John Street, McMahons Point NSW 2060, on 14 February 2021, licence version date 14 July 2021;
- **Letter (SLR, Aug 2021)** to Hamptons Property Group from SLR Consulting dated 31 August 2020;
- Letter from Jacobs, **Responses to EPA Submissions: AQIA and NVA**, dated 18 July 2019;
- **AtCouncil Assessment Report**, Panel Reference 2019SNH021, dated 7 August 2020;
- **Noise Policy for Industry**, EPA, October 2017;
- **Expert Witness Code of Conduct**.

20. I have not relied on the Jacobs noise and vibration assessment or any work carried out by Jacobs.

21. I have relied on the SLR Consulting Noise Impact Assessment of the existing Shipyard, their measurement of the background noise levels and determination of noise criteria. I have relied on the noise modelling carried out by SLR, and agree with SLR's recommended noise mitigation measures of the existing Shipyard.

4.0 ABOUT THE AUTHOR

22. I, Stephen Gauld, am the Managing Director and Principal Acoustical Engineer at Day Design Pty Ltd, Consulting Acoustical Engineers, of Suite 17, 808 Forest Road, Peakhurst, NSW, 2210.

23. I have practiced as a Consulting Acoustical Engineer since December 1997. I was awarded my Bachelor of Engineering (Mechanical) in 1997 and my Masters of Engineering Science (Noise and Vibration) in 2007. My curriculum vitae is attached in Appendix B.

24. I have read Division 2, Part 31 of the Uniform Civil Procedure Rules 2005 and the Expert Witness Code of Conduct in Schedule 7. This report is prepared in accordance with these documents and I agree to be bound by their terms.

25. My evidence in this statement is within my area of expertise, except where I state that I have relied upon the evidence of another person.

5.0 PROJECT DESCRIPTION

26. The facts in Part A of the Statement of Facts and Contentions are accepted.

27. A boat repair and maintenance facility exists at 6 John Street, McMahons Point, known as Noakes Shipyard.

28. The Site is located to the south and south-west side of John Street. It comprises land infrastructure, occupied by car parking areas, hardstand areas, four enclosed buildings for boat repairs and maintenance, a two storey office building, and other marine infrastructure. It also comprises of water-based components, such as, various wharves, jetties, and ships that project into Berrys Bay.

29. The existing Shipyard is subject to EPA Licence 10893, most recently varied on 14 July 2021.

30. The surrounding locality comprises a mix of land uses including a range of residential development, open space, rail infrastructure, environment conservation areas, and working waterfront.

31. John Street, to the north-east of the Site, is characterised by low density housing. Munro Street, to the south of the Site, is characterised by high density residential housing in landscape settings.

32. The nearest noise sensitive receptors to the site, in various directions, are shown on Figure 1 and as follows in Table 2.

Table 2 Noise Sensitive Residential Premises

Receptor Location	Address	Direction from site
R1	11-13 John St	North
R2	41 Dumbarton St	East
R3	16-18 Munro St	South

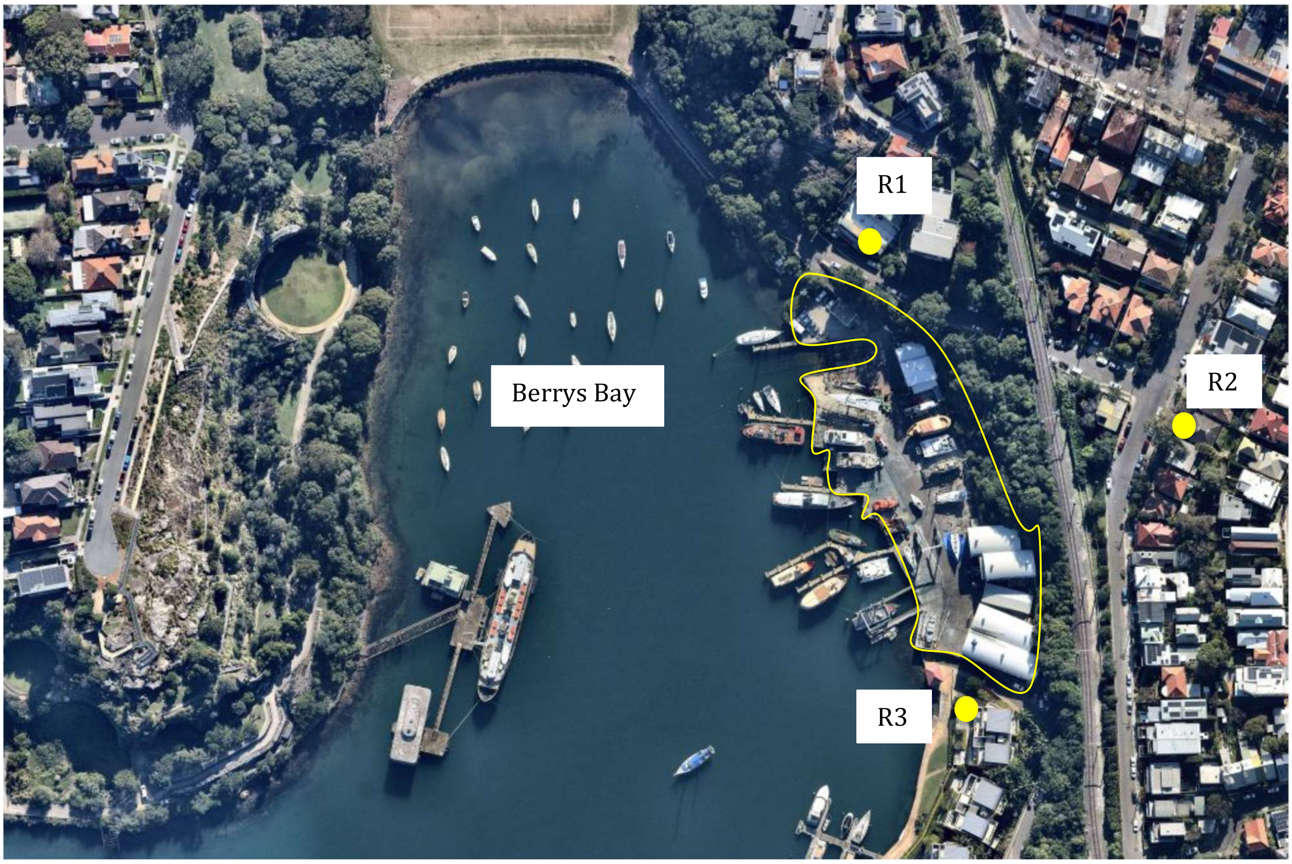

Figure 1 - Site Plan – 6 John Street, McMahons Point

6.0 CONTENTIONS

33. The contentions relevant to acoustics are extracted from the Land and Environment Court of NSW, Case No. 2021/00063136 Statement of Facts and Contentions filed 13 May 2021 below.

34. **Contention 8 – Acoustic Impacts**

*The Noise and Vibration Assessment prepared by Jacobs dated 31 January 2019 (**Noise Report**) is inadequate and does not demonstrate that the FDD will not have adverse acoustic impacts on the surrounding receivers.*

Particulars

(a) Council is in receipt of noise complaints concerning operations carried out at the boatyard. The Noise Report does not assess the cumulative impacts of the FDD with the use of the existing boat building and repair facility at 6 John Street, McMahon Point at which a number of activities occur including sandblasting, spray painting, steel grinding and use of the travel lift.

(b) The Noise Report does not provide any calculations or identification of all noise sources occurring on the site to permit a review of the predicted levels relied on in the conclusions that the FDD and the cumulative noise emitted from the site will not result in unacceptable noise impacts.

(c) The Noise Report does not provide sufficient data to confirm that all the noise sources associated with the construction and operation of the FDD have been considered and assessed.

(d) On the basis of the information provided in the Noise Report it appears that all potential noise sources associated with the use of the FDD have not been considered or assessed such as sand blasting impacting with the metal hull, grinding operations and other maintenance works likely to be carried out on the FDD, compressors and pumps associated with the raising and lowering of the FDD and the proposed air infiltration system. The Noise Report also fails to consider the noise impacts of the tug that is stated in the EIS may be required to position the vessels into the FDD.

(e) The Noise Report provides insufficient detail with regards to the modelling and assessment of the noise attenuation of the acoustic curtains to enable a proper assessment as to the maximum overall attenuation achieved by the acoustic curtains.

(f) The Noise Report does not provide information as to what sound power levels from Table 5-3 were applied and the relevance of a UK document to Australian operations, or how a Standard related to Construction, Demolition or Maintenance sites is relevant to the operation of the subject application.

(g) The Noise Report does not provide information as to the derivation of the various sound power levels shown in Table 5-2 that is identified as "Construction noise assessment scenarios".

(h) The Noise Report does not provide identification of the noise sources or noise emission levels associated with noise source that relate to operation of the FDD, the operation of the land-based component of the site or the cumulative noise emission levels for the entire operations at the subject site.

(i) The Noise Report fails to identify any assessment of the modifying factor corrections that have been applied as required Fact Sheet C of the EPA's Noise Policy for Industry.

(j) Diagrams showing the source locations and proposed barrier/curtains have not been provided, nor identification of noise emission levels when the proposed barrier/curtains are noise shielding noisy activities in or on the FDD

(k) The modelling the basis of the Noise Report has been carried out on the basis of wind conditions at Sydney Olympic Park (over flat ground) that are not reflective of those that occur at the Site.

(l) The Acoustic Report provided noise contours in Figure 5-2 to 5-6 inclusive as ground level contours and fails to consider the predicted noise levels at the higher ground level to confirm whether the impact to the residential receivers overlooking the FDD will be affected.

(m) The noise contours in Figure 5-2 to 5-6 are two small to identify the noise levels at nearby residential receivers and do not permit an examination of the predicted exceedances set out in Appendix C.

(n) The noise contours in Figures 5-2 to 5-6 inclusive if related to Table 5-3 do not appear to include noise sources occurring on the site that are not associated with the FDD.

(o) Scenario 5 in Table 5-3 refers to typical works on the FDD and existing operations, yet the Noise Report does not identify what constitutes existing operations, nor identifies what constitutes "typical works on the FDD". The Noise report does not identify what are non-typical works or worst-case scenario.

(p) Noise controls identified in section 5.3.1 of the Noise Report require sandblasting be limited to 3 metres below the top of the barrier. The Noise Report does not identify the relationship of this limitation with respect to vessel in the FDD, or how work within 3 metres of the top of the barrier that requires sand blasting is to be undertaken and the resultant noise from that work. Similarly, the Noise Report does not identify the noise emission levels from other work that would occur above a position of 3 m below the top of the barriers.

(q) The recommendation for the use of plastic sheet-style enclosure as temporary screens to "capture emission to air" and where that control occurs in the various scenarios is unknown.

(r) Sufficient data was unable to be collected at NM2 due to a battery malfunction. Under EPA requirements the data that was excluded is required to be re-tested for the same day. Data previously collected purportedly at that location has been provided and the relevance of that data has not been substantiated.

(s) The background levels stipulated in Table 3-2 for NM1 and the graphs in Appendix B indicate that some form of mechanical plant has affected the monitoring data in that location. There is the potential that with incorrect background levels the noise target derived from NM is incorrect and therefore the breach at house 354 would be expected to be higher.

(t) The Proposed Development is not in the public interest as it has not adequately demonstrated that the potential air acoustic impacts can be suitably mitigated.

(u) The development is inconsistent with the aims in clause 2(2) of the SREPP,

(v) The Development Application has not adequately demonstrated that the proposed private development protects the harbour and prioritises the public good over the private interests of the developer.

(w) The cumulative adverse impacts described in B1 of the contentions, on balance, outweigh any public or private benefits associated with the development.

(x) The Proposed Development is unacceptable when the cumulative impacts are considered against the aims in clause 2(2) of the SREP which require the public good to take precedence over the private good whenever and whatever change is proposed for Sydney Harbour.

(y) The Development Application is unsatisfactory when assessed pursuant to Section 4.15 (e) of the Act.

Controls

- *SREP - Clause 2(2)*
- *Noise Policy for Industry (2017).*

7.0 STATE GUIDELINE

7.1 NSW Noise Policy for Industry

35. The Environment Protection Authority's (EPA) Noise Policy for Industry (NPI) sets out the requirements for the assessment and management of noise from industrial noise sources that are listed in Schedule 1 of the Protection of the Environment Operations Act 1997 (POEO, 1997).

36. The objective of the policy is to establish noise criteria that will protect the community from excessive intrusive noise and to preserve amenity for particular land uses.

37. Noakes Group Pty Ltd is the holder of the Environment Protection Licence (EPL) No 10893 issued under the Protection of the Environment Operations Act 1997 and authorises the carrying out of activities at 6 John Street, McMahons Point NSW.

38. A copy of EPL 10893 is attached as Appendix A.

7.1.1 Intrusiveness Criteria

39. The EPA states in Section 2.3 of its NSW NPI that the intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source measured over a 15-minute period ($L_{Aeq,15\ minute}$) does not exceed the rating background noise level by more than 5 dB when beyond a minimum threshold.

7.1.2 Amenity Criteria

40. The NSW NPI provides a schedule of recommended L_{Aeq} industrial noise levels for different amenity areas that, under normal circumstances, should not be exceeded. The recommended L_{Aeq} noise levels applicable to the Floating Dry Dock at 6 John Street, McMahons Point are taken from Section 2.4, Table 2.2 of the NPI, shown below in Table 3.

Table 3 Amenity Criteria

Receiver	Noise Amenity Area	Time of Day	Recommended L_{Aeq}, dBA Amenity Noise Level
Residential	Suburban	Day	55
		Evening	45
		Night	40

41. Due to the different averaging periods between the project intrusiveness and project amenity noise levels (L_{Aeq} - 15 minute and L_{Aeq} – day, evening or night) the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. As such, the NPI assumes that the $L_{Aeq,15min}$ will be taken to be equal to the $L_{Aeq,\ period}$ + 3 (dB), in order to standardise these different time periods.

42. To ensure the noise levels (existing plus new) remain within the recommended amenity noise levels for an area, a project amenity noise level applies for each new source of noise in the area. The project amenity noise level is defined as the recommended amenity noise level (Table 3) minus 5 dBA.

7.1.3 Existing Sites

43. In the NPI, Section 6.1 "*Applying the policy to existing sites*" it states "*Where an existing industry has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations, as relevant.*"

8.0 BACKGROUND NOISE LEVEL

44. Background noise levels are required to be determined in order to gauge compliance with and define the intrusiveness noise criteria.

45. The procedure for determining the Rating Background Level is given in Fact Sheet A of the Noise Policy for Industry, published by the EPA in October 2017. That procedure has been used in this assessment.

46. Measurements were conducted by SLR Consulting over a twelve-day period between 15 and 26 February 2021. The noise loggers were calibrated before and after the measurements without significant calibration drift.

47. The locations of the noise loggers are identified in Figure 1 as NML1, NML2, NML3 and NML4.

48. The logger data is graphically shown in Appendices C1-C4 and summarised in Table 4.

Table 4 Rating Background Levels – Day Design

Noise Measurement Location	Time Period	RBL	$L_{eq,15min}$
NML1 - John Street	Day (7 am to 6 pm)	39 dBA	52 dBA
NML2 - Dumbarton Street	Day (7 am to 6 pm)	38 dBA	60 dBA
NML3 - Munro Street	Day (7 am to 6 pm)	41 dBA	61 dBA
NML4 - Onsite	Day (7 am to 6 pm)	39 dBA	65 dBA

49. In report SLR U1, the author states "*a review of noise monitoring data indicates that noise emissions from the Site do not typically influence background noise levels in the vicinity of NML1 on John Street, NML2 on Dumbarton Street or NML3 on Munro Street. ABLs remained reasonably consistent throughout the noise monitoring period at these locations, even on Sundays when the Site is not operational. As such Site operations are considered to have a negligible influence on the measured RBLs at NML1, NML2 and NML3 and the RBL result would be representative of noise in the area in the absence of Site operations. The results from background noise monitoring show the surrounding area would be considered Suburban residential area in accordance with the NPI*".[1]

50. I agree with the assessment and calculation of the RBL carried out by SLR Consulting.

[1] SLR U1 Report, Section 4.2.2

9.0 NOISE CRITERIA

9.1 Existing DA Consent 1164/90

51. The existing site operates under Development Consent No 1164/90 as amended from North Sydney Council.

52. The relevant noise related condition is:

D34 (i) The Applicant shall undertake noise abatement measures for the workshops and worksheds so as to minimise undue disturbance to the surrounding area. Save for the activities provided for in and conducted in accordance with Condition D34B, the operation of the development shall not generate noise levels measured at the boundary of any neighbouring residential developments which exceed:

- at John Street L10 = 57dBa
- at Dumbarton Street L10 = 45dBA
- at Munro Street L10 - 49dBA

9.2 Noise Policy for Industry

53. The boat repair and maintenance facility at John Street has been in operation for more than 10 years at its present location, being granted development consent in December 1990, then modified in June 1992 and September 1992.

54. The EPA's Noise Policy for Industry is the most appropriate policy to determine the noise criteria from the proposal.

55. The SLR Consulting report (SLR, U1, Section 6.5.1)) found that the existing level of noise from the site exceeds the project amenity noise level of 53 dBA.

56. In the NPI, Section 6.1 "*Applying the policy to existing sites*" it states "*Where an existing industry has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations, as relevant.*

57. Therefore, the project amenity noise level of 53 dBA may be used to establish noise criteria for the site.

58. The acoustical environment surrounding the Site is considered as a suburban environment.

59. The resulting Project Noise Trigger Level (PNTL) or Noise Criteria derived from ambient background noise monitoring to the nearest noise sensitive receivers from the Site are contained within Table 5.

Table 5 Noise Criteria

Noise Measurement Location	Project Intrusiveness[2] $L_{Aeq,15\,min}$	Project Amenity[3] $L_{Aeq,\,period}$	Project Amenity[4] $L_{Aeq,15\,min}$	Resulting PNTL[5] $L_{Aeq,15\,min}$
NCA1 – John Street	44 dBA	50 dBA	53 dBA	53 dBA[6]
NCA2 – Dumbarton Street	43 dBA	50 dBA	53 dBA	53 dBA[6]
NCA3, Munro Street	46 dBA	50 dBA	53 dBA	53 dBA[6]

9.3 Noise Policy for Industry – Section 6

60. Section 6 of the Noise Policy for Industry is titled "Applying the policy to existing industrial premises" and allows for several governing principles when applying the policy to existing industry.

61. The following governing principles are provided in Section 6.1:

- The project noise trigger levels should not be applied as mandatory noise limits. The project noise trigger level is the level used to assess noise impact and drive the process of assessing all feasible and reasonable control measures.
- Where an existing industry has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level to assess existing, and existing plus proposed site operations, as relevant.
- Where a development proposal involves a discrete process, and premises-wide mitigation has or is to be considered outside of the development proposal, a project noise trigger level for noise from new/modified components (not the whole site) of the operation may be set at 10 dB(A) or more below existing site noise levels or requirements. This approach means that the increase in noise from the whole site is

62. In this case, the second dot point certainly applies to the existing facility.

63. The SLR U1 report addresses the noise emission from the existing site and determines a noise criterion of 53 dBA, which I agree with.

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[2] Project Intrusiveness is the RBL plus 5 dBA.
[3] Project Amenity (period) noise is the Amenity Criteria (Table 3) minus 5 dBA.
[4] Project Amenity (15 minute) is the Project Amenity (period) noise level plus 3 dBA.
[5] Resulting PNTL is usually the lower of the Project Intrusiveness and the Project Amenity (15 minute) noise levels.
[6] Where an existing industry has been in operation for more than 10 years and existing site operations exceed the project amenity noise level, the project amenity noise level may be adopted as the project noise trigger level. (NPL, section 6.1)

64. This noise criteria could be applied to the noise emission from the FDD also as, once approved would become part of the site.

65. The third dot point in Paragraph 61 is likely more relevant as the FDD is a discrete operation and premises-wide mitigation is considered outside of the development proposal.

66. In this case, a project noise trigger level for noise emission from the FDD (not the whole site) would be 10 dBA below the existing site noise levels.

67. Table 15 of the SLR U1 report presents the calculated operational noise levels for three scenarios. The calculated noise levels range from 47 to 65 dBA for various scenarios at the three residential assessment locations.

68. According to the NPfI the noise criteria for the FDD should be 10 dB less than the higher noise levels from the existing site to not increase the total noise emission.

69. In this case, the noise criteria would be:
    - 65 – 10 dB = 55 dBA at John Street;
    - 57 - 10 dB = 47 dBA at Dumberton Street; and
    - 60 – 10 dB = 50 dBA at Munro Street.

70. By comparing the noise criteria in Table 5 and Paragraph 69 and applying the more conservative noise criteria at each location, we find the following noise criteria based on the EPA NPfI:
    - 53 dBA at John Street;
    - 47 dBA at Dumberton Street; and
    - 50 dBA at Munro Street.

9.4 FDD Noise Criteria

71. Considering the noise criteria for the existing site in DA 1164/90, and the requirements of the NPfI, the noise criteria determined for the FDD is as follows:
    - 44 dBA at John Street;
    - 43 dBA at Dumberton Street; and
    - 46 dBA at Munro Street.

72. If Council assert that the noise criteria for the FDD should be incorporated into the noise criteria for the whole site, the noise criteria should be based on the EPA NPfI as described in Paragraph 70.

10.0 NOISE EMISSION

73. The Noakes boat repair and maintenance facility is an existing facility located at 6 John Street, McMahons Point that consists of both land and water-based components.

74. The landward side of the site is occupied by car parking areas, hardstand areas, four enclosed buildings nominated as Sheds 1 to 4, a two-storey office building and other marine infrastructure.

75. The waterway component of the site includes a number of wharves, jetties and ships that project into Berrys Bay.

10.1 Existing Boatyard

76. The existing shipyard, generally receives vessels via the water and are lifted onto the land using one of two Travelifts to transport the vessel to one of the four sheds where work is carried out on the vessels.

77. Work on the vessel hull generally includes water blasting, grinding and painting. In some cases, sand blasting, being the loudest activity, is conducted inside Shed 4.

78. Shed 4 is the southern-most Shed on the site and closest to the residential premises in Munro Street. It has been acoustically treated with heavy walls and a 25 mm thick sound absorptive lining to the inside of the shed. Glazing is provided at high level to allow light into the shed. Shed 4 has a heavy sliding panel door that is closed while noisy works are conducted inside.

79. Shed 3 is located next to Shed 4 and has not been acoustically treated or lined with sound absorption. It also has a heavy sliding panel door that is closed while noisy works are conducted inside.

80. Shed 2 is primarily used to fabricate smaller timber, steel or aluminium parts and as such is fitted out with a table saw, floor mounted grinders and linishers and also contains storage for smaller parts. Shed 2 has a large folding door that is closed while noisy works are conducted inside.

81. Shed 1 is a general Shed that contains smaller items for storage. It contains a workshop and general tools. Shed 1 has a large folding door that is closed while noisy works are conducted inside.

82. Ventilation of Sheds 3 and 4 is carried out by a large exhaust fan that is ducted from the rear, through a flexible duct and exits in the centre of the site.

83. The site is served by two Travelifts, (60T and 80T) that are diesel powered and used to move vessels from the water to land for work to be carried out, then back to water at the completion of the work.

84. SLR Consulting carried out a Noise Impact Assessment (SLR, U1) that determined the noise criteria for the site, established sound power levels and suggested possible mitigation measures to be installed to the existing Shipyard.

85. A further report, Noise Management Plan (SLR, U2) was prepared in April 2021 that included a Statement of Noise Management Commitments that Noakes Group would carry out over a period of time up to and including June 2022

86. The existing Shipyard is subject to EPA Licence 10893 (EPL 10893) and most recently varied on 14 July 2021 (see Appendix A) to include those Noise Management Commitments put forward by Noakes.

87. EPL 10893 requires Noakes Group to implement noise mitigation measures and undertake a post-commissioning Noise Impact Assessment to assess the effectiveness of the implemented controls. A table of the Mitigation measures required to be installed follows that put forward by SLR in their Noise Management Plan.

88. The purpose of the noise mitigation measures is to reduce the existing level of noise during peak times from the existing levels of 55-65 dBA to the Project Noise Trigger Level of 53 dBA when measured at the most affected residential premises.

89. I have reviewed the reports prepared by SLR Consulting and consider that the proposed noise mitigation measures are reasonable and feasible and once implemented, will reduce the noise emission from the site.

90. I understand that the first of the proposed noise controls, being the upgrade of the Travelift engine casing, was installed late in September 2021. At the time of preparing this report, I had not measured the noise reduction achieved by this item of noise control.

91. With the implementation of post-commissioning acoustic testing as required by the EPA, in Condition U1.2 of EPL 10893, the noise emission from the site will be demonstrated to be reduced to the required Project Noise Trigger Level of 53 dBA.

92. In this report, I rely on the work carried out by SLR Consulting for the existing site. The noise emission from the proposed FDD will be considered in addition to the existing noise emission from the site, to ensure that the overall noise emission will not exceed the noise criteria at the completion of the noise mitigation measures to the existing site.

10.2 Floating Dry Dock

93. It is proposed to demolish a number of the wharves and jetties on the site and locate the proposed FDD within the waterway component of the site.

94. The FDD is constructed from steel and is 18.81 m wide x 59.24 m long with a wall height of 8.5 m and 11.5 m high to the top of the small operating bridge.

95. The structure is generally open at the front and rear. The FDD is shown in Appendices D and E.

96. For the ship to enter the FDD, the FDD is lowered into the water by pumping water into the hull and sides of the FDD and the ship is moved into the FDD. The FDD is then raised up by pumping the water out to create buoyancy.

97. A filter system will be installed in the wall of the FDD to filter air and dust emissions. The noise from the filter system will be controlled by acoustic silencers and the walls of the filter system plantroom.

98. When the proposed boat repair or maintenance work requires sand blasting (SWL in Table 8) within the FDD, acoustic curtains will be drawn to enclose each end and cover over the top.

99. When the proposed boat repair or maintenance work requires any other noisy work (SWL in Table 7), with SWL other than sand blasting within the FDD, acoustic curtains will only be drawn to enclose each end. The top may be required to be covered with a lightweight, non-acoustic cover for air quality purposes.

100. When the proposed boat repair or maintenance work requires any work that is not noisy, (ie not in Table 7 or Table 8), acoustic curtains need not be drawn at all. If encapsulation is required for air quality purposes either the acoustic curtain or a lightweight, non-acoustic cover may be used.

101. Work on the vessel hull will generally include water blasting, grinding and painting. In some cases, where necessary, sand blasting, being the loudest activity, is proposed to be conducted on the FDD.

102. In addition to the acoustic treatment proposed to the on-board filter system, acoustic curtains are proposed to each end of the FDD with sound absorption to the internal walls of the FDD.

10.3 Sound Power Levels

103. I carried out a site visit on 26 August 2021 to measure the noise levels and calculate the sound power levels from the various operations being carried out on the site.

104. Instrumentation used for the measurements is found in Table 6.

Table 6 Noise Survey Instrumentation

Description	Model No	Serial No
Modular Precision Sound Analyser	B&K 2250B	2690243
Condenser Microphone 0.5" diameter	B&K 4189	2754884
Acoustical Calibrator	B&K 4231	2721949

105. The B&K 2250 Sound Analyser is a real-time precision integrating sound level meter with octave and third octave filters, that sample noise at a rate of 10 samples per second and provides L_{eq}, L_{10} and L_{90} noise levels using both Fast and Slow response and L_{peak} noise

levels on Impulse response time settings. The meter is frequency weighted to provide dBA, dBC or Linear sound pressure level readings as required.

106. The instrument system was laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 1 dB during attended measurements. No adjustments for instrument drift during the measurement period were warranted.

107. The sound power level of operations proposed to be conducted inside the FDD are presented in Table 7.

Table 7 Measured Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Hammering + multitool	**102**	97	95	96	96	96	95	94	91
Waterblaster	**101**	81	92	89	91	92	93	95	97
Grinding	**93**	80	76	73	81	81	87	86	88
TUG boat exhaust	**103**	117	111	106	102	94	90	83	74

108. The measured sound power levels are lower than provided in the SLR U1 report, therefore I will use the measured SLR levels as a worse case scenario.

109. The A-weighted sound power levels for sandblasting in Table 8 is equal to the sound power levels in Table 11 of the SLR U1 report.

Table 8 Modelled Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Sandblasting	**124**	93	99	102	107	109	114	119	120

10.4 FDD Filter System Design

110. The FDD filter system is designed by Fowlerex Technologies. The system consists of a 22 kW exhaust fan that draws 'dirty' air from the inside the FDD, through a dust collector and carbon filter and exhausts the 'clean' air above the roof of the FDD.

111. It is proposed to install two identical systems within the Starboard wall of the FDD (see Appendix E).

112. The sound power level for the exhaust fans proposed to be installed on the FDD (Table 9).

Table 9 Manufacturers Sound Power Levels

Description	dBA	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Fowlerex Filter System (FDD Fan) 1 and 2 of 2	**106**	107	107	108	102	101	96	91	86
FDD Water Pumps (x2)	**80**								

113. The exhaust fans force air through a carbon filter and dust collector, each of which will have a certain (unknown) level of acoustic insertion loss. The supplier estimates this loss would be in the range of 8 to 44 dB across the octave band frequency range.

114. As the loss is unknown, as a conservative assumption, I have allowed for 5 dB insertion loss at each octave band centre frequency for the carbon filter and dust collector.

115. I have allowed for three, in-series acoustic silencers (Model Fantech C2P-056QS) on each intake vent within the FDD ventilation system enclosure.

116. I have allowed for three in-series acoustic silencers (Model Fantech C2P-056QS) on each exhaust vent within the FDD ventilation system enclosure.

117. Prior to installation, acoustic testing should be carried out to reduce the number and/or specification of acoustic silencers in response to the acoustic insertion loss provided by the carbon filter and dust collector.

118. Once commissioning is completed, it is likely that no more than two silencers will be required on each side of each fan.

119. It is assumed that as the carbon filter and dust collector get ‘dirty’ the insertion loss will improve due to the pressure increasing, therefore the worst case will be when these items are new and clean.

120. The ventilation system will be enclosed in heavy steel and sound absorptive lining is recommended on the walls inside the ventilation system plantroom.

121. My calculations in Appendix G1 show that the FDD ventilation system will generate a noise level of 31 dBA at the most affected residential premises, at 72 m from the end wall of the FDD.

122. Other residences, being further away, will receive a lower noise level from the FDD ventilation system.

10.5 FDD Operation

123. The operations proposed to be carried out in the FDD are no different to the operations currently carried out on land, typically in Sheds 3 and 4.

124. On the rare occasion that a 'dead' boat is required to be moved into the FDD, the Tug will be used to pull the 'dead' boat. A 'dead' boat is one that does not have an operational motor and cannot move itself.

125. As use of the Tug is rare already a part of the existing operation and when it is used, it is only operated for short periods of time per day, the noise emission from use will not be considered further in this assessment.

126. Operations proposed to be conducted in the FDD consist of water blasting, sanding, hammering, scraping, and at times, sand-blasting, being the loudest of all the proposed activities.

127. While noisy activities are being carried out in the FDD, the acoustic curtains will be closed at each end of the FDD, and for sand blasting, the roof of the FDD will be covered with an acoustic curtain to contain noise within.

128. The FDD has been modelled with two $1m^2$ air intake ducts at each end of the FDD (total $4\ m^2$), directly facing the nearest residence.

129. It is unlikely that two sandblasting operations would occur in the FDD concurrently given the equipment required.

130. However, as a conservative assumption, I have modelled two sandblasting operations being conducted in the FDD and no other noisy operations conducted in the FDD at the same time.

131. A silencer is provided to allow air into the air intake ducts in the FDD. The recommended silencer is equal to Fantech NSA20G (50% open, 2400 mm long).

132. Calculations to support the noise levels from two Sandblasting operations being carried out in the FDD, with sound power levels as defined in Table 8, with end and top acoustic curtains drawn closed are found in Table 10 and Appendices G1 to G6.

Table 10 Calculated Sound Pressure Levels – Sandblasting

Noise Measurement Location	Operation	Calculated Noise Level	Noise Criteria
NML1 - John Street	FDD Ventilation	31 dBA	
	Sandblasting	44 dBA	
	Cumulative	**44 dBA**	44 dBA
NML2 - Dumbarton Street	FDD Ventilation	27 dBA	
	Sandblasting	43 dBA	
	Cumulative	**43 dBA**	43 dBA
NML3 - Munro Street	FDD Ventilation	30 dBA	
	Sandblasting	43 dBA	
	Cumulative	**43 dBA**	46 dBA

133. Calculations to support the noise levels from other noisy operations, with sound power levels defined as those operations in Table 7, being carried out in the FDD with the end acoustic curtains drawn closed are found in Table 11 and Appendices G7 to G9.

Table 11 Calculated Sound Pressure Levels – Other Noisy Work

Noise Measurement Location	Operation	Calculated Noise Level	Noise Criteria
NML1 - John Street	FDD Ventilation	31 dBA	
	Other Noisy Work[7]	42 dBA	
	Cumulative	**42 dBA**	44 dBA
NML2 - Dumbarton Street	FDD Ventilation	27 dBA	
	Other Noisy Work[7]	38 dBA	
	Cumulative	**38 dBA**	43 dBA
NML3 - Munro Street	FDD Ventilation	30 dBA	
	Other Noisy Work[7]	41 dBA	
	Cumulative	**41 dBA**	46 dBA

134. The calculations in Table 10and Table 11 show that the noise emission from the proposed operations inside the FDD will comply with the noise criteria in Section 9.4 provided the noise controls in Section 11.2.

[7] Other Noisy Work is defined by the activities in Table 7.

10.6 Cumulative Noise Assessment

135. SLR Consulting has conducted an assessment of the noise emission from the use of the existing Shipyard and overlayed the noise emission from the proposed FDD in their letter dated 23 April 2021.

136. Scenario 3 in Table 6 of the SLR letter calculates noise levels of 43-47 dBA from sandblasting being carried out in the FDD while the FDD ventilation is operating.

137. Additional noise controls are recommended which will significantly reduce the noise level from that calculated by SLR Consulting.

138. The calculated noise levels from the FDD are significantly lower than the noise emissions from the existing Shipyard.

139. Assuming the FDD is operated as assumed in Table 10 or Table 11 at the same time as the loudest noise emission from the existing Shipyard, the cumulative noise emission will be no higher than from the existing Shipyard alone. That is, the cumulative noise from the Shipyard (including the FDD) will be no more than from the existing Shipyard alone.

140. As the noise emission from the existing Shipyard is reduced over time, as proposed by SLR and required by EPL 10893, the cumulative noise emission will be reduced to the EPA noise criterion of 53 dBA.

11.0 RECOMMENDED ACOUSTICAL TREATMENT

11.1 Existing Shipyard – Required by EPA

141. Two in-series acoustic silencers (Model Fantech C2P-056QS) on each exhaust vent within The EPA requires noise mitigation measures be completed as outlined in EPL 10893, summarised in Section U1.1 of the licence as follows:

    a. Best management practises by 1 October 2021;

    b. Upgrade to Shed 4 by 1 October 2021;

    c. Upgrade of Travelift engine casing and muffler by 1 November 2021;

    d. Acoustic mobile tent by 31 December 2021;

    e. Upgrade ventilation ductwork by 30 June 2022;

    f. Upgrade to Sheds 1, 2 and 3 prior to any fan blasting, needle gunning or other high noise level generating works occurring.

11.2 Acoustic Mitigation Measures

142. Three in-series acoustic silencers (Model Fantech C2P-056QS) on each intake vent within the FDD ventilation system enclosure.

143. Three in-series acoustic silencers (Model Fantech C2P-056QS) on each exhaust vent within the FDD ventilation system enclosure.

144. Prior to installation of the ventilation system, noise level testing is required to determine the acoustic insertion loss provided by the carbon filter and dust collector. At this stage the number and/or specification of acoustic silencers may be reduced, in response to the acoustic insertion loss provided by the carbon filter and dust collector.

145. Sound absorptive lining should be provided on the inside walls of the ventilation system plantroom, consisting of 50 mm thick rockwool, faced with galvanised perforated steel (open area 20%).

146. Sound absorptive lining should be provided on the inside walls of the FDD with NRC 0.75 or greater, which may consist of 50 mm thick polyester, faced with galvanised perforated steel (open area 20%).

147. Four air intake silencers (equal to Fantech NSA20G, 50% open, 2400 mm long), each with an open area no greater than 1 m^2 and no less than 0.5 m^2, to be provided for fresh air intake to the FDD. Two are to be provided in the bow of the FDD and two in the stern. See Appendix E for details.

148. Acoustic curtains consisting of Flexishield 6 kg to be provided on each end of the FDD to enable full coverage of each end when closed. Joints in the curtain should overlap by at least 100 mm.

149. Acoustic curtains consisting of Flexishield 6 kg to be provided to connect the top of the FDD and the deck of the boat to enable full coverage over the top of the FDD when closed. Joints in the curtain should overlap by at least 100 mm.

11.3 Operational Management Plan

150. The acoustic curtains on the bow and stern and the top cover shall be closed when sandblasting operations are being conducted in the FDD.

151. The acoustic curtains on the bow and stern shall be closed when other noisy abrasive operations are being conducted in the FDD. Abrasive operations include sanding, grinding or water blasting.

152. When painting is being conducted in the FDD, the acoustic curtains need not be closed at all.

153. No more than two sandblasting machines should be used in the FDD at any one time

154. No other noisy operations should be conducted in the FDD at the same time as sandblasting.

155. No more than three noisy operations (excluding sandblasting) should be conducted in the FDD concurrently.

12.0 NOISE IMPACT STATEMENT

156. I have been engaged by Stannards Marine Pty Ltd to provide an expert Acoustic Report to assist in resolving the Contentions in an appeal to the NSW Land and Environmental Court – Stannards Marine Pty Ltd v North Sydney Council, 63136 of 2021.

157. Calculations show that provided the noise controls described in Section 0 are constructed and adhered to, the level of noise emitted by the operation of the Floating Dry Dock (FDD) proposed to be installed at the Noakes Shipyard at 6 Johns Road, McMahons Point, NSW, will comply with the most stringent noise criteria set by the EPA's Noise Policy for Industry.

158. With the noise mitigation measures proposed by SLR Consulting and required by the EPA in EPL 10893, the noise emission from the existing Shipyard will be reduced to significantly improve the acoustic amenity at the nearby residential premises.

Stephen Gauld, MEngSc (Noise and Vibration), BE(Mech), MIEAust, MAAS
Principal Acoustical Consultant
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP
Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

APPENDICES
- Appendix A – EPL 10893
- Appendix B – Stephen Gauld's CV
- Appendix C1 – Ambient Noise Survey – John Street, McMahons Point
- Appendix C2 – Ambient Noise Survey – Dumbarton Street, McMahons Point
- Appendix C3 – Ambient Noise Survey – Munro Street, McMahons Point
- Appendix C4 – Ambient Noise Survey – Noakes Shipyard, McMahons Point
- Appendix D – Floating Dry Dock, Location
- Appendix E – Floating Dry Dock, Details
- Appendix F – FDD Ventilation System
- Appendix G – Calculations

Section 58(5) Protection of the Environment Operations Act 1997

Licence Variation

Licence - 10893

NOAKES GROUP PTY LIMITED
ABN 36 002 057 294 ACN 002 057 294
PO BOX 1644
NORTH SYDNEY NSW 2059

Attention: The Proper Officer

Notice Number	1610126
File Number	EF13/3370
Date	14-Jul-2021

NOTICE OF VARIATION OF LICENCE NO. 10893

BACKGROUND

A. NOAKES GROUP PTY LIMITED (“the licensee”) is the holder of Environment Protection Licence No. 10893 (“the licence”) issued under the *Protection of the Environment Operations Act 1997* (“the Act”). The licence authorises the carrying out of activities at 6 JOHN STREET, MCMAHONS POINT, NSW, 2060 ("the premises").

Air Quality Risk Assessment

B. The EPA has received numerous reports for the premises of air quality impacts, particularly in relation to odour, since 2016.

C. On 8 June 2021, the EPA met with the licensee and proposed a pollution reduction study which seeks to better understand the risk of air quality impacts from existing operations and whether the pollution controls currently installed at the premises are appropriate.

D. The licensee agreed to the proposal during the meeting.

E. This variation notice implements a new pollution reduction study at condition U2 to undertake an air quality risk assessment.

Implement Noise Mitigation Measures

F. On 22 June 2021, the EPA issued Notice of Variation No. 1609665 ("the variation notice") which required the licensee to implement noise mitigation measures and undertake a Post-Commissioning Noise Impact Assessment to assess the effectiveness of the implemented controls.

G. Under Condition U1.3 of the licence, the licensee was required to submit a report outlining the findings of the Post-Commissioning Noise Impact Assessment by 30 December 2022. Prior to the issuing of the variation notice, the licensee and the EPA agreed on a report submission date of 21 January 2023.

H. The EPA has now corrected the due date under Condition U1.3 to 21 January 2023.

Licence Variation

I. In issuing this notice the EPA has considered the provisions of section 45 of the Act.

VARIATION OF LICENCE NO. 10893

1. By this notice the EPA varies licence No. 10893. The attached licence document contains all variations that are made to the licence by this notice.
2. The following variations have been made to the licence:
   - Condition U1.3 - "30 December 2022" has been amended to "21 January 2023"
   - Condition U2 has been added to the licence and requires the licensee to undertake an Air Quality Risk Assessment.

....

Erin Barker

Manager Regulatory Operations

Environment Protection Authority

(by Delegation)

INFORMATION ABOUT THIS NOTICE

- This notice is issued under section 58(5) of the Act.
- Details provided in this notice, along with an updated version of the licence, will be available on the EPA's Public Register (http://www.epa.nsw.gov.au/prpoeo/index.htm) in accordance with section 308 of the Act.

Appeals against this decision

- You can appeal to the Land and Environment Court against this decision. The deadline for lodging the appeal is 21 days after you were given notice of this decision.

When this notice begins to operate

- The variations to the licence specified in this notice begin to operate immediately from the date of this notice, unless another date is specified in this notice.
- If an appeal is made against this decision to vary the licence and the Land and Environment Court directs that the decision is stayed the decision does not operate until the stay ceases to have effect or the Land and Environment Court confirms the decision or the appeal is withdrawn (whichever occurs first).

Environment Protection Licence

Licence - 10893

Licence Details	
Number:	10893
Anniversary Date:	14-February

Licensee

NOAKES GROUP PTY LIMITED

PO BOX 1644

NORTH SYDNEY NSW 2059

Premises

NOAKES BOATYARD

6 JOHN STREET

MCMAHONS POINT NSW 2060

Scheduled Activity

Marinas and boat repairs

Fee Based Activity	**Scale**
Boat construction/maintenance (general)	Any annual handling capacity

Contact Us

NSW EPA

4 Parramatta Square

12 Darcy Street

PARRAMATTA NSW 2150

Phone: 131 555

Email: info@epa.nsw.gov.au

Locked Bag 5022

PARRAMATTA NSW 2124

Environment Protection Licence

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

NOAKES GROUP PTY LIMITED
PO BOX 1644
NORTH SYDNEY NSW 2059

subject to the conditions which follow.

Environment Protection Licence

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Marinas and boat repairs	Boat construction/maintenance (general)	Any annual handling capacity

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
NOAKES BOATYARD
6 JOHN STREET
MCMAHONS POINT
NSW 2060
LOT 2 DP 77853, LOT 1 DP 127195, LOT 2 DP 179730, LOT B DP 420377, LOT A DP 420377, LOT 1 DP 449731, LOT 987 DP 752067
THE PREMISES INCLUDES THE 'WATER LEASE AREA' MARKED IN PINK ON SURVEY PLAN DP 849188, DATED 16.05.1995, PROVIDED TO THE EPA ON 02.10.2019 AND TITLED DOC19/869106-1 SITE SURVEY OF WATER LEASE AREA USED TO DEFINE LICENSED PREMISES BOUNDARY (DP 849188).

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

Environment Protection Licence

2 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Waste

L2.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled “Waste” and meeting the definition, if any, in the column titled “Description” in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled “Activity” in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled “Other Limits” in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014	As specified in each particular resource recovery exemption	NA

L3 Hours of operation

L3.1 (a) Works and activities may only be undertaken at the premises between 7:00 am and 6:00 pm, Mondays to Saturdays.

(b) Works and activities must not be undertaken at the premises on Sundays or Public Holidays.

Exceptions to permitted hours of operation

L3.2 Works and activities are permitted to be undertaken outside of the hours specified in condition L3.1 for:
(i) the delivery of equipment and materials as requested by Police or other authorities for safety reasons;
(ii) emergency work to avoid the loss of lives, damage to property and/ or to prevent environmental harm; and
(iii) use of the travel lift between 8:00 am and 5:00 pm on Sundays for a maximum of 90 minutes in total.

Environment Protection Licence

L4 Potentially offensive odour

L4.1 No condition of this licence identifies a potentially offensive odour for the purposes of Section 129 of the Protection of the Environment Operations Act 1997.

L4.2 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

3 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

Note: Materials and substances includes but is not limited to: vessels, watercraft, tanks and engines.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

Note: Plant is defined in the Dictionary. The type of plant and equipment that should be considered includes, but is not limited to, drainage systems; infrastructure and pollution control equipment such as (but not limited to) spill containment and clean-up equipment; dust screens and collectors; sediment collection systems, traps and sumps; waste collection, storage and disposal equipment.

O3 Dust

O3.1 Where neither a concentration nor rate for emission of air impurities has been prescribed, for the purposes of Section 128 of the Act, all operations and activities occuring at the premises must be conducted in a manner that will minimise airborne impurities at the boundary of the premises.

Note: Guidance information on the source and management of odours, dust and particulates is available in the document *Environmental Action for Marinas, Boatsheds and Slipways (EPA, 2007).*

O4 Processes and management

Blasting and painting activities

O4.1 a) Spray painting of vessels must be undertaken inside a shed or building, unless the vessel is too large to fit inside any shed or building on the premises.
b) If the shed or building is occupied by another vessel, only minor repair works are to be undertaken on vessels outside the shed or building.

Note: 'Minor repair works' is defined as the preparation and painting of isolated damaged areas which are up to 10 square metres.

O4.2 Any external spray painting must be encapsulated using tarpaulins.

O4.3 Sand blasting works may only be undertaken inside a shed or building.

Note: Soda blasting works may be undertaken outside of a shed or building.

O4.4 All doors providing access to a shed or building in which sand blasting or spray painting activities are being undertaken must remain closed while those activities are being undertaken.

Note: Doors providing access to a shed or building in which sand blasting or spray painting activities are undertaken may remain open if no sand blasting or spray painting activities are being undertaken at that time.

O4.5 Antifoulant paint may only be applied to vessels using a roller, brush or airless spray application.

Note: Antifoul application using airless spray application outside of a shed or building must only be undertaken following encapsulation / screening using shade cloth or plastic.

Note: Guidance information relating to the Organotin Chemical Control order and application of other antifouling paints is provided in the *Fact sheet - Applying Antifouling paints at marinas* (NSW EPA, 2013).

O5 Waste management

O5.1 All activities at the premises must be carried out in a manner that will prevent waste from polluting waters.

O5.2 The licensee must provide facilities to ensure the collection storage and disposal of waste generated at the premises so that it does not pollute waters.

O5.3 For the purposes of condition O5:
a) Waste generated at the premises includes waste collected from vessels at the premises and may include but not be limited to contaminated bilge water, litter, garbage, fuel, oil and waste from abrasive cleaning, sanding, scraping and painting.
b) Facilities may include but not be limited to tarpaulins, waste bins, pump-out facilities, signage and agreements with those operating on the site.

O5.4 The licensee must ensure that contaminated stormwater at the premises is managed in a manner that will prevent pollution of waters.

O5.5 The licensee must ensure that sewage and greywater, that is associated with vessels at the premises, is managed in a manner that will prevent pollution of waters.

4 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Recording of pollution complaints

M2.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M2.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M2.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M2.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M3 Telephone complaints line

M3.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of

Environment Protection Licence

receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M3.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M3.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

5 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

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R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

6 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Other general conditions

G2.1 **Completed Programs**

Program	Description	Completed Date
Prevention of water pollution	Options report for preventing pollution of waters from activities undertaken on the slipway	30-July-2001
Preferred option implementation	Install and operate the preferred option to collect and dispose of wastewater from boat cleaning and maintenance on the slipway to prevent water pollution.	31-May-2003
Noise Impact Assessment	To address ongoing noise issues at the premises a Noise PRP encompassing a Noise Impact Assessment and a Noise Management Plan has been added to the EPL.	23-April-2021
Noise Management Plan	Noise Management Plan added to EPL to address ongoing noise issues at the site	23-April-2021

7 Pollution Studies and Reduction Programs

U1 Implement Noise Mitigation Measures

U1.1 The licensee must complete the staged noise mitigation works by the dates listed in the table below and in accordance with the details provided in section 6 of the Noise Management Plan prepared by SLR Consulting Australia Pty Ltd (SLR reference 610.19179.00200-R02, Version v1.0, dated 23 April 2021; EPA reference DOC21/476638).

Reference	Mitigation Measure	Due Date

a.	Implement all best management practices identified in section 5 of the SLR Noise Management Plan	1 October 2021
b.	Shed 4 - upgrade cladding and seal roof vents and shed door.	1 October 2021
c.	Upgrade of travel lift engine casing and install upgraded high performance muffler	1 November 2021
d.	Use acoustic mobile tent or acoustic screening for any significant noise generating work conducted in zone 2 or zone 3 in the direction of residential receivers, as depicted in Figure 1 of the SLR Noise Management Plan.	By 31 December 2021 and prior to any sandblasting occurring
e.	Upgrade ventilation ductwork to a permanent steel rigid duct to reduce low-frequency noise from the large centrifugal fan located in shed 4.	30 June 2022
f.	Sheds 1, 2 and 3 - Upgrade cladding and seal roof. Note: this measure is only required if sandblasting, needle-gunning or other high noise level generating works are to occur in sheds 1,2 and 3.	Prior to any sandblasting, needle-gunning or other high noise level generating works occurring.

U1.2 Upon completion of the noise mitigation measures under condition U1.1 of this licence, the licensee must engage a competent person(s) to assess the residual noise levels that have been achieved once all reasonable and feasible mitigation measures have been applied, at all relevant receivers within each of the noise catchment areas identified in the Noise Impact Assessment report prepared by SLR Consulting Australia Pty Ltd (SLR Reference 630.19179.00200-RO1, Version v1.0, dated 23 April 2021; EPA reference DOC21/476638). The Post-Commissioning Noise Impact Assessment must be carried out by a competent person which is defined as satisfying one or more of the following:

1. Have qualifications and/or experience sufficient to fulfil the requirements of 'member' grade of the Australian Acoustical Society.
2. Undertake the duties of an acoustic consultant on behalf of a consultancy firm that is a member of the Association of Australasian Acoustical Consultants.

U1.3 The licensee must submit a report electronically to the Director, Regulatory Operations Metropolitan, by 21 January 2023 at RegOps.MetroWest@epa.nsw.gov.au outlining the findings of the Post-Commissioning Noise Impact Assessment described under condition U1.2 of this licence. The report must include, but not necessarily be limited to:
1. details of noise reduction works undertaken;
2. details of noise reduction(s) achieved from various sources (and locations) on the premises.
3. details of the residual noise levels at receiver locations; and
4. any changes to the noise mitigation measures described in the table provided under Condition U1.1 of this licence.

U2 Air Quality Risk Assessment

U2.1 The licensee must engage an independent and appropriately qualified consultant to undertake an Air

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Quality Risk Assessment. The Assessment must;
1. Include a detailed description of all activities occurring on the site and include:
a) A process flow diagram clearly showing all activities/ operations carried out on the premises including, but not limited to;
i. vessel spray painting
ii. welding, and
iii. surface preparation activities
b) A detailed discussion of all activities carried out on the site, including frequency of occurrence and variability (i.e. seasonal, ad-hoc, routine)
c) A comprehensive inventory of all materials/ products used for performing the identified activities such as paints, thinners, solvents, adhesives and surface coating materials. For each material/ product identified, the following must be included;
i. details regarding the frequency of use and typical application rates
ii. details of the volumes used (litre's per annum)
iii. material Safety Data Sheet
2. Identify all potential sources of air pollutants (including dust, VOC's and odour) arising from activities undertaken and materials used on the site. Sources must be identified as point sources or fugitive sources.
3. Include a detailed site plan clearly showing the layout of the site and;
a) locations where all activities/ operations occur
b) all emission sources clearly identified
c) plant boundary
d) sensitive receptors (e.g. nearest residences)
e) topography
4. Include a risk evaluation and assessment of each emission source and their potential impact on air quality. Methods for developing the risk classification must give consideration to, but not necessarily be limited to the:
a) type of material and specific material properties which may contribute to odour generation;
b) quantity of individual material types used by the Premises;
c) specific activities undertaken which utilise the material
d) odour emission intensity, including the results of any odour sampling where considered reasonable and practical to collect as part of the risk classification process
5. Identify and describe all currently installed emission controls including;
a) plans, process flow diagrams and descriptions that clearly identify and explain all pollution control equipment and control techniques for all activities occurring on the premises
b) a description of all aspects of the air emission control systems, with particular regard to any fugitive emission capture systems (e.g. hooding, ducting), treatment systems (e.g. scrubbers, bag filters) and discharge systems (e.g. stacks)
c) the operational parameters of all emission sources, including all operational variability, i.e. location, release type (stack, volume or area) and release parameters (e.g. stack height, stack diameter, exhaust velocity, temperature, emission concentration and rate)
d) emission concentrations and rates must be determined;
i. from all point sources during activities with high potential to cause air impacts
ii. during peak operations, or at times representing worst case conditions
iii. for pollutants including particles, odour and volatile organic compounds (VOC's)
iv. in accordance with the approved methods for the sampling and analysis of air pollutants in NSW
6. Evaluate the effectiveness of currently installed controls at controlling pollutant emissions from all activities with a high potential to cause air quality impacts;
a) the effectiveness must be determined based on the achieved emission performance and removal efficiency of the installed controls, and

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b) must be determined based on the results of emission testing for pollutants including particles, odour and VOC's

7. Identify, evaluate and recommend options to reduce air quality impacts (including odour) from the premises. The proposal must specify:

a) how pollutant emissions will be mitigated for each material and activity identified and classified as having high emission potential

b) how emission performance improvements will be implemented for each material and activity identified as having high emission potential

c) a timeline for implementation of each odour performance improvement identified.

d) each mitigation and improvement measure identified must:

i. be tailored to the odour risk for each material and activity, and

ii. include performance targets that are measurable, auditable and consistent with the Objective* of the pollution reduction study.

Note: * The objective of this pollution reduction study is to:

1. understand the risk of air quality impacts from site activities;
2. determine if currently installed pollution controls remain fit-for-purpose; and
3. identify measures to minimise air quality impacts and ensure compliance with section 128 and section 129 of the *Protection of the Environment Operations Act 1997* and Conditions O1-O4 and Condition L4 of this licence.

U2.2 The works required by this Pollution Reduction Study must make reference to methodologies set out in the following documents:

- Technical Framework: Assessment and management of odour from stationary sources in NSW (NSW DEC, 2006);
- Technical Notes: Assessment and management of odour from stationary sources in NSW (NSW DEC, 2006);
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC, 2005); and
- Approved Methods for Sampling and Analysis of Air Pollutants in NSW (NSW DEC, 2006).

U2.3 The licensee must submit a report electronically to the Director, Regulatory Operations Metropolitan, by 1 November 2021 at RegOps.MetroWest@epa.nsw.gov.au outlining the findings of the Air Quality Risk Assessment described under condition U2.1 of this licence.

8 Special Conditions

E1 Special Dictionary

E1.1 Special Dictionary

Term	Definition
Soda blasting	An abrasive blasting process that uses sodium bicarbonate and compressed air.
Sand blasting	An abrasive blasting process that uses sand and compressed air.
Antifoulant paint	Coating applied to the hull of a vessel that is a pesticide registered by the Australian Pesticides and Veterinary Medicines Authority.
Spray painting	Application of a paints and other coatings via a high pressure spray technique.

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Airless spray application	Application of paints and other coatings via a high pressure spray technique that does not use compressed air.

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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

Environment Protection Licence

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same me aning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Warren Hicks

Environment Protection Authority

(By Delegation)

Date of this edition: 14-February-2001

End Notes

1	Licence varied by notice 1019571, issued on 12-Sep-2002, which came into effect on 07-Oct-2002.
2	Licence varied by notice 1035424, issued on 02-Apr-2004, which came into effect on 27-Apr-2004.
3	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
4	Licence varied by notice 1528262 issued on 13-Mar-2015
5	Licence varied by notice 1549209 issued on 06-Feb-2018
6	Licence varied by notice 1586007 issued on 15-Oct-2019
7	Licence varied by notice 1603694 issued on 17-Dec-2020
8	Licence varied by notice 1606020 issued on 18-Feb-2021
9	Licence varied by notice 1609665 issued on 18-Jun-2021

DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

SUITE 17, 808 FOREST ROAD, PEAKHURST 2210 ABN 73 107 291 494
P. 02 9046 3800 ACOUSTICS@DAYDESIGN.COM.AU WWW.DAYDESIGN.COM.AU

Curriculum Vitae

Stephen Gauld

Stephen Gauld is the Managing Director of Day Design Pty Ltd and works in a technical capacity as the Principal Acoustical Engineer. Stephen provides oversight on all projects and checks the majority of the reports that leave the office. He manages the larger projects and provides training to staff in acoustic measurement and noise control design. Sound level meters and long-term noise monitors are used in the field to measure different types of noise sources and computer software is used to analyse and design noise control.

Qualifications:

Bachelor of Engineering (Mechanical),
University of New South Wales (1997)

Masters of Engineering Science (Noise & Vibration),
University of New South Wales (2007)

Memberships:

Member - Institution of Engineers Australia (2001)

Member - Australian Acoustical Society (2001)

Corporate Member – Association of Australian Acoustical Consultants

Professional Experience:

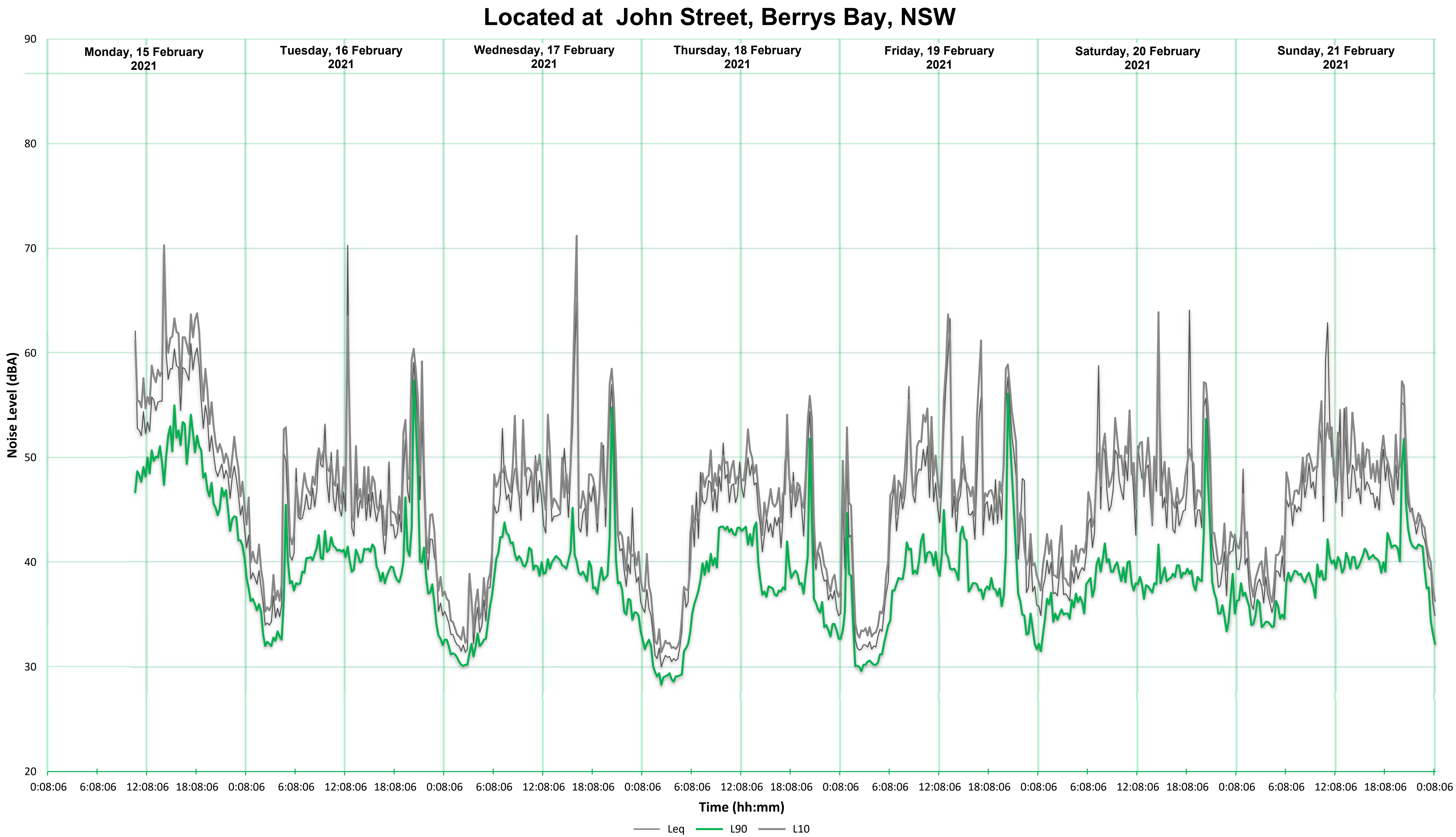
February 2004 - Present
Managing Director and Principal Acoustical Engineer
Day Design Pty Ltd

October 1998 – February 2004
Consulting Acoustical Engineer
Day Design Pty Ltd

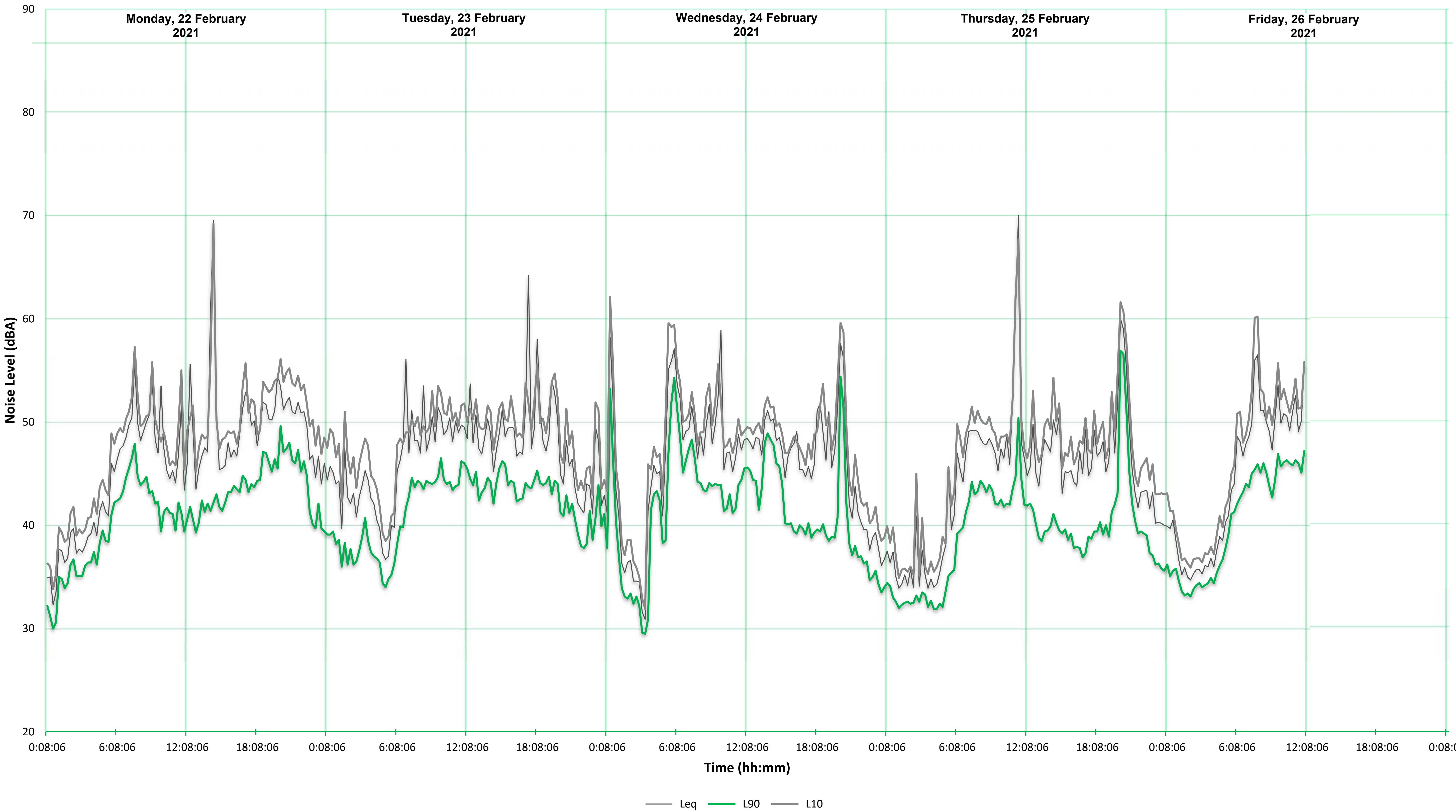
November 1997 – October 1998
Acoustical\Quality Engineer
Acoustic Dynamics Pty Ltd, Glebe, NSW
Consulting Acoustical Engineers

A short overview of the nature of **Mr Gauld's Professional Experience** is provided below:

Churches and Places of Worship:	Thornleigh Uniting Church; Corrimal Uniting Church; Glenmore Park Anglican Church; St Johns Church Kirribilli; Roseville Uniting Church; Lakes Baptist Church; Dapto Anglican Church; Heathcote Gospel Trust; Holy Family; Marayong.
Schools and Child Care Centres:	Schools located at Prestons, Bass Hill, Greenacre, Edensor Park. Childcare Centres located at Kingsgrove, Greenacre, Quakers Hill, Gymea, Kirrawee, Mount Annan and Thornleigh.
Hotels/Clubs	Bangor Tavern; Narellan Hotel; Billabong Hotel; Royal Oak Hotel; Dooleys Lidcombe Catholic Club; Easts Leagues Club; Gymea Hotel; Summer Hill Hotel; St Johns Park Bowling Club; Five Dock RSL Club; Royal Hotel at Richmond; Welcome Inn at Thirlmere; Wentworth Leagues Club.
Hearing Loss Assessments:	Assessment of occupational noise exposure for many and varied occupations including but not limited to, sheet metal workers, printers, labourers, hotel employees and drivers.
Industrial and Mining:	Gulf Conveyor Engineering – Appin Colliery main conveyor; BHP Billiton Illawarra Coal – West Cliff Mine; IE Engineered Products – New Ackland Coal Mine machinery; Hanson Construction Materials – Hanson's Quarry, Seaham.
Legal Assignments:	SHCAG Pty Ltd v the Minister for Planning and Infrastructure & Anor, Berrima Colliery Dewharp Pty Ltd v Sutherland SC, Night Club Noise Impact; Ghassibe v Wingecarribee SC, Dog Breeding Facility; Shelly Bear Pty Ltd v Canterbury CC, Child Care Centre; Martin v Camden Council, Child Care Centre; Robert Creed Architects v Strathfield MC, Residential Development Spiro Houteas v Parramatta CC, Residential Development.
Occupational Noise:	Pilkington Alexandria and Ingleburn; United Group Rail; Franklins; Transfield Services; King Gee Clothing; Tyco Electronics.
Residential:	Building Defect Claims - Sydney Mansions and 'The Rivage'; Collins Street, Kiama; Gymea Bay Rd, Gymea Bay; Chapel Street, Rockdale; Auburn Centre; Main St, Blacktown; Taylor Street, Annandale; Queen Victoria Street, Bexley; Willoughby Rd, Crows Nest; Trelawney Street, Woollahra.
Traffic:	Casula Powerhouse Arts Centre; Davies Road Expansion at Padstow; Lindenwood Development at Kellyville; Residential Units at McEvoy Street, Alexandria; President Avenue, Miranda; Bulwara Road, Ultimo; Soho Apartments, Waterloo.


Located at John Street, Berrys Bay, NSW
Monday, 15 February 2021
Tuesday, 16 February 2021
Wednesday, 17 February 2021
Thursday, 18 February 2021
Friday, 19 February 2021
Saturday, 20 February 2021
Sunday, 21 February 2021
Noise Level (dBA)
90
80
70
60
50
40
30
20
0:08:06
6:08:06
12:08:06
18:08:06
Time (hh:mm)
Leq
L90
L10

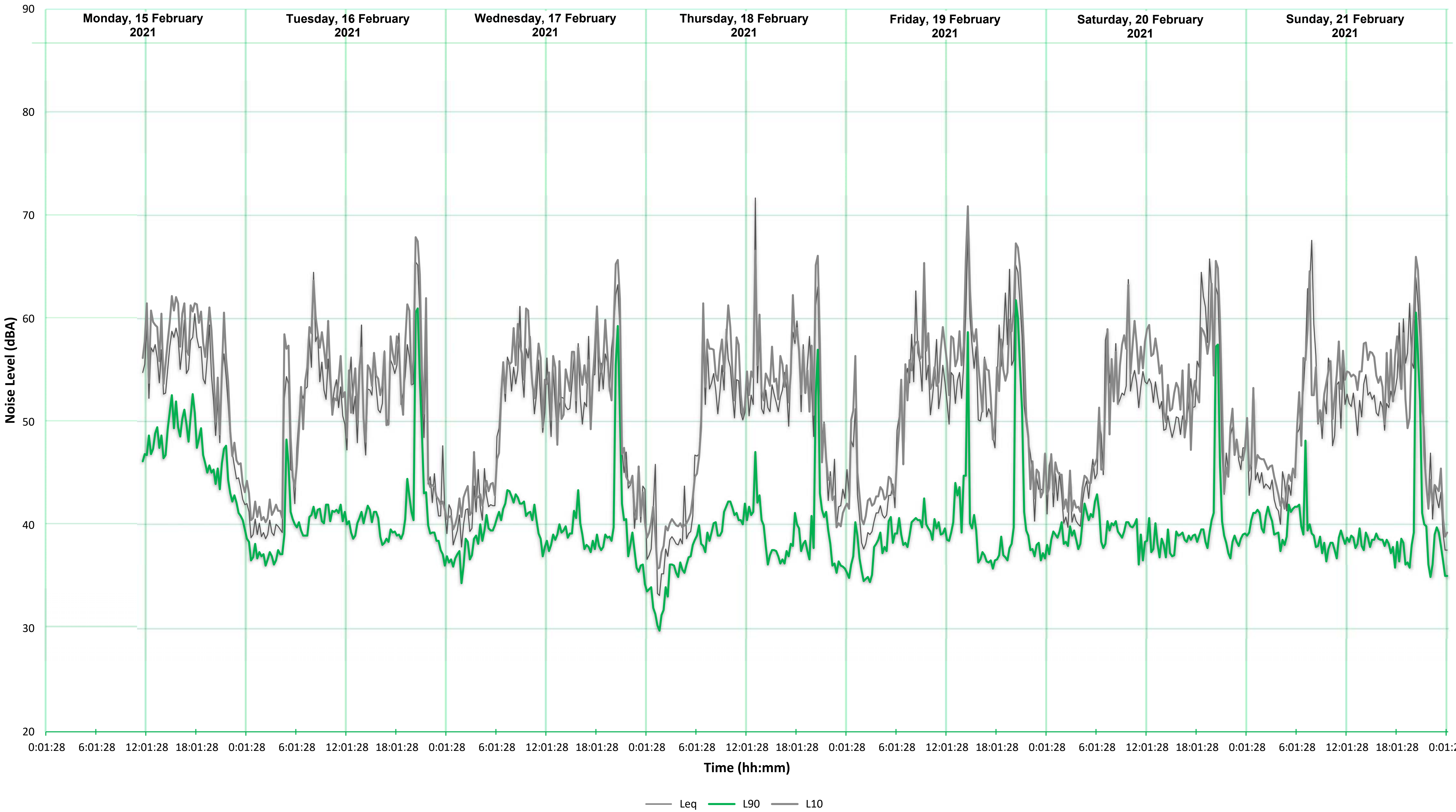
Located at John Street, Berrys Bay, NSW



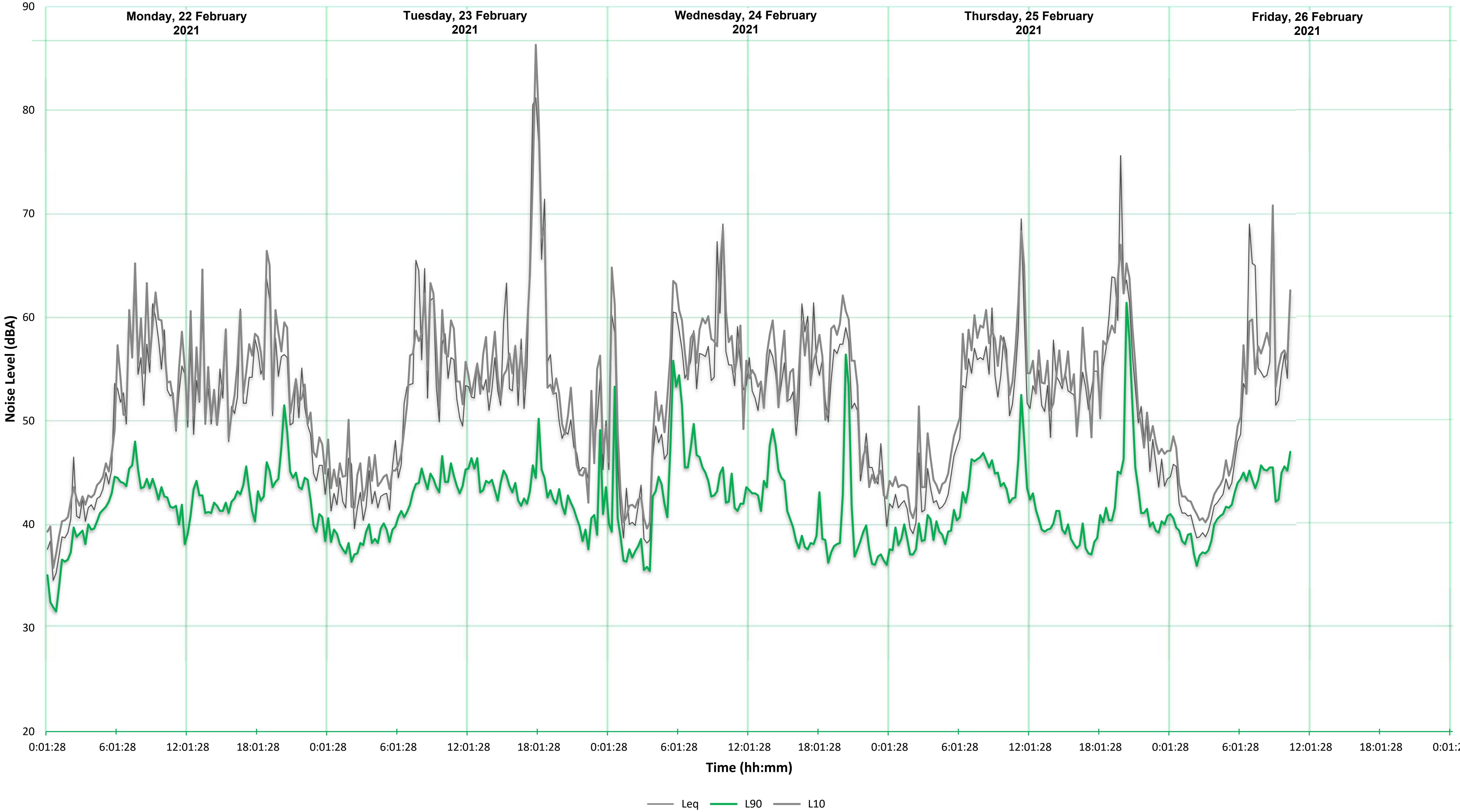
NML2

AMBIENT NOISE SURVEY

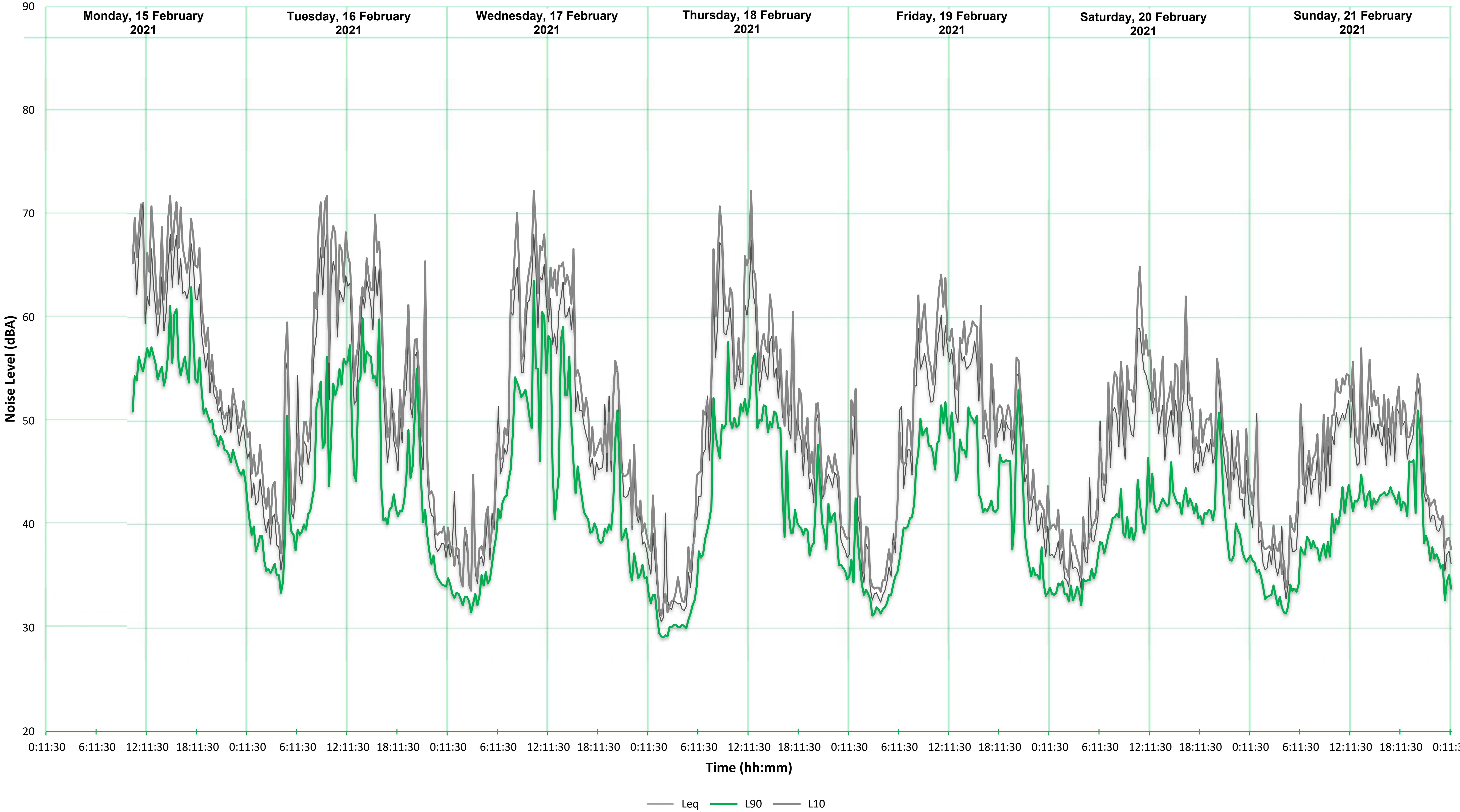
Located at Dumbarton Street, Berrys Bay, NSW



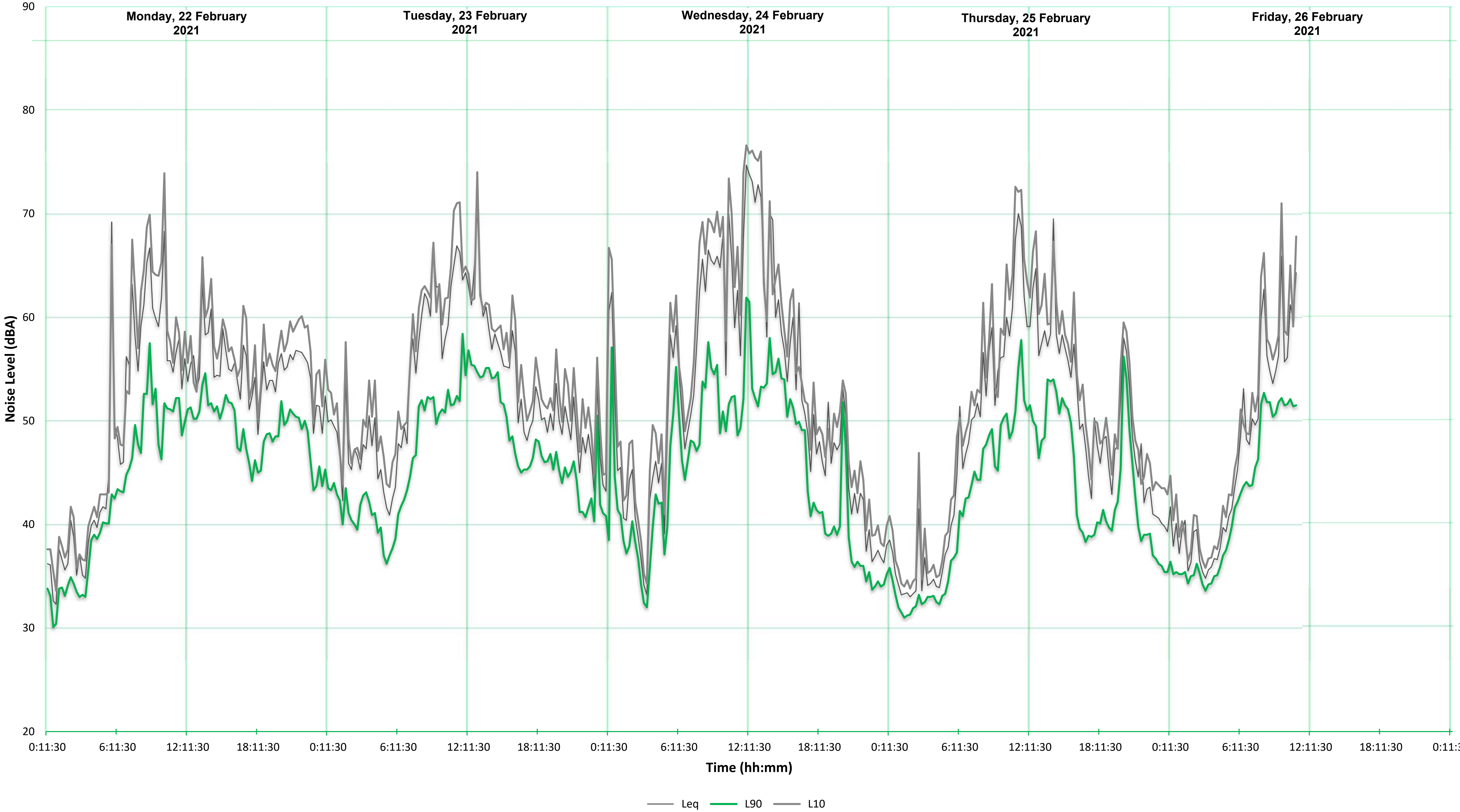
Located at Dumbarton Street, Berrys Bay, NSW



Located at Munro Street, Berrys Bay, NSW



Located at Munro Street, Berrys Bay, NSW

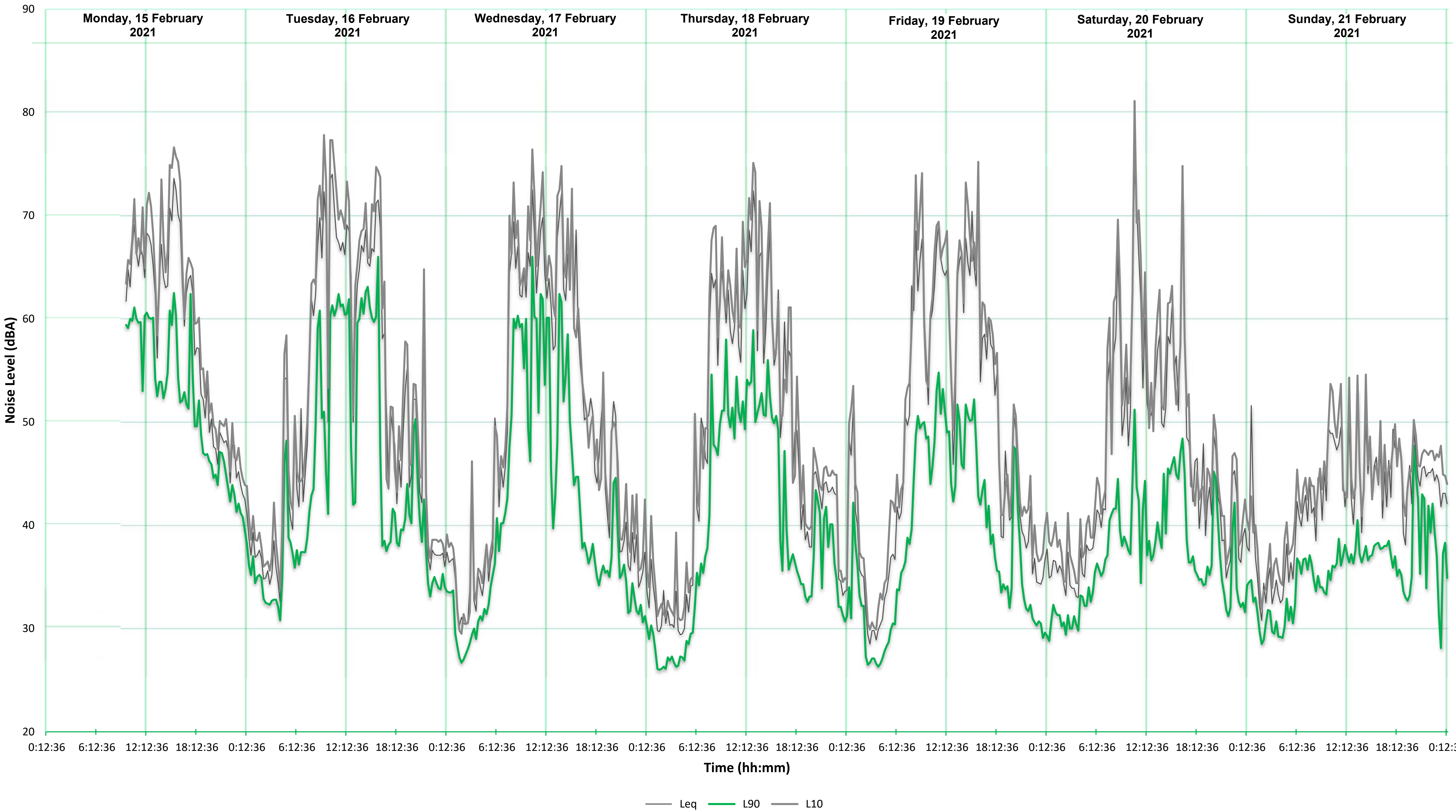


NML4

AMBIENT NOISE SURVEY

7281-1
Appendix C4

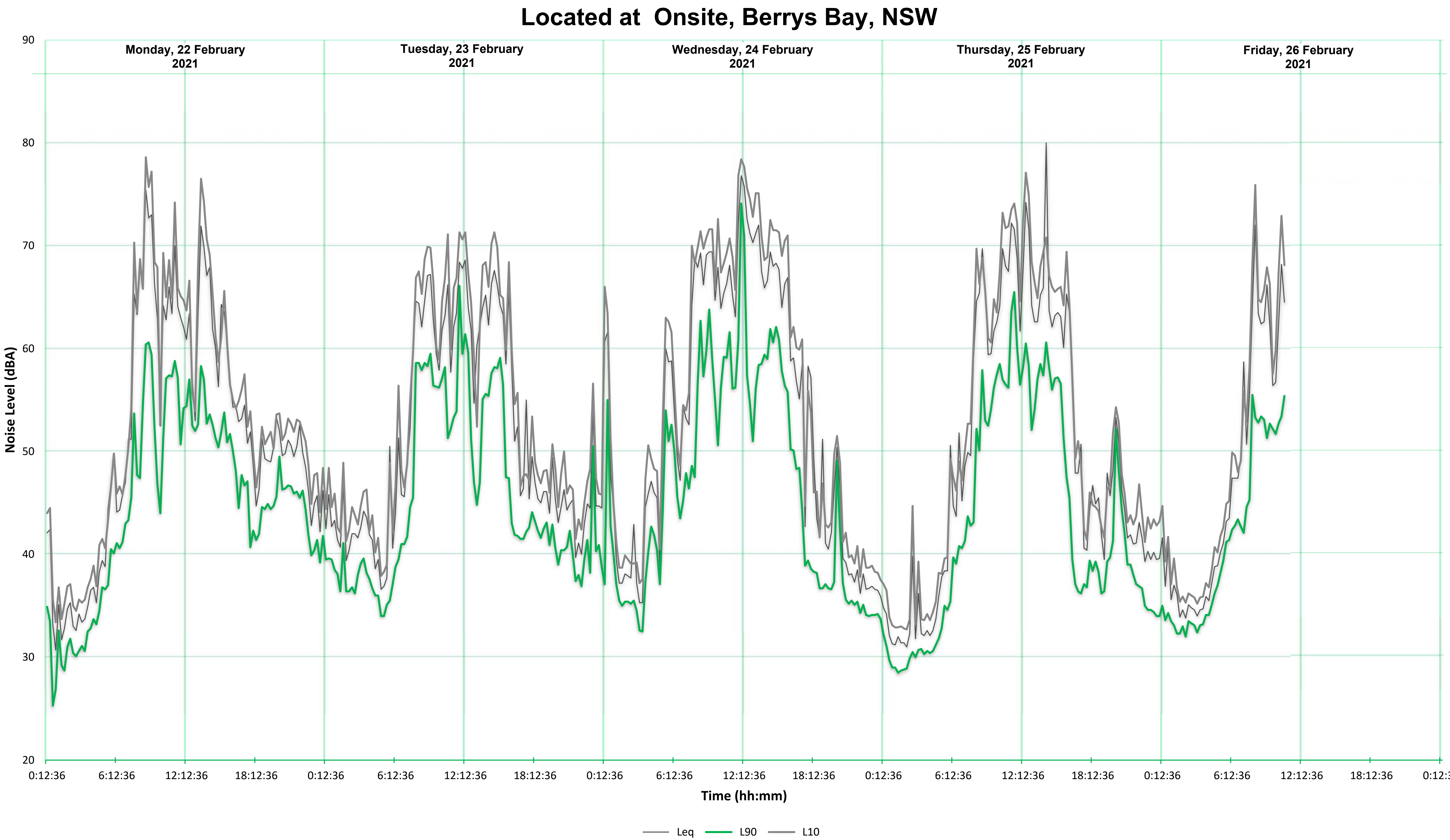
Located at Onsite, Berrys Bay, NSW

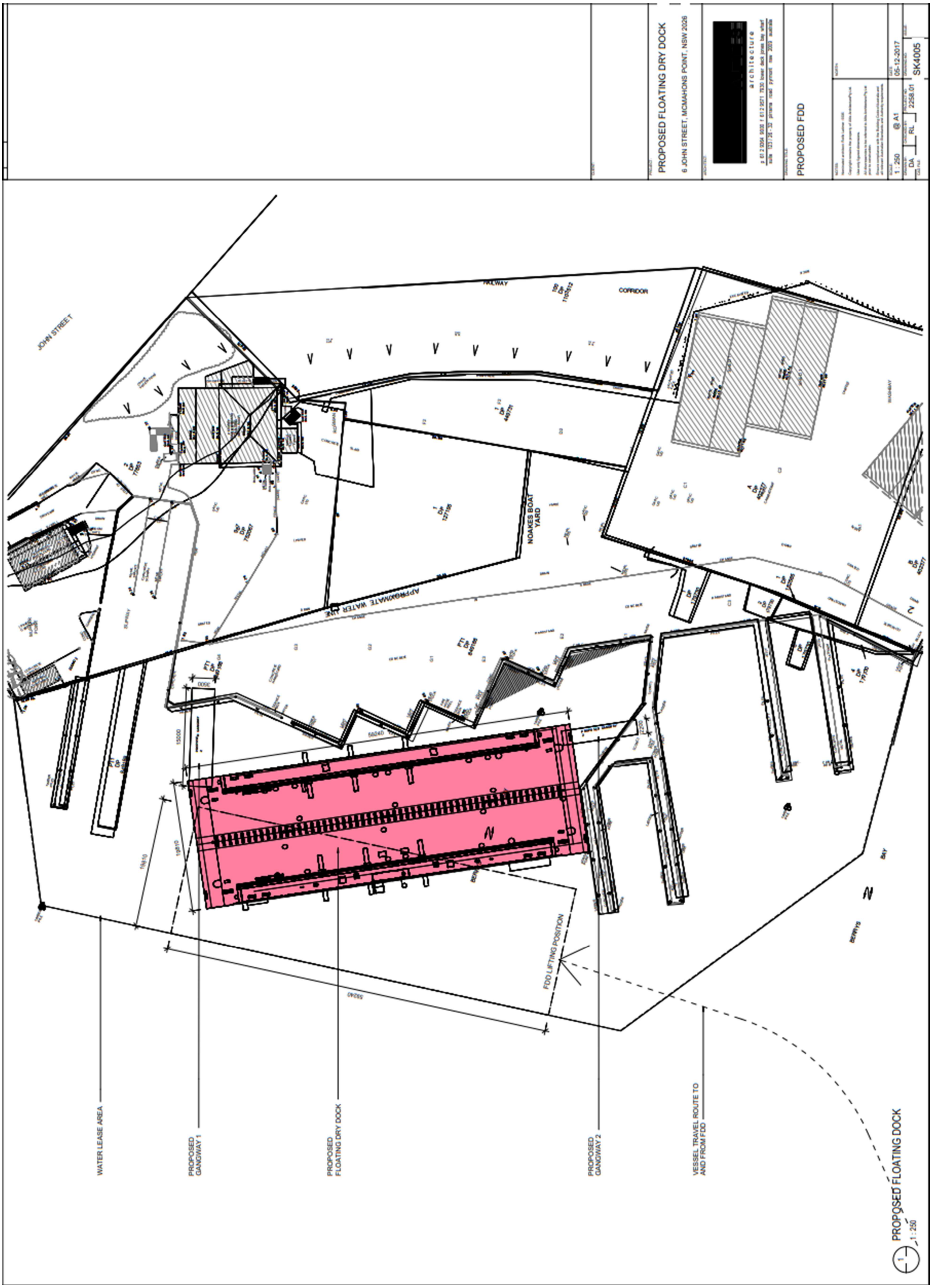


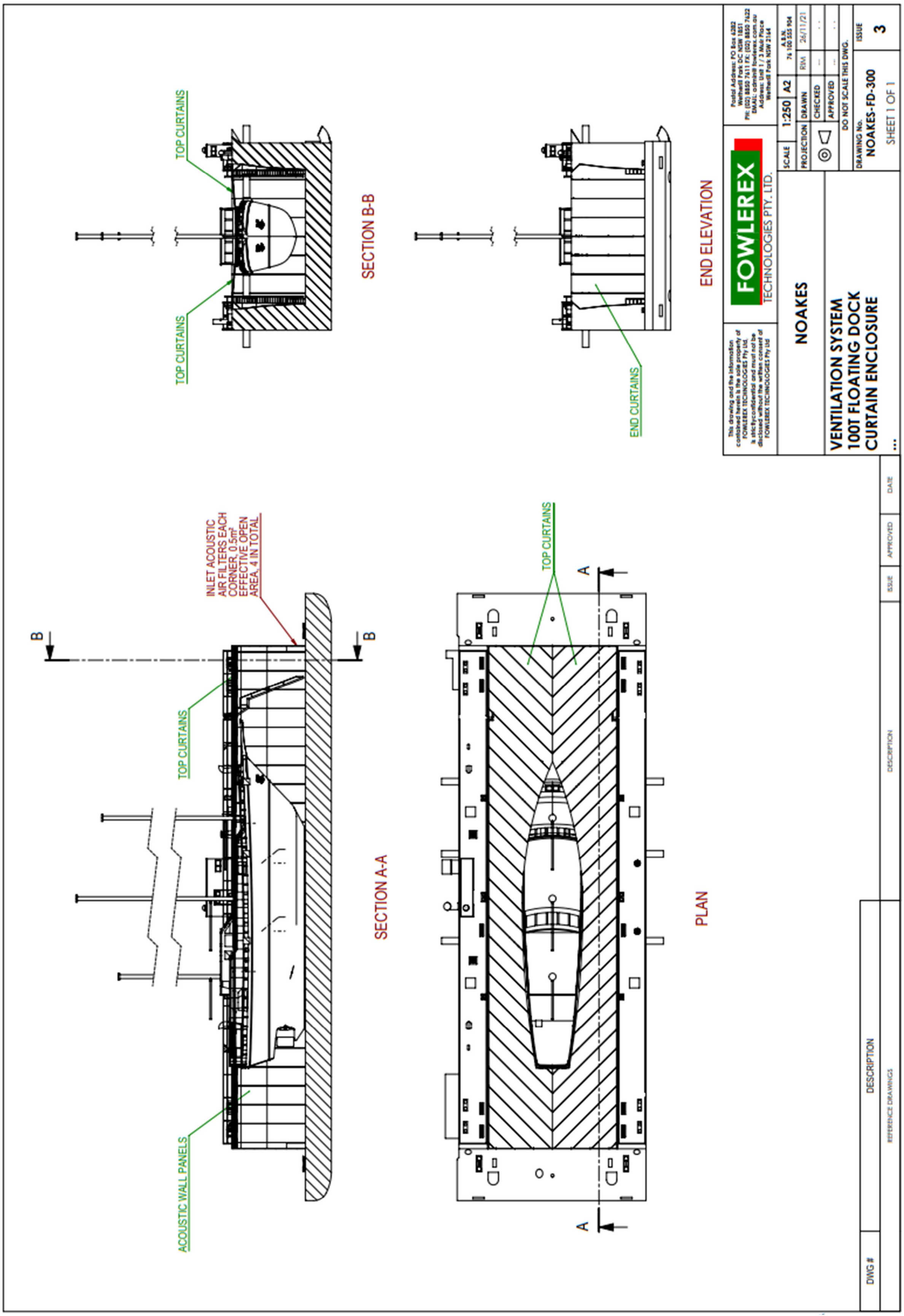
NML4

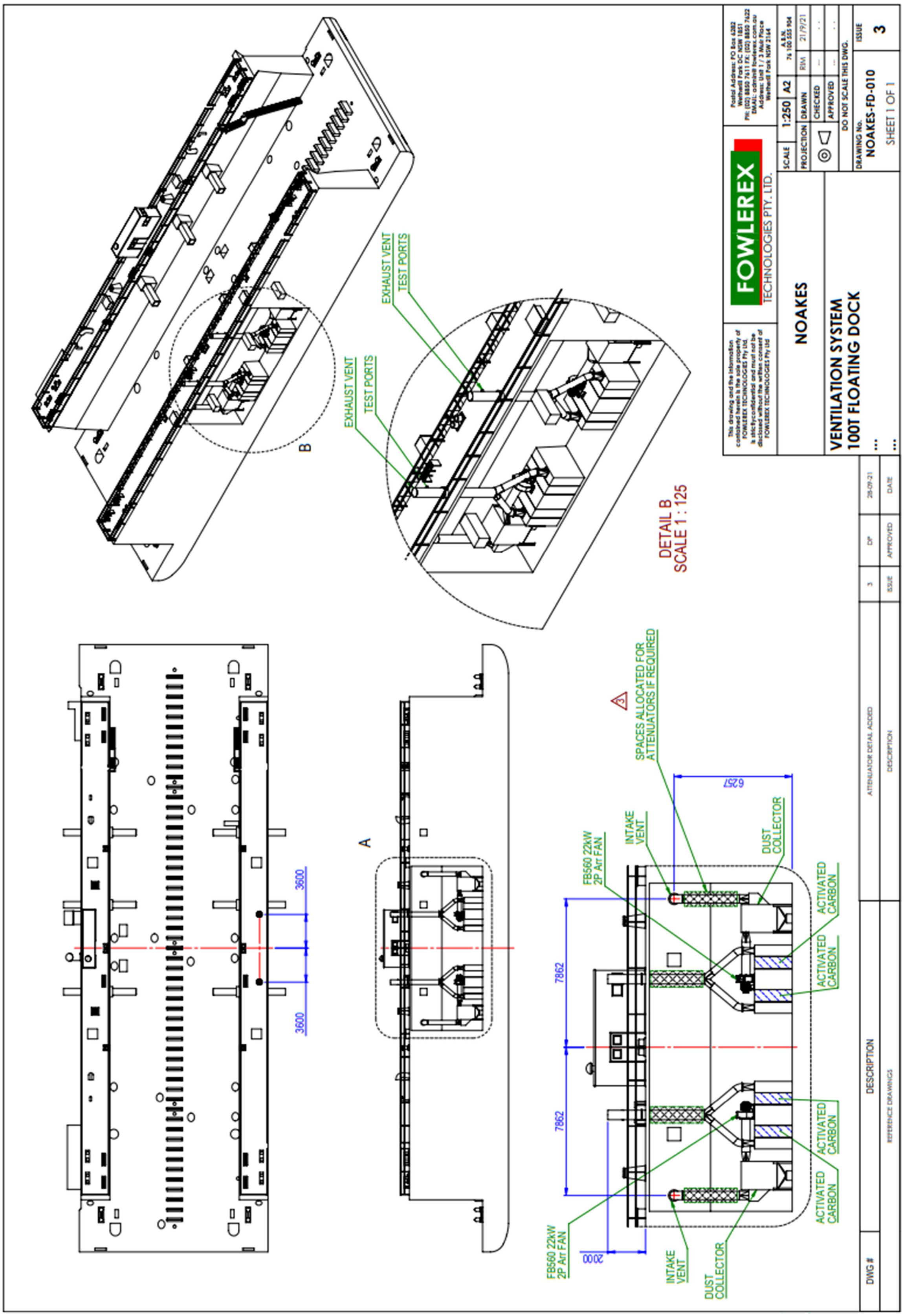
AMBIENT NOISE SURVEY

7281-1
Appendix C4




PROPOSED FLOATING DRY DOCK
6 JOHN STREET, MCMAHONS POINT, NSW 2026
PROPOSED FDD
1 : 250
05-12-2017
SK4005
JOHN STREET
RAILWAY
CORRIDOR
NOAKES BOAT YARD
APPROXIMATE WATER LINE
FDD LIFTING POSITION
WATER LEASE AREA
PROPOSED GANGWAY 1
PROPOSED FLOATING DRY DOCK
PROPOSED GANGWAY 2
VESSEL TRAVEL ROUTE TO AND FROM FDD
PROPOSED FLOATING DOCK
BERRYS
BAY


TOP CURTAINS
SECTION B-B
END ELEVATION
END CURTAINS
INLET ACOUSTIC AIR FILTERS EACH CORNER, 0.5m² EFFECTIVE OPEN AREA, 4 IN TOTAL
SECTION A-A
PLAN
ACOUSTIC WALL PANELS
FOWLEREX
TECHNOLOGIES PTY. LTD.
NOAKES
VENTILATION SYSTEM
100T FLOATING DOCK
CURTAIN ENCLOSURE
SCALE 1:250 A2
DO NOT SCALE THIS DWG.
DRAWING No. NOAKES-FD-300
SHEET 1 OF 1
ISSUE 3
DESCRIPTION
REFERENCE DRAWINGS
DWG #


FOWLEREX
TECHNOLOGIES PTY. LTD.
NOAKES
VENTILATION SYSTEM
100T FLOATING DOCK
SCALE 1:250 A2
DRAWING No. NOAKES-FD-010
SHEET 1 OF 1
ISSUE 3
DO NOT SCALE THIS DWG.
DETAIL B
SCALE 1 : 125
EXHAUST VENT
TEST PORTS
B
A
SPACES ALLOCATED FOR ATTENUATORS IF REQUIRED
INTAKE VENT
DUST COLLECTOR
FB560 22kW 2P Arr FAN
ACTIVATED CARBON
3600
7862
6257
2000
ATTENUATOR DETAIL ADDED
REFERENCE DRAWINGS
DESCRIPTION
DWG #

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		DUCT NOISE EMISSION COMPUTATION (Ductout.xls)									DAY DESIGN PTY LTD		
2			Version	3.0							Engineer:	SG	
3		Client:	Noakes Group								Project No:	7281	
4		Project:	Noakes Shipyard										
5		Noise Source	FDD Filter System									Atmosphere:	
6		Receptor Location:	John Street									deg.C	RH
7		Noise Control:	Silencers	Overall Level =		31	dBA					20	60 %
8		Noise Criterion:			=	44	dBA						
9		Exhaust				Noise Level - dB							
10	1	FB560			dBA	63	125	250	500	1000	2000	4000	8000
11		Sound Power Level - dB			106	107	107	108	102	101	96	91	86
13		Multiple units	Number =	2		3	3	3	3	3	3	3	3
14		Safety Factor	(normally 3)			0	0	0	0	0	0	0	0
22		Duct Directivity Loss	Angle =	45		-1.2	-1.2	-2.0	-2.8	-2.9	-3.2	-3.2	-2.8
23		Duct Diameter (m)	Diameter (m) =	0.56									
24		End Reflection, Correction				5	1	0	0	0	0	0	0
27		Distance Loss (m)		80		46	46	46	46	46	46	46	46
29		Carbon Filter and dust collector											
30		Fantech C2P-056QS				6	8	11	21	27	24	19	15
31		Fantech C2P-056QS				6	8	11	21	27	24	19	15
34		Fantech C2P-056QS				6	8	11	21	27	24	19	15
36		Lp Contribution at Receptor			28	42	40	34	-1	-20	-16	-6	1
37			A Weighted			16	24	25	-4	-20	-15	-5	0
38		Intake				Noise Level - dB							
39	2	FB560			dBA	63	125	250	500	1000	2000	4000	8000
40		Sound Power Level - dB			106	107	107	108	102	101	96	91	86
42		Multiple units	Number =	2		3	3	3	3	3	3	3	3
43		Safety Factor	(normally 3)			0	0	0	0	0	0	0	0
51		Duct Directivity Loss	Angle =	45		-1.2	-1.2	-2.0	-2.8	-2.9	-3.2	-3.2	-2.8
52		Duct Diameter (m)	Diameter (m) =	0.56									
53		End Reflection, Correction				5	1	0	0	0	0	0	0
56		Distance Loss (m)		80		46	46	46	46	46	46	46	46
58		Fantech C2P-056QS				6	8	11	21	27	24	19	15
59		Fantech C2P-056QS				6	8	11	21	27	24	19	15
60		Fantech C2P-056QS				6	8	11	21	27	24	19	15
61													
62		Lp Contribution at Receptor			28	42	40	34	-1	-20	-16	-6	1
63			A Weighted			16	24	25	-4	-20	-15	-5	0
116													
117		TOTAL NOISE LEVEL AT RECEPTOR			dBA	63	125	250	500	1000	2000	4000	8000
124		Combined Noise Level =			31	45	43	37	2	-17	-13	-3	4

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		DUCT NOISE EMISSION COMPUTATION (Ductout.xls)									DAY DESIGN PTY LTD		
2			Version	3.0							Engineer:	SG	
3		Client:	Noakes Group								Project No:	7281	
4		Project:	Noakes Shipyard										
5		Noise Source	FDD Filter System								Atmosphere:		
6		Receptor Location:	Dumberton Street								deg.C	RH	
7		Noise Control:	Silencers	Overall Level =		27	dBA				20	60	%
8		Noise Criterion:			=	43	dBA						
9		Exhaust				Noise Level - dB							
10	1	FB560			dBA	63	125	250	500	1000	2000	4000	8000
11		Sound Power Level - dB			106	107	107	108	102	101	96	91	86
13		Multiple units	Number =	2		3	3	3	3	3	3	3	3
14		Safety Factor	(normally 3)			0	0	0	0	0	0	0	0
22		Duct Directivity Loss	Angle =	45		-1.2	-1.2	-2.0	-2.8	-2.9	-3.2	-3.2	-2.8
23		Duct Diameter (m)	Diameter (m) =	0.56									
24		End Reflection, Correction				5	1	0	0	0	0	0	0
27		Distance Loss (m)		125		50	50	50	50	50	50	50	50
29		Carbon Filter and dust collector											
30		Fantech C2P-056QS				6	8	11	21	27	24	19	15
31		Fantech C2P-056QS				6	8	11	21	27	24	19	15
32		Fantech C2P-056QS				6	8	11	21	27	24	19	15
33		Lp Contribution at Receptor			24	38	36	30	-5	-24	-20	-10	-3
34			A Weighted			12	20	21	-8	-24	-19	-9	-4
35		Intake				Noise Level - dB							
36	2	FB560			dBA	63	125	250	500	1000	2000	4000	8000
37		Sound Power Level - dB			106	107	107	108	102	101	96	91	86
39		Multiple units	Number =	2		3	3	3	3	3	3	3	3
40		Safety Factor	(normally 3)			0	0	0	0	0	0	0	0
48		Duct Directivity Loss	Angle =	45		-1.2	-1.2	-2.0	-2.8	-2.9	-3.2	-3.2	-2.8
49		Duct Diameter (m)	Diameter (m) =	0.56									
50		End Reflection, Correction				5	1	0	0	0	0	0	0
53		Distance Loss (m)		125		50	50	50	50	50	50	50	50
55		Fantech C2P-056QS				6	8	11	21	27	24	19	15
56		Fantech C2P-056QS				6	8	11	21	27	24	19	15
57		Fantech C2P-056QS				6	8	11	21	27	24	19	15
58													
59		Lp Contribution at Receptor			24	38	36	30	-5	-24	-20	-10	-3
60			A Weighted			12	20	21	-8	-24	-19	-9	-4
114		TOTAL NOISE LEVEL AT RECEPTOR			dBA	63	125	250	500	1000	2000	4000	8000
121		Combined Noise Level =			27	41	39	33	-2	-21	-17	-7	0

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		DUCT NOISE EMISSION COMPUTATION (Ductout.xls)								DAY DESIGN PTY LTD			
2			Version	3.0						Engineer:		SG	
3		Client:	Noakes Group							Project No:		7281	
4		Project:	Noakes Shipyard										
5		Noise Source	FDD Filter System								Atmosphere:		
6		Receptor Location:	Munro Street								deg.C	RH	
7		Noise Control:	Silencers	Overall Level =		30	dBA				20	60 %	
8		Noise Criterion:			=	46	dBA						
9		Exhaust				Noise Level - dB							
10	1	FB560			dBA	63	125	250	500	1000	2000	4000	8000
11		Sound Power Level - dB			106	107	107	108	102	101	96	91	86
13		Multiple units	Number =	2		3	3	3	3	3	3	3	3
14		Safety Factor	(normally 3)			0	0	0	0	0	0	0	0
22		Duct Directivity Loss	Angle =	45		-1.2	-1.2	-2.0	-2.8	-2.9	-3.2	-3.2	-2.8
23		Duct Diameter (m)	Diameter (m) =	0.56									
24		End Reflection, Correction				5	1	0	0	0	0	0	0
27		Distance Loss (m)		95		48	48	48	48	48	48	48	48
29		Carbon Filter and dust collector											
30		Fantech C2P-056QS				6	8	11	21	27	24	19	15
31		Fantech C2P-056QS				6	8	11	21	27	24	19	15
32		Fantech C2P-056QS				6	8	11	21	27	24	19	15
33		Lp Contribution at Receptor			27	40	39	32	-3	-22	-17	-7	-1
34			A Weighted			14	23	24	-6	-22	-16	-6	-2
35		Intake				Noise Level - dB							
36	2	FB560			dBA	63	125	250	500	1000	2000	4000	8000
37		Sound Power Level - dB			106	107	107	108	102	101	96	91	86
39		Multiple units	Number =	2		3	3	3	3	3	3	3	3
40		Safety Factor	(normally 3)			0	0	0	0	0	0	0	0
48		Duct Directivity Loss	Angle =	45		-1.2	-1.2	-2.0	-2.8	-2.9	-3.2	-3.2	-2.8
49		Duct Diameter (m)	Diameter (m) =	0.56									
50		End Reflection, Correction				5	1	0	0	0	0	0	0
53		Distance Loss (m)		95		48	48	48	48	48	48	48	48
55		Fantech C2P-056QS				6	8	11	21	27	24	19	15
56		Fantech C2P-056QS				6	8	11	21	27	24	19	15
57		Fantech C2P-056QS				6	8	11	21	27	24	19	15
58													
59		Lp Contribution at Receptor			27	40	39	32	-3	-22	-17	-7	-1
60			A Weighted			14	23	24	-6	-22	-16	-6	-2
113													
114		TOTAL NOISE LEVEL AT RECEPTOR			dBA	63	125	250	500	1000	2000	4000	8000
121		Combined Noise Level =			30	43	42	35	0	-18	-14	-4	2

Row	A	B / C	D / E (Input)	G (dBA)	63	125	250	500	1000	2000	4000	8000
1	ROOM NOISE EMISSION COMPUTATION		(ROOMOUT.XLS)						DAY DESIGN PTY LTD			
2				Version	6.10				Engineer:	SG		
3		Client	Noakes Group						Project No:	7281		
4		Project Title.	Noakes Shipyard, Berrys Bay						Date:	3-Dec-2021		
5		Room Description	FDD							Atmosphere:		
6										Temp C	20.0	
7		Receptor Location. . . .	John Street							RH%	90.0	
8		Noise Criterion	44.0 dBA									
9		Lw of NOISE SOURCES			NOISE LEVELS - dB (re: 1 picowatt)							
10		INSIDE ROOM	Number	dBA	63	125	250	500	1000	2000	4000	8000
11	1.	Sandblasting	2	127	96	102	105	110	112	117	122	123
21		TOTAL Lw IN ROOM =		127	96	102	105	110	112	117	122	123
22												
23	ROOM ABSORPTION,	Length =	59.2	Width= 15.0	m, Height = 8.5 metres				= 7553 m³			
24		Total Surface Area =	3039	Square Metres			Ave Absorption Co=efficients					
25	20.9				63	125	250	500	1000	2000	4000	8000
26	Ave Absorption Coefficient =	FDD with Stratocell Whisper and wavebar			0.07	0.11	0.19	0.44	0.56	0.57	0.65	0.78
27		Absorption =			200	344	563	1328	1699	1745	1982	2362
28		(Option: Enter m² Sabin) =										
29		Lw to Lp Correction =		dBA	-17.3	-19.9	-22.4	-27.7	-29.8	-30.1	-31.5	-34.2
30		Reverberant Lp Inside Room =		95	79	82	82	82	82	87	91	89
31	End Wall				Octave Band Centre Frequencies - Hz							
32	90.10	Flexishield, 6kg										
33				dBA	63	125	250	500	1000	2000	4000	8000
34	Dist Source	Direct Lp Inside Barrier	Input	104.6	74	80	83	88	90	95	100	101
35	to Barrier	Comb'd Lp Inside Barrier		105.0	80	84	85	89	91	96	101	101
36	No: Dist.	Trial Combined Lw Inside Barrier		125.8	96	102	105	110	112	117	121	122
37	1. 5.0	Effective Reverb Lp Inside Barrier		105.0	75	81	84	89	91	96	101	101
38	2.	Barrier Sound Trans. Loss	Rw =	30	12	16	20	25	32	39	45	45
39	3.	Area of Barrier, m² =	120									
40	4.	Lw Outside Barrier		87.2	84	86	85	85	81	78	77	78
41	5.	Reflection Q =	2		0	0	0	0	0	0	0	0
44	8.	Distance Loss Distance (m) =	72		45	45	45	45	45	45	45	45
49				dBA	63	125	250	500	1000	2000	4000	8000
50		Lp Contribution at Receptor =		41.6	38.7	41.2	39.6	39.8	35.5	33.0	30.9	28.8
51		(A weighted level =)			12.5	25.1	31.0	36.6	35.5	34.2	31.9	27.7
52												
53	Roof				Octave Band Centre Frequencies - Hz							
54	90.10	Flexishield, 6kg										
55				dBA	63	125	250	500	1000	2000	4000	8000
56	Dist Source	Direct Lp Inside Barrier		104.6	74	80	83	88	90	95	100	101
57	to Barrier	Comb'd Lp Inside Barrier		105.0	80	84	85	89	91	96	101	101
58	No: Dist.	Trial Combined Lw Inside Barrier		126.6	96	102	105	110	112	117	122	123
59	1. 5.0	Effective Reverb Lp Inside Barrier		100.8	70	76	79	84	87	92	96	97
60	2.	Barrier Sound Trans. Loss	Rw =	30	12	16	20	25	32	39	45	45
61	3.	Area of Barrier, m² =	375									
62	4.	Lw Outside Barrier		91.4	88	90	89	89	85	83	81	82
63	5.	Reflection Q =	2		0	0	0	0	0	0	0	0
66	8.	Distance (Loss) metre =	85		47	47	47	47	47	47	47	47
67	9.	Air Absorption							0	0	1	4
68	10.	Wall / Roof Directivity angle from normal	90		8	8	8	8	8	8	8	8
71				dBA	63	125	250	500	1000	2000	4000	8000
72		Lp Contribution at Receptor =		36.4	33.4	35.9	34.4	34.6	30.3	27.8	25.6	23.0
73		(A weighted level =)			7.2	19.8	25.8	31.4	30.3	29.0	26.6	21.9
74												
75	Gaps				Octave Band Centre Frequencies - Hz							
76	0.00	Open Window/Door										
77				dBA	63	125	250	500	1000	2000	4000	8000
78	Dist Source	Direct Lp Inside Barrier		104.6	74	80	83	88	90	95	100	101
79	to Barrier	Comb'd Lp Inside Barrier		105.0	80	84	85	89	91	96	101	101
80	No: Dist.	Trial Combined Lw Inside Barrier		108.0	83	87	88	92	94	99	104	104
81	1. 5.0	Effective Reverb Lp Inside Barrier		105.0	80	84	85	89	91	96	101	101
82	2.	Barrier Sound Trans. Loss	Rw =	0	0	0	0	0	0	0	0	0
83	3.	Area of Barrier, m² =	2									
84	4.	Lw Outside Barrier		108.7	80	85	87	92	94	99	104	105
85	5.	Reflection Q =	2		0	0	0	0	0	0	0	0
88	8.	Distance (Loss) metre =	72		45	45	45	45	45	45	45	45
89	9.	Air Absorption							0	0	1	4
90	10.	Wall / Roof Directivity angle from normal	0		0	0	0	0	0	0	0	0
91		Silencer (Fantech NSA20G, 50%open, 2400mm long)			8	17	34	50	50	40	28	20
92		Ground Absorption =										
93				dBA	63	125	250	500	1000	2000	4000	8000
94		Lp Contribution at Receptor =		36.5	26.9	23.2	8.2	-3.1	-0.8	14.1	30.2	36.0
95		(A weighted level =)			0.7	7.1	-0.4	-6.3	-0.8	15.3	31.2	34.9
148	Total Noise Level Contribution at Receptor =			44	40.1	42.4	40.8	41.0	36.6	34.2	34.2	36.9
149		(A weighted level =)			13.9	26.3	32.2	37.8	36.6	35.4	35.2	35.8
150		Noise Level Criterion =		44	dBA							

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	ROOM NOISE EMISSION COMPUTATION			(ROOMOUT.XLS)									DAY DESIGN PTY LTD				
2							Version		6.10				Engineer:	SG			
3		Client		Noakes Group									Project No:	7281			
4		Project Title.		Noakes Shipyard, Berrys Bay									Date:	3-Dec-2021			
5		Room Description		FDD										Atmosphere:			
6														Temp C	20.0		
7		Receptor Location. . . .		Dumbarton Street										RH%	90.0		
8		Noise Criterion		43.0	dBA												
9		Lw of NOISE SOURCES							NOISE LEVELS - dB (re: 1 picowatt)								
10		INSIDE ROOM			Number		dBA		63	125	250	500	1000	2000	4000	8000	
11	1.	Sandblasting			2		127		96	102	105	110	112	117	122	123	
21		TOTAL Lw IN ROOM =					127		96	102	105	110	112	117	122	123	
22																	
23	ROOM ABSORPTION,		Length =		59.2		Width=		18.8	m, Height =		8.5	metres	=	9467	m^3	
24			Total Surface Area =		3554		Square Metres				Ave Absorption Co=efficients						
25	20.9								63	125	250	500	1000	2000	4000	8000	
26	Ave Absorption Coefficient =			FDD with Stratocell Whisper and wavebar					0.07	0.11	0.19	0.44	0.56	0.57	0.65	0.78	
27			Absorption =						234	402	658	1553	1987	2041	2317	2762	
28			(Option: Enter m^2 Sabin) =														
29			Lw to Lp Correction =				dBA		-18.0	-20.5	-23.1	-28.4	-30.5	-30.8	-32.2	-34.9	
30			Reverberant Lp Inside Room =				94		78	82	82	81	82	87	90	88	
31	End Wall								Octave Band Centre Frequencies - Hz								
32	90.10			Flexishield, 6kg													
33							dBA		63	125	250	500	1000	2000	4000	8000	
34	Dist Source		Direct Lp Inside Barrier		Input		104.6		74	80	83	88	90	95	100	101	
35	to Barrier		Comb'd Lp Inside Barrier				105.0		79	84	85	89	91	96	101	101	
36	No:	Dist.	Trial Combined Lw Inside Barrier				125.8		96	102	105	110	112	117	121	122	
37	1.	5.0	Effective Reverb Lp Inside Barrier				105.0		75	81	84	89	91	96	101	101	
38	2.		Barrier Sound Trans. Loss			Rw =	30		12	16	20	25	32	39	45	45	
39	3.		Area of Barrier, m^2 =		120												
40	4.		Lw Outside Barrier				87.1		84	86	85	85	81	78	77	78	
41	5.		Reflection Q =		2				0	0	0	0	0	0	0	0	
44	8.		Distance Loss	Distance (m) =	123				50	50	50	50	50	50	50	50	
45	9.		Air Absorption										0	0	2	6	
49							dBA		63	125	250	500	1000	2000	4000	8000	
50			Lp Contribution at Receptor =				36.8		34.1	36.5	35.0	35.1	30.8	28.2	25.5	21.4	
51			(A weighted level =)						7.9	20.4	26.4	31.9	30.8	29.4	26.5	20.3	
52																	
53	Roof								Octave Band Centre Frequencies - Hz								
54	90.10			Flexishield, 6kg													
55							dBA		63	125	250	500	1000	2000	4000	8000	
56	Dist Source		Direct Lp Inside Barrier				104.6		74	80	83	88	90	95	100	101	
57	to Barrier		Comb'd Lp Inside Barrier				105.0		79	84	85	89	91	96	101	101	
58	No:	Dist.	Trial Combined Lw Inside Barrier				126.6		96	102	105	110	112	117	122	123	
59	1.	5.0	Effective Reverb Lp Inside Barrier				100.8		70	76	79	84	87	92	96	97	
60	2.		Barrier Sound Trans. Loss			Rw =	30		12	16	20	25	32	39	45	45	
61	3.		Area of Barrier, m^2 =		375												
62	4.		Lw Outside Barrier				91.4		88	90	89	89	85	83	81	82	
63	5.		Reflection Q =		2				0	0	0	0	0	0	0	0	
66	8.		Distance (Loss) metre =		130				50	50	50	50	50	50	50	50	
67	9.		Air Absorption										0	0	2	7	
71							dBA		63	125	250	500	1000	2000	4000	8000	
72			Lp Contribution at Receptor =				40.5		37.7	40.2	38.7	38.9	34.6	32.0	29.3	24.9	
73			(A weighted level =)						11.5	24.1	30.1	35.7	34.6	33.2	30.3	23.8	
74																	
75	Gaps								Octave Band Centre Frequencies - Hz								
76	0.00			Open Window/Door													
77							dBA		63	125	250	500	1000	2000	4000	8000	
78	Dist Source		Direct Lp Inside Barrier				104.6		74	80	83	88	90	95	100	101	
79	to Barrier		Comb'd Lp Inside Barrier				105.0		79	84	85	89	91	96	101	101	
80	No:	Dist.	Trial Combined Lw Inside Barrier				111.0		86	90	91	95	97	102	107	107	
81	1.	5.0	Effective Reverb Lp Inside Barrier				105.0		79	84	85	89	91	96	101	101	
82	2.		Barrier Sound Trans. Loss			Rw =	0		0	0	0	0	0	0	0	0	
83	3.		Area of Barrier, m^2 =		4												
84	4.		Lw Outside Barrier				111.7		83	88	90	95	97	102	107	108	
85	5.		Reflection Q =		2				0	0	0	0	0	0	0	0	
88	8.		Distance (Loss) metre =		123				50	50	50	50	50	50	50	50	
89	9.		Silencer (Fantech NSA20G, 50%open, 2400mm long)						8	17	34	50	50	40	28	20	
90	10.		Wall / Roof Directivity - angle from normal		45				2	2	2	2	2	2	2	2	
93							dBA		63	125	250	500	1000	2000	4000	8000	
94			Lp Contribution at Receptor =				36.4		23.5	19.9	5.0	-6.3	-3.9	11.2	28.0	36.7	
95			(A weighted level =)						-2.7	3.8	-3.6	-9.5	-3.9	12.4	29.0	35.6	
148	Total Noise Level Contribution at Receptor =						43		39.4	41.8	40.2	40.4	36.1	33.6	32.6	37.1	
149			(A weighted level =)						13.2	25.7	31.6	37.2	36.1	34.8	33.6	36.0	
150			Noise Level Criterion =				43		dBA								

	A	B	C	D	E	F	G	I	J	K	L	M	N	O	P
1	ROOM NOISE EMISSION COMPUTATION			(ROOMOUT.XLS)								DAY DESIGN PTY LTD			
2							Version	6.10				Engineer:		SG	
3			Client	Noakes Group								Project No:		7281	
4			Project Title.	Noakes Shipyard, Berrys Bay								Date:		3-Dec-2021	
5			Room Description	FDD										Atmosphere:	
6														Temp C	20.0
7			Receptor Location. . . .	Munro Street										RH%	90.0
8			Noise Criterion	46.0	dBA										
9			Lw of NOISE SOURCES								NOISE LEVELS - dB (re: 1 picowatt)				
10			INSIDE ROOM		Number		dBA	63	125	250	500	1000	2000	4000	8000
11		1.	Sandblasting		2		127	96	102	105	110	112	117	122	123
21			TOTAL Lw IN ROOM =				127	96	102	105	110	112	117	122	123
22															
23	ROOM ABSORPTION,		Length =		59.2		Width=	18.8	m, Height =		8.5	metres		= 9467	m³
24			Total Surface Area =		3554		Square Metres				Ave Absorption Co=efficients				
25	20.9							63	125	250	500	1000	2000	4000	8000
26	Ave Absorption Coefficient =			FDD with Stratocell Whisper and wavebar				0.07	0.11	0.19	0.44	0.56	0.57	0.65	0.78
27			Absorption =					234	402	658	1553	1987	2041	2317	2762
28			(Option: Enter m² Sabin) =												
29			Lw to Lp Correction =				dBA	-18.0	-20.5	-23.1	-28.4	-30.5	-30.8	-32.2	-34.9
30			Reverberant Lp Inside Room =				94	78	82	82	81	82	87	90	88
31	End Wall										Octave Band Centre Frequencies - Hz				
32	90.10			Flexishield, 6kg											
33							dBA	63	125	250	500	1000	2000	4000	8000
34	Dist Source		Direct Lp Inside Barrier		Input		104.6	74	80	83	88	90	95	100	101
35	to Barrier		Comb'd Lp Inside Barrier				105.0	79	84	85	89	91	96	101	101
36	No:	Dist.	Trial Combined Lw Inside Barrier				125.8	96	102	105	110	112	117	121	122
37	1.	5.0	Effective Reverb Lp Inside Barrier				105.0	75	81	84	89	91	96	101	101
38	2.		Barrier Sound Trans. Loss			Rw =	30	12	16	20	25	32	39	45	45
39	3.		Area of Barrier, m² =		120										
40	4.		Lw Outside Barrier				87.1	84	86	85	85	81	78	77	78
41	5.		Reflection Q =		2			0	0	0	0	0	0	0	0
44	8.		Distance Loss	Distance (m) =	88			47	47	47	47	47	47	47	47
45	9.		Air Absorption									0	0	1	5
49							dBA	63	125	250	500	1000	2000	4000	8000
50			Lp Contribution at Receptor =				39.8	37.0	39.4	37.9	38.0	33.7	31.2	28.9	26.2
51			(A weighted level =)					10.8	23.3	29.3	34.8	33.7	32.4	29.9	25.1
52															
53	Roof										Octave Band Centre Frequencies - Hz				
54	90.10			Flexishield, 6kg											
55							dBA	63	125	250	500	1000	2000	4000	8000
56	Dist Source		Direct Lp Inside Barrier				104.6	74	80	83	88	90	95	100	101
57	to Barrier		Comb'd Lp Inside Barrier				105.0	79	84	85	89	91	96	101	101
58	No:	Dist.	Trial Combined Lw Inside Barrier				126.6	96	102	105	110	112	117	122	123
59	1.	5.0	Effective Reverb Lp Inside Barrier				100.8	70	76	79	84	87	92	96	97
60	2.		Barrier Sound Trans. Loss			Rw =	30	12	16	20	25	32	39	45	45
61	3.		Area of Barrier, m² =		375										
62	4.		Lw Outside Barrier				91.4	88	90	89	89	85	83	81	82
63	5.		Reflection Q =		2			0	0	0	0	0	0	0	0
66	8.		Distance (Loss) metre =		95			48	48	48	48	48	48	48	48
67	9.		Air Absorption									0	0	1	5
68	10.		Wall / Roof Directivity - angle from normal		90			8	8	8	8	8	8	8	8
71							dBA	63	125	250	500	1000	2000	4000	8000
72			Lp Contribution at Receptor =				35.4	32.4	34.9	33.4	33.6	29.3	26.8	24.5	21.5
73			(A weighted level =)					6.2	18.8	24.8	30.4	29.3	28.0	25.5	20.4
74															
75	Gaps										Octave Band Centre Frequencies - Hz				
76	0.00			Open Window/Door											
77							dBA	63	125	250	500	1000	2000	4000	8000
78	Dist Source		Direct Lp Inside Barrier				104.6	74	80	83	88	90	95	100	101
79	to Barrier		Comb'd Lp Inside Barrier				105.0	79	84	85	89	91	96	101	101
80	No:	Dist.	Trial Combined Lw Inside Barrier				108.0	83	87	88	92	94	99	104	104
81	1.	5.0	Effective Reverb Lp Inside Barrier				105.0	79	84	85	89	91	96	101	101
82	2.		Barrier Sound Trans. Loss			Rw =	0	0	0	0	0	0	0	0	0
83	3.		Area of Barrier, m² =		2										
84	4.		Lw Outside Barrier				108.7	80	85	87	92	94	99	104	105
85	5.		Reflection Q =		2			0	0	0	0	0	0	0	0
88	8.		Distance (Loss) metre =		88			47	47	47	47	47	47	47	47
89	9.		Silencer (Fantech NSA20G, 50%open, 2400mm long)					8	17	34	50	50	40	28	20
93							dBA	63	125	250	500	1000	2000	4000	8000
94			Lp Contribution at Receptor =				37.8	24.9	21.3	6.4	-4.9	-2.5	12.6	29.4	38.1
95			(A weighted level =)					-1.3	5.2	-2.2	-8.1	-2.5	13.8	30.4	37.0
148	Total Noise Level Contribution at Receptor =						43	38.5	40.8	39.2	39.4	35.0	32.6	32.9	38.4
149			(A weighted level =)					12.3	24.7	30.6	36.2	35.0	33.8	33.9	37.3
150			Noise Level Criterion =				46	dBA							

	A	B	C	D	E	F	G	I	J	K	L	M	N	O	P
1	ROOM NOISE EMISSION COMPUTATION			(ROOMOUT.XLS)								DAY DESIGN PTY LTD			
2							Version	6.10				Engineer:	SG		
3		Client		Noakes Group								Project No:	7281		
4		Project Title..........		Noakes Shipyard, Berrys Bay								Date:	3-Dec-2021		
5		Room Description		FDD									Atmosphere:		
6													Temp C	20.0	
7		Receptor Location....		John Street									RH%	90.0	
8		Noise Criterion		44.0	dBA										
9		Lw of NOISE SOURCES						NOISE LEVELS - dB (re: 1 picowatt)							
10		INSIDE ROOM			Number		dBA	63	125	250	500	1000	2000	4000	8000
13	3.	Hammering & Multi-tool			1		102	97	95	96	96	96	95	94	91
14	4.	Water Blaster			1		101	81	92	89	91	92	93	95	97
15	5.	Polishing Steel with Grinder			1		93	80	76	73	81	81	87	86	88
21		TOTAL Lw IN ROOM =					105	97	97	97	97	98	98	98	98
22															
23	ROOM ABSORPTION,		Length =		59.2		Width=	18.8	m, Height =		8.5	metres	=	9467	m^3
24			Total Surface Area =		3554		Square Metres				Ave Absorption Co=efficients				
25	20.9							63	125	250	500	1000	2000	4000	8000
26	Ave Absorption Coefficient =			FDD with Stratocell Whisper and wavebar				0.07	0.11	0.19	0.44	0.56	0.57	0.65	0.78
27			Absorption =					234	402	658	1553	1987	2041	2317	2762
28			(Option: Enter m^2 Sabin) =												
29			Lw to Lp Correction =				dBA	-18.0	-20.5	-23.1	-28.4	-30.5	-30.8	-32.2	-34.9
30			Reverberant Lp Inside Room =				74	79	76	74	69	67	67	66	63
31	End Wall							Octave Band Centre Frequencies - Hz							
32	90.10			Flexishield, 6kg											
33							dBA	63	125	250	500	1000	2000	4000	8000
34	Dist Source		Direct Lp Inside Barrier		Input		82.7	75	75	75	75	76	76	76	76
35	to Barrier		Comb'd Lp Inside Barrier				83.3	81	79	77	76	76	76	76	77
36	No:	Dist.	Trial Combined Lw Inside Barrier				104.0	97	97	97	97	97	97	97	97
37	1.	5.0	Effective Reverb Lp Inside Barrier				83.2	76	76	76	76	76	76	76	77
38	2.	5.0	Barrier Sound Trans. Loss			Rw =	30	12	16	20	25	32	39	45	45
39	3.	5.0	Area of Barrier, m^2 =		120										
40	4.	5.0	Lw Outside Barrier				73.9	85	81	77	72	66	59	53	53
41	5.	5.0	Reflection Q =		2			0	0	0	0	0	0	0	0
44	8.		Distance Loss	Distance (m) =	72			45	45	45	45	45	45	45	45
45	9.		Air Absorption									0	0	1	4
49							dBA	63	125	250	500	1000	2000	4000	8000
50			Lp Contribution at Receptor =				28.7	39.9	35.8	31.8	27.3	20.7	13.2	6.5	4.3
51			(A weighted level =)					13.7	19.7	23.2	24.1	20.7	14.4	7.5	3.2
53	Roof							Octave Band Centre Frequencies - Hz							
54	0.00			Open Window/Door											
55							dBA	63	125	250	500	1000	2000	4000	8000
56	Dist Source		Direct Lp Inside Barrier				82.7	75	75	75	75	76	76	76	76
57	to Barrier		Comb'd Lp Inside Barrier				83.3	81	79	77	76	76	76	76	77
58	No:	Dist.	Trial Combined Lw Inside Barrier				104.7	97	97	97	97	98	98	98	98
59	1.	5.0	Effective Reverb Lp Inside Barrier				79.0	71	71	71	72	72	72	72	73
60	2.	5.0	Barrier Sound Trans. Loss			Rw =	0	0	0	0	0	0	0	0	0
61	3.	5.0	Area of Barrier, m^2 =		375										
62	4.	5.0	Lw Outside Barrier				97.7	90	90	90	90	91	91	91	91
63	5.	5.0	Reflection Q =		2			0	0	0	0	0	0	0	0
66	8.		Distance (Loss) metre =		85			47	47	47	47	47	47	47	47
67	9.		Air Absorption									0	0	1	4
68	10.		Wall / Roof Directivity - angle from normal		90			8	8	8	8	8	8	8	8
71							dBA	63	125	250	500	1000	2000	4000	8000
72			Lp Contribution at Receptor =				42.2	35.6	35.2	35.2	35.7	35.9	35.7	35.1	32.3
73			(A weighted level =)					9.4	19.1	26.6	32.5	35.9	36.9	36.1	31.2
74															
75	Air Intake							Octave Band Centre Frequencies - Hz							
76	0.00			Open Window/Door											
77							dBA	63	125	250	500	1000	2000	4000	8000
78	Dist Source		Direct Lp Inside Barrier				82.7	75	75	75	75	76	76	76	76
79	to Barrier		Comb'd Lp Inside Barrier				83.3	81	79	77	76	76	76	76	77
80	No:	Dist.	Trial Combined Lw Inside Barrier				86.3	84	82	80	79	79	79	79	80
81	1.	5.0	Effective Reverb Lp Inside Barrier				83.3	81	79	77	76	76	76	76	77
82	2.	5.0	Barrier Sound Trans. Loss			Rw =	0	0	0	0	0	0	0	0	0
83	3.	5.0	Area of Barrier, m^2 =		2										
84	4.	5.0	Lw Outside Barrier				86.8	81	80	79	80	80	80	80	80
85	5.	5.0	Reflection Q =		2			0	0	0	0	0	0	0	0
88	8.		Distance (Loss) metre =		72			45	45	45	45	45	45	45	45
89	9.		Air Absorption									0	0	1	4
91			Silencer (Fantech NSA20G, 50%open, 2400mm long)					8	17	34	50	50	40	28	20
93							dBA	63	125	250	500	1000	2000	4000	8000
94			Lp Contribution at Receptor =				12.9	27.8	17.7	0.3	-15.6	-15.5	-5.7	5.8	11.5
95			(A weighted level =)					1.6	1.6	-8.3	-18.8	-15.5	-4.5	6.8	10.4
148	Total Noise Level Contribution at Receptor =						42	41.5	38.6	36.9	36.3	36.0	35.7	35.2	32.4
149			(A weighted level =)					15.3	22.5	28.3	33.1	36.0	36.9	36.2	31.3

Row	A	B	C	D	E	G	I	J	K	L	M	N	O	P
1	ROOM NOISE EMISSION COMPUTATION			(ROOMOUT.XLS)							DAY DESIGN PTY LTD			
2						Version	6.10				Engineer:		SG	
3		Client		Noakes Group							Project No:		7281	
4		Project Title.		Noakes Shipyard, Berrys Bay							Date:		3-Dec-2021	
5		Room Description		FDD									Atmosphere:	
6													Temp C	20.0
7		Receptor Location. . . .		Dumbarton Street									RH%	90.0
8		Noise Criterion		43.0	dBA									
9		Lw of NOISE SOURCES					NOISE LEVELS - dB (re: 1 picowatt)							
10		INSIDE ROOM			Number	dBA	63	125	250	500	1000	2000	4000	8000
13	3.	Hammering & Multi-tool			1	102	97	95	96	96	96	95	94	91
14	4.	Water Blaster			1	101	81	92	89	91	92	93	95	97
15	5.	Polishing Steel with Grinder			1	93	80	76	73	81	81	87	86	88
21		TOTAL Lw IN ROOM =				105	97	97	97	97	98	98	98	98
22														
23	ROOM ABSORPTION,		Length =		59.2	Width=	18.8	m, Height =		8.5	metres	=	9467	m^3
24			Total Surface Area =		3554	Square Metres			Ave Absorption Co=efficients					
25	20.9						63	125	250	500	1000	2000	4000	8000
26	Ave Absorption Coefficient =			FDD with Stratocell Whisper and wavebar			0.07	0.11	0.19	0.44	0.56	0.57	0.65	0.78
27			Absorption =				234	402	658	1553	1987	2041	2317	2762
28			(Option: Enter m^2 Sabin) =											
29			Lw to Lp Correction =			dBA	-18.0	-20.5	-23.1	-28.4	-30.5	-30.8	-32.2	-34.9
30			Reverberant Lp Inside Room =			74	79	76	74	69	67	67	66	63
31	End Wall						Octave Band Centre Frequencies - Hz							
32	90.10			Flexishield, 6kg										
33						dBA	63	125	250	500	1000	2000	4000	8000
34	Dist Source		Direct Lp Inside Barrier		Input	82.7	75	75	75	75	76	76	76	76
35	to Barrier		Comb'd Lp Inside Barrier			83.3	81	79	77	76	76	76	76	77
36	No:	Dist.	Trial Combined Lw Inside Barrier			104.7	97	97	97	97	98	98	98	98
37	1.	5.0	Effective Reverb Lp Inside Barrier			83.1	76	75	75	76	76	76	76	77
38	2.	5.0	Barrier Sound Trans. Loss		Rw =	30	12	16	20	25	32	39	45	45
39	3.	5.0	Area of Barrier, m^2 =		144									
40	4.	5.0	Lw Outside Barrier			74.5	86	82	78	73	67	59	53	54
41	5.	5.0	Reflection Q =		2		0	0	0	0	0	0	0	0
44	8.		Distance Loss	Distance (m) =	123		50	50	50	50	50	50	50	50
45	9.		Air Absorption								0	0	2	6
49						dBA	63	125	250	500	1000	2000	4000	8000
50			Lp Contribution at Receptor =			24.7	35.9	31.8	27.8	23.3	16.8	9.2	1.9	-2.3
51			(A weighted level =)				9.7	15.7	19.2	20.1	16.8	10.4	2.9	-3.4
52														
53	Roof						Octave Band Centre Frequencies - Hz							
54	0.00			Open Window/Door										
55						dBA	63	125	250	500	1000	2000	4000	8000
56	Dist Source		Direct Lp Inside Barrier			82.7	75	75	75	75	76	76	76	76
57	to Barrier		Comb'd Lp Inside Barrier			83.3	81	79	77	76	76	76	76	77
58	No:	Dist.	Trial Combined Lw Inside Barrier			104.7	97	97	97	97	98	98	98	98
59	1.	5.0	Effective Reverb Lp Inside Barrier			79.0	71	71	71	72	72	72	72	73
60	2.	5.0	Barrier Sound Trans. Loss		Rw =	0	0	0	0	0	0	0	0	0
61	3.	5.0	Area of Barrier, m^2 =		375									
62	4.	5.0	Lw Outside Barrier			97.7	90	90	90	90	91	91	91	91
63	5.	5.0	Reflection Q =		2		0	0	0	0	0	0	0	0
66	8.		Distance (Loss) metre =		130		50	50	50	50	50	50	50	50
67	9.		Air Absorption								0	0	2	7
68	10.		Wall / Roof Directivity - angle from normal		90		8	8	8	8	8	8	8	8
71						dBA	63	125	250	500	1000	2000	4000	8000
72			Lp Contribution at Receptor =			38.1	31.9	31.5	31.5	32.0	32.2	31.8	30.9	26.3
73			(A weighted level =)				5.7	15.4	22.9	28.8	32.2	33.0	31.9	25.2
74														
75	Air Intake						Octave Band Centre Frequencies - Hz							
76	0.00			Open Window/Door										
77						dBA	63	125	250	500	1000	2000	4000	8000
78	Dist Source		Direct Lp Inside Barrier			82.7	75	75	75	75	76	76	76	76
79	to Barrier		Comb'd Lp Inside Barrier			83.3	81	79	77	76	76	76	76	77
80	No:	Dist.	Trial Combined Lw Inside Barrier			89.3	87	85	83	82	82	82	82	83
81	1.	5.0	Effective Reverb Lp Inside Barrier			83.3	81	79	77	76	76	76	76	77
82	2.	5.0	Barrier Sound Trans. Loss		Rw =	0	0	0	0	0	0	0	0	0
83	3.	5.0	Area of Barrier, m^2 =		4									
84	4.	5.0	Lw Outside Barrier			89.9	84	83	82	83	83	83	83	83
85	5.	5.0	Reflection Q =		2		0	0	0	0	0	0	0	0
88	8.		Distance (Loss) metre =		123		50	50	50	50	50	50	50	50
89	9.		Silencer (Fantech NSA20G, 50%open, 2400mm long)				8	17	34	50	50	40	28	20
90	10.		Wall / Roof Directivity - angle from normal		45		2	2	2	2	2	2	2	2
93						dBA	63	125	250	500	1000	2000	4000	8000
94			Lp Contribution at Receptor =			12.4	24.7	14.6	-2.8	-18.8	-18.6	-8.6	3.6	12.2
95			(A weighted level =)				-1.5	-1.5	-11.4	-22.0	-18.6	-7.4	4.6	11.1
148	Total Noise Level Contribution at Receptor =					38	37.6	34.7	33.1	32.6	32.3	31.9	30.9	26.5
149			(A weighted level =)				11.4	18.6	24.5	29.4	32.3	33.1	31.9	25.4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	ROOM NOISE EMISSION COMPUTATION			(ROOMOUT.XLS)									DAY DESIGN PTY LTD			
2							Version		6.10				Engineer:		SG	
3			Client	Noakes Group									Project No:		7281	
4			Project Title.	Noakes Shipyard, Berrys Bay									Date:		3-Dec-2021	
5			Room Description	FDD											Atmosphere:	
6															Temp C	20.0
7			Receptor Location. . . .	Munro Street											RH%	90.0
8			Noise Criterion	46.0	dBA											
9			Lw of NOISE SOURCES						NOISE LEVELS - dB (re: 1 picowatt)							
10			INSIDE ROOM		Number		dBA		63	125	250	500	1000	2000	4000	8000
13	3.	Hammering & Multi-tool			1		102		97	95	96	96	96	95	94	91
14	4.	Water Blaster			1		101		81	92	89	91	92	93	95	97
15	5.	Polishing Steel with Grinder			1		93		80	76	73	81	81	87	86	88
21			TOTAL Lw IN ROOM =				105		97	97	97	97	98	98	98	98
22																
23	ROOM ABSORPTION,		Length =	59.2			Width=		18.8	m,	Height =	8.5	metres	=	9467	m^3
24			Total Surface Area =	3554			Square Metres					Ave Absorption Co=efficients				
25	20.9								63	125	250	500	1000	2000	4000	8000
26	Ave Absorption Coefficient =			FDD with Stratocell Whisper and wavebar					0.07	0.11	0.19	0.44	0.56	0.57	0.65	0.78
27			Absorption =						234	402	658	1553	1987	2041	2317	2762
28			(Option: Enter m^2 Sabin) =													
29			Lw to Lp Correction =				dBA		-18.0	-20.5	-23.1	-28.4	-30.5	-30.8	-32.2	-34.9
30			Reverberant Lp Inside Room =				74		79	76	74	69	67	67	66	63
31	End Wall								Octave Band Centre Frequencies - Hz							
32	90.10			Flexishield, 6kg												
33							dBA		63	125	250	500	1000	2000	4000	8000
34	Dist Source		Direct Lp Inside Barrier		Input		82.7		75	75	75	75	76	76	76	76
35	to Barrier		Comb'd Lp Inside Barrier				83.3		81	79	77	76	76	76	76	77
36	No:	Dist.	Trial Combined Lw Inside Barrier				104.7		97	97	97	97	98	98	98	98
37	1.	5.0	Effective Reverb Lp Inside Barrier				83.1		76	75	75	76	76	76	76	77
38	2.	5.0	Barrier Sound Trans. Loss			Rw =	30		12	16	20	25	32	39	45	45
39	3.	5.0	Area of Barrier, m^2 =		144											
40	4.	5.0	Lw Outside Barrier				74.5		86	82	78	73	67	59	53	54
41	5.	5.0	Reflection Q =		2				0	0	0	0	0	0	0	0
44	8.		Distance Loss	Distance (m) =	88				47	47	47	47	47	47	47	47
49							dBA		63	125	250	500	1000	2000	4000	8000
50			Lp Contribution at Receptor =				27.6		38.8	34.7	30.7	26.2	19.7	12.2	5.3	2.5
51			(A weighted level =)						12.6	18.6	22.1	23.0	19.7	13.4	6.3	1.4
52																
53	Roof								Octave Band Centre Frequencies - Hz							
54	0.00			Open Window/Door												
55							dBA		63	125	250	500	1000	2000	4000	8000
56	Dist Source		Direct Lp Inside Barrier				82.7		75	75	75	75	76	76	76	76
57	to Barrier		Comb'd Lp Inside Barrier				83.3		81	79	77	76	76	76	76	77
58	No:	Dist.	Trial Combined Lw Inside Barrier				104.7		97	97	97	97	98	98	98	98
59	1.	5.0	Effective Reverb Lp Inside Barrier				79.0		71	71	71	72	72	72	72	73
60	2.	5.0	Barrier Sound Trans. Loss			Rw =	0		0	0	0	0	0	0	0	0
61	3.	5.0	Area of Barrier, m^2 =		375											
62	4.	5.0	Lw Outside Barrier				97.7		90	90	90	90	91	91	91	91
63	5.	5.0	Reflection Q =		2				0	0	0	0	0	0	0	0
66	8.		Distance (Loss) metre =		95				48	48	48	48	48	48	48	48
67	9.		Air Absorption										0	0	1	5
68	10.		Wall / Roof Directivity - angle from normal		90				8	8	8	8	8	8	8	8
71							dBA		63	125	250	500	1000	2000	4000	8000
72			Lp Contribution at Receptor =				41.1		34.6	34.3	34.3	34.8	34.9	34.7	34.0	30.8
73			(A weighted level =)						8.4	18.2	25.7	31.6	34.9	35.9	35.0	29.7
74																
75	Air Intake								Octave Band Centre Frequencies - Hz							
76	0.00			Open Window/Door												
77							dBA		63	125	250	500	1000	2000	4000	8000
78	Dist Source		Direct Lp Inside Barrier				82.7		75	75	75	75	76	76	76	76
79	to Barrier		Comb'd Lp Inside Barrier				83.3		81	79	77	76	76	76	76	77
80	No:	Dist.	Trial Combined Lw Inside Barrier				86.3		84	82	80	79	79	79	79	80
81	1.	5.0	Effective Reverb Lp Inside Barrier				83.3		81	79	77	76	76	76	76	77
82	2.	5.0	Barrier Sound Trans. Loss			Rw =	0		0	0	0	0	0	0	0	0
83	3.	5.0	Area of Barrier, m^2 =		2											
84	4.	5.0	Lw Outside Barrier				86.8		81	80	79	80	80	80	80	80
85	5.	5.0	Reflection Q =		2				0	0	0	0	0	0	0	0
88	8.		Distance (Loss) metre =		88				47	47	47	47	47	47	47	47
89	9.		Silencer (Fantech NSA20G, 50%open, 2400mm long)						8	17	34	50	50	40	28	20
93							dBA		63	125	250	500	1000	2000	4000	8000
94			Lp Contribution at Receptor =				13.8		26.1	16.0	-1.4	-17.4	-17.2	-7.2	5.0	13.6
95			(A weighted level =)						-0.1	-0.1	-10.0	-20.6	-17.2	-6.0	6.0	12.5
148	Total Noise Level Contribution at Receptor =						41		40.4	37.5	35.9	35.3	35.1	34.7	34.1	30.9
149			(A weighted level =)						14.2	21.4	27.3	32.1	35.1	35.9	35.1	29.8

Aboriginal Cultural Heritage Assessment

6 John St, Berrys Bay

Prepared for Stannards Marine
December 2021

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SYDNEY
Ground Floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

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Level 3, 175 Scott Street
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BRISBANE
Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

ADELAIDE
Level 4, 74 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Ground Floor, 188 Normanby Road
Southbank VIC 3006
T 03 9993 1905

PERTH
Suite 9.02, Level 9, 109 St Georges Terrace
Perth WA 6000
T 02 9339 3184

CANBERRA
PO Box 9148
Deakin ACT 2600

www.emmconsulting.com.au

Aboriginal Cultural Heritage Assessment

6 John St, Berrys Bay

Report Number

E210732 RP1

Client

Stannards Marine

Date

3 December 2021

Version

v3 Final

Prepared by

Pamela Chauvel
Senior Archaeologist
3 December 2021

Approved by

Dr Alan Williams FSA FRSA MAACAI
Associate Director
3 December 2021

Content warning

Aboriginal and Torres Strait Islander peoples are advised that the following report contains reference to, and images of, people who have died.

Executive Summary

EMM Consulting Pty Ltd (EMM) has been engaged by Stannards Marine Pty Ltd to undertake an Aboriginal cultural heritage assessment (ACHA) of the proposed mooring of a floating dry dock (FDD) facility at 6 John Street, McMahons Point, NSW (the project). The proposed activity for the FFD facility are located primarily within Berrys Bay itself, limited to the removal or extrusion of several moor piles and wharf supports from the seabed. No ground disturbance is proposed for works associated with the mooring and other land-based components of the project, although some improvement of existing systems are necessary to address additional environmental requirements (eg water runoff, air quality, etc).

To allow the works, a Development Application (DA) (#03/2018) was lodged with North Sydney Council on 5 March 2019. As an integrated development, inputs into the DA were sought from Heritage NSW (then Office of Environment and Heritage) and these were provided as Secretary's Environmental Assessment Requirements (SEARs). They indicated that consideration of Aboriginal cultural heritage impacts of the proposed activity was required. The DA was ultimately rejected on 13 May 2021 and is now being determined through the Land and Environment Court (LEC) process (#2021/00063136). The Statement of Facts and Contentions for the case identified that Aboriginal cultural heritage has yet to be investigated or assessed. EMM have subsequently been engaged to prepare an ACHA which addresses these contentions, and further understand the potential impacts (if any) to Aboriginal cultural heritage.

Aboriginal consultation was undertaken for the project in accordance with Heritage NSW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). The consultation process initially identified 46 Aboriginal stakeholder organisations who may have an interest in the project. Following notification of these organisations, eight registered to be consulted through the project. Four of these Registered Aboriginal Parties (RAPs) participated on a one-day site inspection, this included a number of Darug traditional owner groups. Feedback for the project to date has been generally positive, with no site specific issues identified. A draft report was provided to the RAPs in mid-November 2021, and two written responses have been received. The comment period required by Heritage NSW guidelines extends to 12 December 2021; and an update to this report regarding consultation will be provided if further commentary is received.

Desktop information indicated that the archaeological record of the locale is dominated by rockshelters, middens, engravings and/or stone artefact sites of varying densities. These are primarily dated to the last several thousand years. A review of the history of the study area suggests that the potential for cultural materials of these past activities would be limited. Prior to 8,000 years ago, the study area would have represented a moderate slope over-looking the now drowned river valley of Port Jackson. The apparent relief and geomorphology of the site indicates that rockshelter-type environments were not present, and as such were likely characterised by shallow soil profiles still found along parts of Port Jackson today. Such soil profiles (and any associated cultural material) are prone to replacement and loss by natural and anthropogenic processes, which included both the process of inundation and subsequent marine activities, and the more recent reclamation of the locale in the last hundred years. After 8,000 years, the site has been submerged or inter-tidal. Geotechnical information indicates that that some 5 m of fill and overburden is present on the site as part of reclamation works in the 20th Century.

Early explorer and colonial records do not make specific reference to activities in Berrys Bay, although a range of socio-economic activities (eg fishing, etc) are documented as occurring along the foreshores of Port Jackson. More recent activity in Berrys Bay has been documented in the late 19th Century in which an Aboriginal camp was briefly noted. No further information on its exact location, size, or composition was mentioned however.

Based on these conditions, it is expected that any remnant cultural material would comprise isolated or disparate stone artefact sites and/or shell found in a secondary context (ie not where it was initially discarded) in marine sediments and/or 20th Century fill materials within the study area. The potential for other more significant archaeological sites, such as rockshelters (and associated features such as art) or engravings are considered improbable based on the geomorphology of the site.

No Aboriginal objects, sites or areas of potential archaeological deposit (PAD) were identified as a result of a site inspection conducted with RAP representatives on 27 October 2021. Discussions with RAPs did not identify any cultural or intangible values within the study area which may be impacted by proposed activity. This was similarly the case when considering potential impacts to the cultural landscape, with feedback suggesting that the proposed activity would result in limited change to the already heavily urbanised harbour foreshore.

The proposed activity has limited potential impacts to the soil profile (whether marine sediments or 20th Century fill units). Specifically, the works would be limited to the removal or extrusion of the seven moor piles and several wharf supports, some ~33 m^2, from the seabed. The removal of these piles would affect the surrounding sediment, and which may expose cultural materials if present. This value would increase to ~1,203 m^2 should the FDD impact the seabed during operation, which is not expected.

The absence of identified cultural material and the location of potential impact areas in submerged environments limits the management and recommendations that can be applied to the project. Further characterisation of the deposits to identify cultural materials at this time is not feasible, since access to the deposits could only be achieved through implementation of the development (ie to investigate the area of the mooring pile, the mooring pile would need to be removed). Given the low risk of significant cultural materials being present and these constraints, recommendations include the inspection of the works at their completion, and the suitable management of any cultural materials if any become apparent.

Recommendations include:

- It is considered that there is a low risk of Aboriginal objects, sites or deposits being present within the study area. In the unlikely event that cultural materials are present, they would likely consist of isolated or low density stone artefact sites and/or shell material in a secondary context (either in active marine sediments or 20th Century fill units) and be of low significance. As such, it is considered that the development may proceed with caution.
- To ensure no inadvertent impacts to cultural materials occur and/or manage them if present, underwater inspection of the works should be undertaken at the completion of the extrusion of mooring piles and wharf supports. The inspection should specifically investigate the presence of stone artefacts and shell material. Where cultural materials are encountered, they should be flagged/recorded in place, and liaison with Heritage NSW and the RAPs undertaken to determine subsequent steps. This may include the need for further approvals, such as an Aboriginal heritage impact permit (AHIP), and additional mitigation measures such as recovery of the cultural material and/or sieving of extruded material for additional cultural material.
- Consideration should be given to the development of an Aboriginal interpretation strategy to explore opportunities for acknowledging and celebrating Aboriginal heritage of the study area.
- If human skeletal material less than 100 years old is discovered, the *Coroners Act 2009* requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the *National Parks and Wildlife Act 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification of Heritage NSW and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.
- Consultation should be maintained with the RAPs during the finalisation of the assessment process and throughout the project.
- A copy of the final ACHA should be lodged with AHIMS and provided to each of the RAPs.
- Where the heritage consultant changes through the project, suitable hand over should be undertaken to ensure no loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.

Table of Contents

Appendices

Tables

Figures

Plates

1 Introduction

1.1 Background

EMM Consulting Pty Ltd (EMM) has been engaged by Stannards Marine Pty Ltd to undertake an Aboriginal cultural heritage assessment (ACHA) of the proposed mooring of a floating dry dock (FDD) facility at 6 John Street, McMahons Point, NSW (the project). The proposed activity for the FFD facility are located primarily within Berrys Bay itself, limited to the removal or extrusion of several moor piles and wharf supports from the seabed. No ground disturbance is proposed for works associated with the mooring and other land-based components of the project, although some improvement of existing systems are necessary to address additional environmental requirements (eg water runoff, air quality, etc).

To allow the works, a Development Application (DA) (#03/2018) was lodged with North Sydney Council on 5 March 2019. As an integrated development, inputs into the DA were sought from Heritage NSW (then Office of Environment and Heritage) and these were provided as Secretary's Environmental Assessment Requirements (SEARs). They indicated that consideration of Aboriginal cultural heritage impacts of the proposed activity was required. The DA was ultimately rejected on 13 May 2021 and is now being determined through the Land and Environment Court (LEC) process (#2021/00063136). The Statement of Facts and Contentions for the case identified that Aboriginal cultural heritage has yet to be investigated or assessed, specifically:

- B1 – Non-compliance with SEARS
  - (c) The SEARS required, *inter alia*:
    - (ii) Aboriginal cultural heritage report.
  - (e) There is no evidence that an Aboriginal cultural heritage report has been prepared as required by the SEARS. The Aboriginal Heritage Information Management System Search referred to in the EIS is not sufficient to address this requirement.
- B2 – Contentions that there is insufficient information to assess the application
  - 20. An Aboriginal cultural heritage report is required to be submitted in accordance with the SEARS.

This document has been developed to address these contentions, and further understand the potential impacts (if any) to Aboriginal cultural heritage. The objectives of the ACHAR are to:

- consult with and involve key Aboriginal community members and knowledge holders to identify areas and places of cultural value within or in the vicinity of the study area;
- compile a review of existing environmental, historical and archaeological information for the study area, by identifying and summarising known and previously recorded Aboriginal heritage places, cultural values areas and landforms of archaeological interest in its immediate surrounds;
- determine if any Aboriginal objects, places, cultural values areas, or areas of archaeological potential are present (or are likely to be present) within the impact footprint, as well as areas of existing disturbance, through ground-truthing, including field survey and test excavations;
- identify the type, nature, and extent of any Aboriginal sites, objects, archaeological deposits, potential archaeological deposits, and cultural values areas within the impact footprint;

- map the locations of known and potential Aboriginal sites, objects and deposits and cultural values areas identified;
- assess the archaeological and cultural significance of the impact footprint;
- assess and identify heritage constraints and opportunities and the potential impacts of the project; and
- identify and recommend measures to mitigate any heritage impacts and risks to the project.

1.2 Legislative context

There are several Commonwealth and State Acts (and associated regulations) that manage and protect Aboriginal cultural heritage (Annexure A provides further details). These are summarised in Table 1.1.

Table 1.1 Commonwealth and State legislation relevant to the project.

Legislation	Description	Relevant to the project?	Details
Commonwealth			
Environment Protection and Biodiversity Conservation Act 1999	Recognises sites with universal value on the World Heritage List (WHL). Protects Indigenous heritage places with outstanding heritage value to the nation on the National Heritage List (NHL), and significant heritage value on the Commonwealth Heritage List (CHL).	No	There are no Indigenous heritage places within the study area that are listed on the WHL, NHL, or the CHL.
Native Title Act 1993	Established a system for recognising Aboriginal and Torres Strait Islander peoples' rights and interests over lands and waters by Aboriginal people. Provides for negotiation and registration of Indigenous Land Use Agreements (ILUAs). Often used in NSW to identify relevant stakeholders for consultation.	No	There is no active claims within the study area.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	Preserves and protects declared areas and objects of particular significance to Aboriginal and Torres Strait Islander people that are under threat from injury or desecration.	No	There are no areas or objects within the study area subject to a Declaration under the Act.
State			
Environmental Planning and Assessment Act 1979	Requires environmental impacts, including to Aboriginal heritage, to be considered in land use planning. Provides for the development of environmental planning instruments, including State Environmental Planning Policies and Local Environmental Plans.	Yes	The proposed activity is being assessed by Council with an DA under Part 4 of this Act. This requires that Aboriginal heritage is investigated and considered as part of the application.

Table 1.1 Commonwealth and State legislation relevant to the project.

Legislation	Description	Relevant to the project?	Details
National Parks and Wildlife Act 1974	Provides blanket protection for all Aboriginal objects and declared Aboriginal places. Includes processes and mechanisms for development where Aboriginal objects are present, or where Aboriginal Places are proposed for harm.	Yes	The proposed activity is subject to the requirements of this Act, and is subject to Heritage NSW guidelines and processes.
Aboriginal Land Rights Act 1983	Establishes Local Aboriginal Land Councils (LALCs). Allows transfer of ownership of vacant crown land to a LALC. The Office of the Registrar, *Aboriginal Land Rights Act 1983 (ORALRA)*, registers Aboriginal land claims and maintains the Register of Aboriginal Owners. Often used in NSW to identify relevant stakeholders for consultation.	No	The study area is within the boundaries of the Metropolitan Local Aboriginal Land Council, which is a registered Aboriginal party (RAP) for this project and has been consulted. A request to search the Register of Aboriginal Owners was made to the ORALRA on 7 September 2021, however no response was received. The study area does not appear to have Registered Aboriginal Owners pursuant to Division 3 of the Act.

1.2.1 Assessment guidelines and requirements

This ACHA has been prepared in accordance with the SEARs advised by Heritage NSW during the initial DA application, which stated:

- The EIS must include an assessment of all potential impacts of the proposed activity on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigation and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed:
  - Heritage – including:
    - Aboriginal cultural heritage

To address these requirements and conform with current standard and guidelines, the following documents were used in the development of the ACHA:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011);
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010); and
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).

1.3 Study area and proposed activity

The land component of the site is located on the eastern shore of Berrys Bay, a part of the Sydney Harbour. The site is legally described as: Lot 987 DP752067; Lot 2 DP 77853; Lot 1 DP 127195; Lot 1 DP 449731; Lot A and B DP 420377; and Lots 1-4 DP 179730 (Figure 1.1). The current operations of the existing boat repair and maintenance facility on site are subject to Development Consent 1164/90 which sets parameters for hours of operation, vessel accommodation and the nature of works permitted on site.

For the purposes of this report, the **study area** refers to the broader site owned and operated by Stannard Marine. The **project footprint** relates to the specific proposed development activities outlined below.

Stannards Marine propose to demolish existing water-based structures and construct a FDD facility for maintenance and repair of maritime commercial vessels up to 750 tonne in association with the existing boat building and repair facility. The structure will be located on the south-western side of the site at the land/water interface.

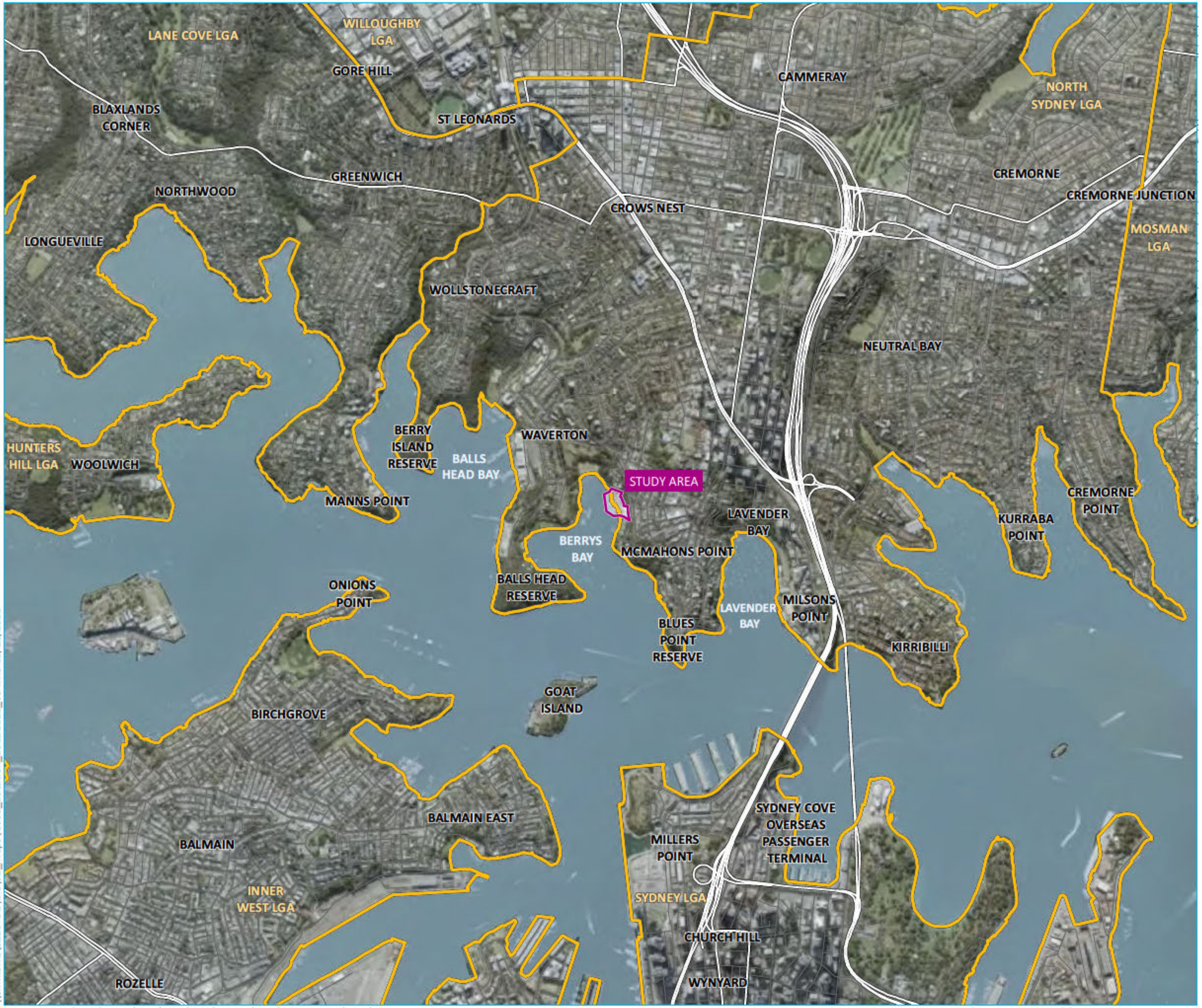
Specifically, the proposed activity includes (Figure 1.2):

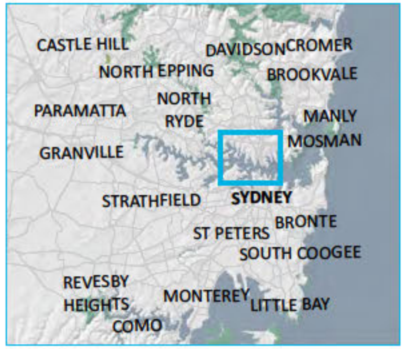
- demolition and removal of:
  - seven mooring poles;
  - the removal of two existing wharves/jetties; and
  - the partial removal of the end of a further existing wharf/jetty.
- construction and installation of:
  - the FDD, a steel structure some 19.81 x 59.24 m. The maximum height of the structure when fully raised is ~11 m above water level. Lowered, the structure is 3.5 m high. The lowered position would be at the edge of the maritime lease area and the raised position would be next to the land-based facilities and modified wharf;
  - installation of various environmental requirements (eg acoustic curtains) on or within the FDD;
  - installation of saw tooth fenders to the hardstand at the water's edge within the study area to enable the FDD to be secured; and
  - provision of new on-shore infrastructure in the form of ducting and plant relating to air quality mitigation. It is not expected that this would require ground disturbance.

1.4 Limitations

This report is based on existing and publicly available environmental and archaeological information (including AHIMS data) and reports about the study area. The background research did not include any independent verification of the results and interpretations of externally sourced existing reports (except where the ground-truthing was undertaken). The report further makes archaeological predictions based on these existing data and targeted ground-truthing, and which may contain errors depending on the accuracy of these third-party studies and the extent of ground-truthing (constrained to surface) investigations.

This report does not consider historical and/or built heritage unless specifically related to Aboriginal heritage values.





KEY
- Study area
- Major road
- Minor road
- Local government area
- NPWS reserve
- Named waterbody

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Source: EMM (2021); DFSI (2020); GA (2011); ASGC (2006); MetroMap (2021)

Regional location

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 1.1

Source: EMM (2021); DFSI (2020); GA (2011); MetroMap (2021)

0 25 50 m
GDA 1994 MGA Zone 56 N

KEY

Study area

Project footprint

Proposed demolition/removal

Proposed FDD

Existing environment

Rail line

Proposed development

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 1.2

EMM creating opportunities

2 Aboriginal consultation

2.1 Key findings

- The assessment adopted the processes and methods outlined in DECCW's *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010).
- The consultation process initially identified 46 Aboriginal stakeholder organisations who may have had an interest in the project. Following notification of these organisations, eight responded as wishing to be registered for subsequent consultation through the project.
- The one-day field program included the participation of four of these organisations. This included a number of Darug traditional owner groups. Feedback for the project to date has been generally positive, with no site specific issues identified.
- Feedback on the report was received, and was supportive of the findings and recommendations. Additional interpretive outputs were sought from one Aboriginal organisation, and this has now been integrated into the recommendations of the report.

A summary of the consultation process is provided below, and full documentation of the consultation process is provided in Appendix B.

2.2 The process

This section describes Aboriginal stakeholder consultation and engagement undertaken as part of the cultural heritage assessment to date, to identify and assess Aboriginal cultural, mythological, social and spiritual values associated with the study area.

Aboriginal consultation for this project has been undertaken in accordance with procedures set out in the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). These guidelines identify a five-stage process:

1. pre-notification – identification of the Aboriginal individuals and/or communities relevant to the study area by contacting several state government agencies;
2. notification – contacting all Aboriginal individuals and/or communities identified in Stage 1 to determine their interest in being consulted during the project. This includes direct communication and the placement of advertisements in local media seeking further expressions of interest from Aboriginal individuals and/or communities that may have been missed through (1). Those Aboriginal individuals and/or communities that wish to be consulted become a 'registered' Aboriginal party (RAP);
3. presentation of project information/assessment methodology – briefing RAPs about the project and scope of any Aboriginal heritage assessment and investigations. This is usually undertaken through written correspondence, but can include meetings, and may undergo several iterations through the project as the nature of the assessment changes (eg surface ground-truthing may lead to a requirement for test excavations);
4. impacts and mitigation strategies – discussion of potential impacts to cultural materials and mitigation options with the RAPs prior to developing the ACHA. This is often undertaken either onsite at the end of any field program and/or as part of Stage 5; and
5. report review – the RAPs are provided an opportunity to review and comment upon the draft ACHA, to contribute input into the overall findings, significance and management of cultural heritage.

The consultation process for this project had two aims: i) to comply with the Heritage NSW consultation procedures to obtain input on the ACHA process; and ii) to identify cultural places and intangible values that may be affected by the proposed activity.

2.3 This project

Aboriginal consultation for this project has been undertaken in accordance with procedures set out in Section 2.2 and included numerous interactions with the RAPs between August and November 2021. A log of actions and correspondence regarding Aboriginal community consultation to date is included in Appendix B.1 and summarised in Table 2.2.

EMM distributed pre-notification letters to Heritage NSW, Metropolitan Local Aboriginal Land Council (LALC), North Sydney Council, the National Native Title Tribunal (NNTT), Native Title Services Corporation (NTSCorp), the Greater Sydney Local Land Services (LLS) and the Office of the Registrar, *Aboriginal Land Rights Act 1983* (ORALRA) on 1 September 2021. This included information about the proposed project and proponent contact details, and a request to provide contact details for any potential interested parties. A request to search the ORALRA register of Aboriginal Owners and the NNTT Schedule of Native Title Determination Applications, Register of Native Title Claims, Native Title Determinations and Indigenous Land Use Agreements was also made (Appendix B.2).

This process identified 46 potential Aboriginal stakeholders in the region (Appendix B.3). Notification letters were posted and/or emailed to these organisations on 10 September 2021 (Appendix B.4). A public notice informing potential stakeholders of the project was published in the *Mosman Daily* on 10 September 2021, inviting interested parties to register an interest in being consulted for the project.

During the notification period seven organisations registered an interest in the project. As is standard procedure for EMM, the local Aboriginal land council, in this case the Metropolitan LALC, was also registered despite no response being received. The Registered Aboriginal Parties for this project are provided in Table 2.1. The list of registered Aboriginal stakeholders was provided to Heritage NSW and Metropolitan LALC on 1 October 2021.

EMM distributed the methodology letters (3 above) to the registered parties on 26 September 2021 (Appendix B.5). The Stage letter included a proposed methodology for targeted survey, information on the project, and requested feedback from the community to identify any specific cultural values information for the site. Feedback in email format was received from two RAPs, including the Kamilaroi Yankunjatjara Working Group and A1 Indigenous Services. Both were in support of the proposed investigative approach. No specific cultural values information was identified within the study area at this time.

A site inspection was undertaken on the 26 October 2021. While all eight RAPs were invited to attend, only four participated. (Repeated attempts were undertaken to organise a representative of the Metropolitan LALC, but this proved unfeasible with the timing of the project). The site inspection undertook general observations of the study area, acknowledging that any disturbance would be to the submerged sea-floor, and visited other parts of Berrys Bay and Ball’s Head to obtain a better context of the proposed project.

Discussions on the proposed activity, any concerns and any potential mitigation measures were discussed with the RAPs on site during the site inspection. These were integrated into the ACHA. The ACHA was subsequently distributed to the RAPs on 15 November - 12 December 2021. Their specific feedback is summarised in Section 2.4. Table 2.2 provides a summary of the main steps undertaken to conform with Heritage NSW guidelines.

Table 2.1 List of RAPs for the project.

Organisation	Date of registration
Metropolitan Local Aboriginal Lands Council	-
Didge Ngunawal Clan	10 September 2021
A1 Indigenous Services Pty Ltd	13 September 2021
Kamilaroi Yankuntjatjara Working Group	14 September 2021
Wailwan Aboriginal Group	15 September 2021
Ngambaa Cultural Connections	18 September 2021
Wurrumay Pty Ltd	24 September 2021
Butucarbin Aboriginal Corporation	24 September 2021

Table 2.2 Summary of Aboriginal consultation steps required by Heritage NSW guidelines.

Consultation stage	Description	Date started	Date completed	Notes
1	Government agency pre-notification	1.9.21	15.9..21	Additional details provided in Appendix B.2.
	Advertisement in *Mosman Daily*	10.9.21	24.9.21	A tearsheet is provided in Appendix B.4.
	Notification and registration of potential Aboriginal stakeholders	10.9.21	24.9.21	Additional details provided in Appendix B.4.
	Advising Heritage NSW and Metropolitan LALC of RAPs	1.10.21		Additional details provided in Appendix B.4.
2/3	Presentation of information about the proposed project; and gathering information about cultural significance.	26.9.21	24.10.21	Additional details provided in Appendix B.5.
-	Site inspection	26.10.21	26.10.21	Attended by representatives of Didge Ngunawal Clan, Kamilaroi Yankuntjatjara Working Group, Wailwan Aboriginal Group, Butucarbin Aboriginal Corporation.
4	Review of draft report	15 November 2021	12 December 2021	Additional details provided in Appendix B.6.

Notes: To comply with LEC requirements, a final report was developed prior to the full report comment period being fulfilled. (Some three weeks of the four week comment period had elapsed at the time of finalisation). Should comments be received following the finalisation of the report, additional updates will be undertaken as necessary.

2.4 Aboriginal stakeholder feedback

Two responses were received from the RAPs during the methodology review and subsequent ACHA review period (Appendix B.6). This is summarised as follows:

- Kamilaroi Yankuntjatjara Working Group –
  - identified that Port Jackson was and remains important to the Aboriginal people of the region, having been an important area for resources in the past;
  - supported the recommendations of the report, including the need to inspect/monitor any ground disturbance activities; and
  - recommended that interpretive outputs be considered, including a connection to Country report or interpretation plan.
- Butucarbin Aboriginal Corporation –
  - provided a short report that confirmed their sites officer identified no tangible or intangible cultural materials during the site inspection;
  - agreed and supported the recommendations of the ACHA, including inspection of any extruded material from the works; and
  - be aware of unexpected finds, such as human remains.

3 Existing environment

3.1 Key findings

- The study area is situated on Berrys Bay, a part of the Sydney Harbour, and surrounded by various sandstone outcrops and surfaces that would have been of use to Aboriginal people in the past. Prior to ~8,000 years ago, when sea-level was considerably lower, the study area and project footprint would have been exposed. They would probably have been a moderate to steep slope over-looking minor tributaries that would have run into a major river system in the centre of Port Jackson. After ~8,000 years, sea-level rose and the project footprint was inundated, and is currently between -3 to -7 m below current sea-level. The study area also appears to have been either entirely submerged or within the inter-tidal zone through these events.

- The study area and project footprint would have originally been composed of shallow duplex soil profiles upon the Hawkesbury sandstone geology, as is evident in nearby areas such as Balls Head Reserve. Following inundation, it is considered that the soil profile has likely been lost or extensively mixed by more recent biogenic activity and terrigenous inputs. Geotechnical investigation of the study area identified up to 5 m of modern overburden beneath the current hard stand. Beneath this depth appears to be truncated terrestrial and/or marine sediments that may have reflected the original soil profile.

- The study area and project footprint have been subject to extensive past impact, including their inundation and location within the active inter-tidal zone. This was followed by the reclamation of much of the study area, and the establishment of various boatyard activities since the 1940s.

- Berrys Bay was part of Edward Wollstonecraft's 1821 land grant. The property was subsequently subdivided and developed with industrial activity in the area increased over the 20th century. The study area has been used for boat building and repair for over 100 years.

3.2 Rationale

Understanding environmental context assists with predictions of archaeological potential, such as the likelihood of archaeological material being present in the landscape, its spatial distribution and its preservation. Landscape features were an important factor for the choice of camping and transitory and ceremonial areas used by Aboriginal people. Similarly, these landscape features and historical land-use plays a role in the level of preservation and the integrity of archaeological sites.

A landscape consisting of suitable topography, hydrology, geology and soils has strong links with natural resources that would have been available to, and sought after, by Aboriginal people. Flora and fauna would have provided food, tools and ceremony (culturally modified trees); proximity to fresh water was necessary for life and growing crops, as well as gathering fish and eels. Landscape features, such as sandstone overhangs, were useful for shelter; stone artefacts were manufactured from raw stone material that was collected from quarry sites; and stone arrangements relied on the landscape.

3.3 Landscape overview

The study area is situated on the north shore of Port Jackson (Sydney Harbour) on the eastern side of Berrys Bay within the Sydney Basin Bioregion. It is characterised deep-cliffed sandstone gorges and remnant plateaus across which eucalypt forests, woodlands and heaths grow. Soil profiles consist of shallow texture contrast residual units situated above the sandstone and/or shale geologies, with increasing alluvium adjacent creeklines and waterways.

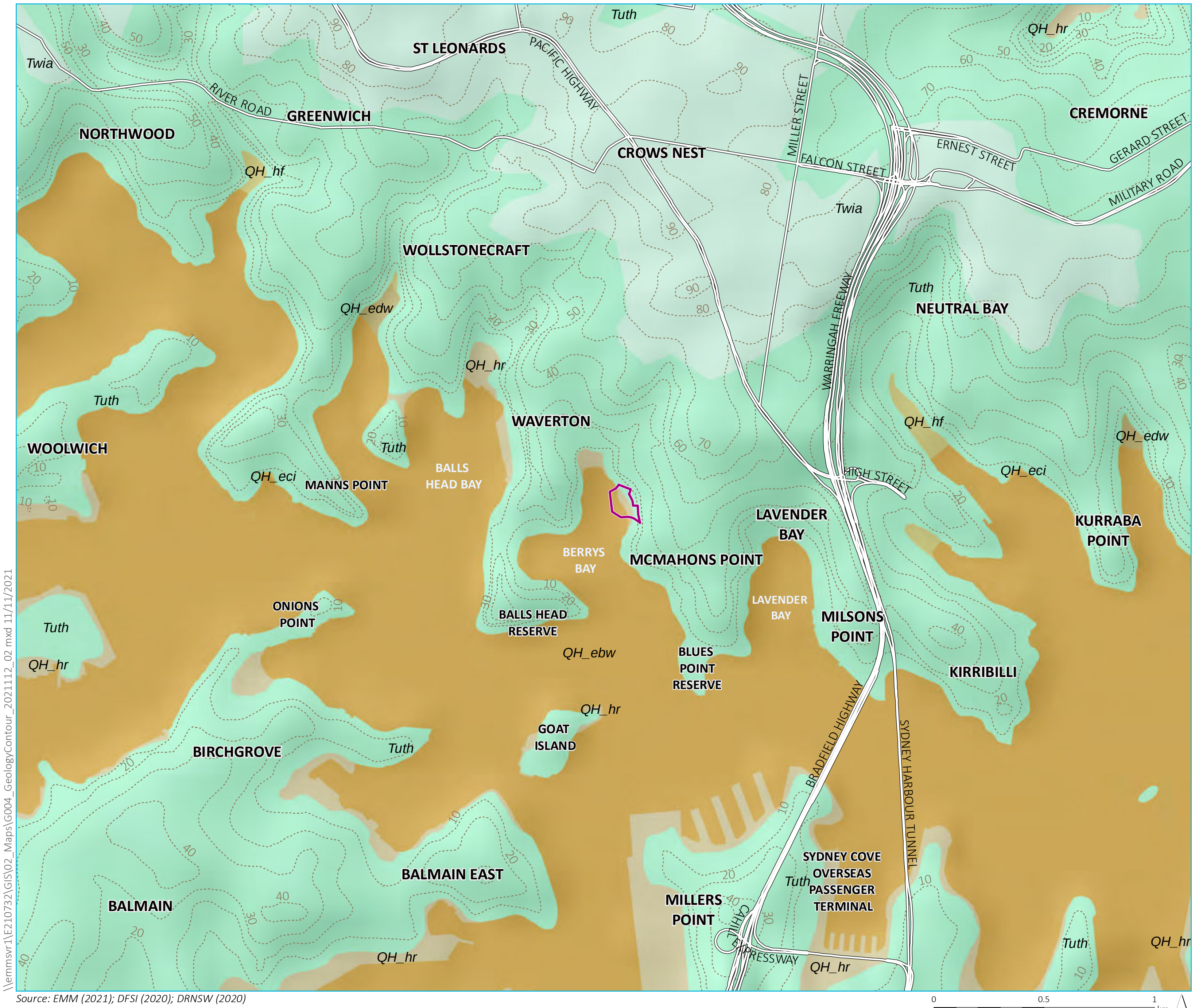
The region has, however, been extensively urbanised, encompassing one of the largest cities in Australia. In the case of the study area, medium density residential development is found around Berrys Bay, with a range of road and rail infrastructure nearby. The western side of Berrys Bay was a former oil storage depot, and has only recently been remediated.

3.4 Geology and geomorphology

The Sydney Basin is a major sedimentary basin, some 60,000 km^2 in size. Initially formed on Palaeozoic (541-250 ma) metamorphosed rocks, the basin is primarily a series of Permian (300-250 ma) and Triassic (250-200 ma) sandstones and siltstones that were formed by a massive delta, and then subject to a range of uplift and subsidence (see Gale, 2020 for a comprehensive review). This has resulted in a series of smaller plateaus and basins surrounded by elevated dissected sandstone uplands on its periphery (eg the Great Dividing Range to the west). Over-laying these basal sandstone and siltstones are Wianamatta shales (also of Triassic age), and then more recent Quaternary alluvium and other pedogenetic units (Figure 3.1).

Until relatively recently, Port Jackson would have been one of the large-dissected sandstone valleys that characterise other parts of Sydney, and especially the Blue Mountains (Williams et al. 2018). However, sea-level change during the last Glacial resulted in the inundation of the valley, and to the current expression of the harbour today. Specifically, sea-level was some -125 m below current levels around ~20,000 year age (20 ka) before rapidly rising after 14 ka. It reached present day levels at ~7 ka, was then slightly higher (up to ~1 m) until 2 ka, and then returned to current levels. The project footprint encompasses water depths of between -3 and -7 m below current surface (Figure 3.2) (Port Authority of New South Wales, 2021), which would have been inundated ~8.7-8.3 ka (Williams et al. 2018).

The sandstone geology characteristic of the region is conducive to the formation of certain archaeological site types. Sandstone tends to break away in large blocks creating boulders and vertical cliffs. It weathers cavernously creating overhangs or caves that could have been occupied, and flat surfaces or platforms that can be used for engraving (McDonald, 2008). Prior to inundation, the project footprint appears to have reflected a moderate to steep slope that would have overlooked a small valley to running along the western portion of Berrys Bay; and probably containing a creekline that would have run into the base of Port Jackson. Based on the bathymetry (ie underwater topography), and acknowledging the seabed has changed since inundation, there does not appear to be any evidence of vertical sandstone cliffs or escarpments within the project footprint that may have the potential for sites such as rockshelters to have been present. Similarly, the sloping nature of the project footprint reduces the potential that large flat sandstone platforms would have been present.



Geology of the study area

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 3.1

EMM creating opportunities

Source: EMM (2021); Advisory (2021); DFSI (2020); GA (2011); MetroMap (2021)

0 25 50 m

GDA 1994 MGA Zone 56

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KEY

Study area

Project footprint

Proposed demolition/removal

Proposed FDD

Bathymetry (m)

<2 m

2 - 5 m

5 - 10 m

Approximate 1817 shoreline

Existing environment

Rail line

Bathymetry and pre-20th Century foreshore of the study area

6 John Street Berrys Bay

Aboriginal cultural heritage assessment

Figure 3.2

EMM creating opportunities

3.5 Soil landscapes

The study area contains a number of soil landscapes as defined in Chapman et al. (2009). These include the Gymea soil landscape that entirely encompasses the study area, while other parts of Berrys Bay also contain evidence of the Hawkesbury soil landscape (Figure 3.3).

These two soil profiles are both residual and are the result of diagenesis (soil formation) of under-lying sandstone. They are typically shallow varying in depth between ~30 and 70 cm and characterised by sandy or clayey loams. The topsoil (A1 horizon), within which cultural materials is typically constrained is usually only the upper part of this soil profile and if frequently loss or affected by later activities. It must, however, be highlighted that the study area is composed of primarily reclaimed land (Section 3.8) with geotechnical investigations outlining the following description (Hampton Property Services, 2019):

> Previous geotechnical investigations[1] undertaken at on shore locations across the site indicate the following general stratigraphy, consisting of fill material (black gravelly sand, sandstone fragments, ash, timber, fragments of bricks, glass, wire and steel, coarse clayey gravel and silt. Fill depths ranged from existing ground surface to approximately 5 meters below ground surface. Below the fill material are marine sediments (gravelly sand and silty sand) and residual soils (clayey sand) underlain by sandstone bedrock.

The project footprint is entirely within Berrys Bay. While originally, the soil profile is considered to have been either of Gymea and/or Hawkesbury soil landscapes based on the surrounding environment, it has been significantly modified by marine processes. These include the introduction of terrigenous sediments, biogenic activity and more recent modifications from boat and ship activities. The geotechnical information indicates that the remnants of these soils may be present beneath marine sediments, although their condition is unclear. It is considered probable that the upper portion of the soil profile within which cultural material may have been present, would have been adversely affected by inundation and subsequent activity. As such, the potential for in situ (primary context) cultural material is considered improbable.

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Source: EMM (2021); DFSI (2020); DPE (2015); DPIE (2017); MetroMap (2021)

Soil landscapes of the study area

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 3.3

EMM
creating opportunities

3.6 Hydrology

Prior to ~8,000 years ago, sea-level was considerably lower than present day, and both the study area and project footprint would have been exposed. Based on the bathymetric data, it appears that the site would have been situated on a moderate to steep slope overlooking the western part of Berrys Bay that was several metres lower. It is probable based on extant dissected sandstone valleys in the Sydney Basin, that this 'palaeo-valley' to the west of the bay would have encompassed a creekline or water course that fed into the main part of Port Jackson. Works on the proposed second harbour tunnel by Och et al. (2018) have shown that a significant palaeo-valley is present in the centre of Port Jackson (Plate 3.1), and likely reflecting a major river system running past Berrys Bay. This palaeo-valley measuring some 160 m wide and to depths of -56 m AHD is only ~600 m from the study area.

After 8,000 years ago, the study area and project footprint were inundated by sea-level rise and formed part of Berrys Bay. This is an entirely shallow marine environment connected to the wider Port Jackson. The project footprint would have been in water throughout the last 8,000 years, with even the lowest tides unlikely to have exposed any parts of site. The study area was similarly within the bay itself until reclaimed in the more recent period. Given the seabed surrounding the study area is only about 1 m below present day sea-level, it may have formed an inter-tidal zone prior to urbanisation, and parts may have been exploited by Aboriginal people in the past. However, it is unlikely that any form of permanent or long-term occupation prior to the reclamation would have been feasible.

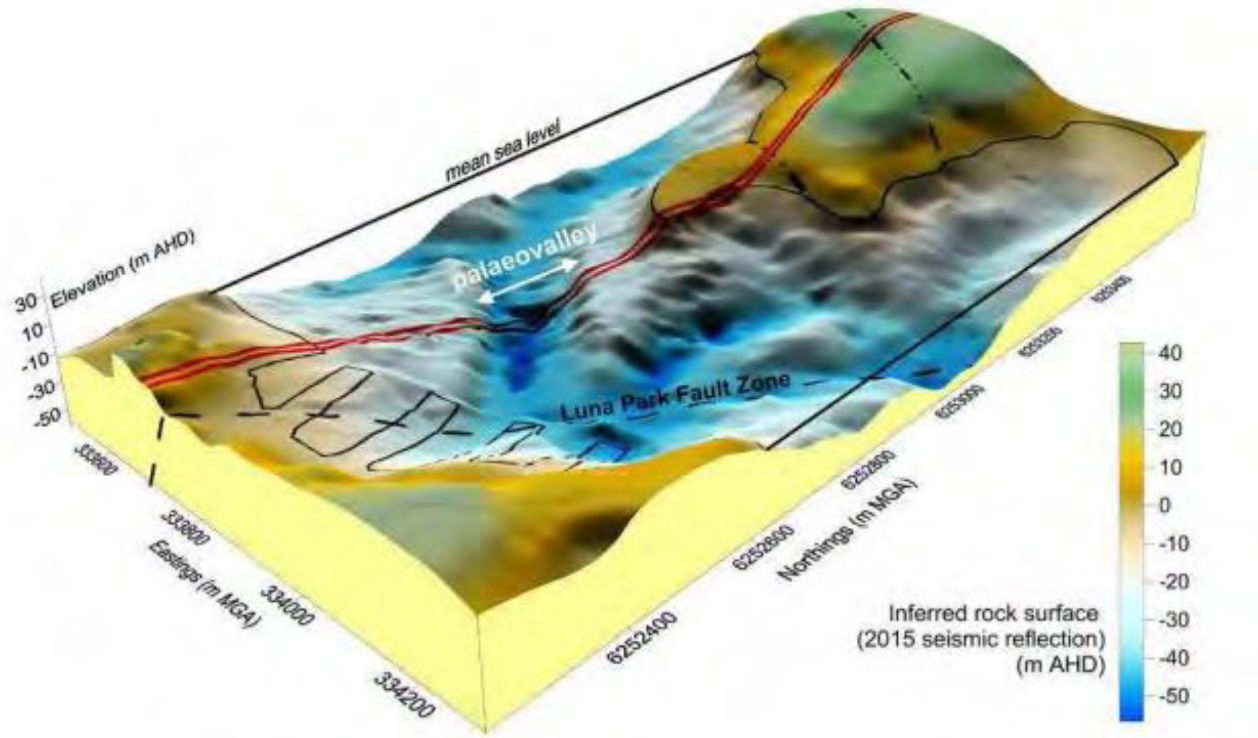


Plate 3.1 A bathymetric model of Port Jackson for the second harbour tunnel. The study area is situated in the top right corner of this model. (Source: Och et al. 2018).

3.7 Flora and fauna

The natural vegetation of a landscape is an important consideration when preparing an Aboriginal heritage assessment because it provided Aboriginal people with resources. Bark from trees could be stripped to make canoes, shields and other items. The vegetation itself provided food resources such as edible plants, fruits and seeds and also provided habitats for animals such as possums and birds, which could be hunted (Attenbrow 2010).

Prior to 8,000 years ago, the study area and project footprint would have formed relatively high ground or promontory overlooking a former valley that is now Port Jackson. Vegetation and flora and fauna would probably have looked broadly similar national parks and reserves that remain around the harbour today. This would have includedSydney peppermint, scribbly gum, red bloodwood, smooth-barked apple with native grasses and shrubs (National Parks & Wildlife Service 2003; North Sydney Council 2021). These resources would have been used by local Aboriginal people for a variety of activities, including to construct huts, build canoes and create fire (Hoskins 2009, p. 9). Along the sandstone slopes towards the west, Port Jackson figs, coastal banksia and wattle alongside blueberry ash, cheese trees and sweet pittosporum are also found in close proximity to rock escarpments and grew close to rock shelters (National Parks & Wildlife Service 2003 pp. 186 193; North Sydney Council 2021).

After 8,000 years ago, the study area and project footprint would have formed part of Berrys Bay. While there is some potential that the study area was in parts inter-tidal, for the most part the site was underwater. As such, resources for Aboriginal people in the past would have been primarily the marine species that are found within Port Jackson. Based on modern observations for the project (Hampton Property Services, 2019), these would have included a range of mollusc species, such as mussels, oysters and limpets; and fish species including bream and leather-jackets. Based on excavations at the nearby Balmoral midden, an Aboriginal site utilised over the last few thousand years, by Val Attenbrow in the 1990s, other species such as snapper, bream, wrasse, blue groper, catfish, flathead, were probably also caught from the harbour in the past.

3.8 Land use and disturbance

Initial disturbance to both the study area and project footprint occurred some 8,000 years ago when the site was inundated by sea-level change. While inundation itself does not necessarily result in the loss of cultural materials (eg Benjamin et al. 2020), the process of submergence especially wave action can have an adverse effect. Subsequent marine processes including biogenic activity and input of terrigenous sediments would have all resulted in mixing and modification of any soil profile (and cultural materials within it) to have been impacted. While there is a lack of robust studies to date into what happens to cultural materials (such as stone artefacts) when submerged, it is improbable that they would remain in their primary context. A recent investigation of the Windsor Bridge replacement recovered a large number of Aboriginal objects dating to the late Holocene and potentially earlier were all recovered from 19th Century units as one example of this (AAJV, 2020).

When considering the study areas itself, historical evidence suggests that it has been substantially reclaimed in the last 19th/early 20th Century (Plate 3.2; Plate 3.3; Figure 3.2). The geotechnical investigations outlined in Section 3.5 support this, indicating up to 5 m of modern overburden was found in parts of the site. This overlaid marine sediments strongly suggesting it was an inter-tidal or submerged location prior to reclamation.

Based on the above information, both the study area and project footprint were submerged or a partially submerged part of Port Jackson for at least 8,000 years. This encompasses the most significant period of use by Aboriginal people, which occurred in the last few thousand years based on existing evidence (Section 5).

In addition to these previous changes, historical aerial imagery shows the establishment of boat yards and other industrial activity since the 1930s (Appendix C). A more detailed Statement of Heritage Impact has been developed for the project by NBRS & Partners (2018), which provides more information on the historical and recent development of the site. However, these aerial images show an increasing number of structures within the study area through the 1940-1990s that would have adversely affected the study area.

While the installation of a number of wharves and jetty's would also have impacted the project footprint. Indeed, several of the proposed installation activities are within the footprint of these established structures.

Plate 3.2 **A map showing the 1817 shore-line (orange) underlain by a modern aerial photograph. This shows that significant parts of the study area are recent reclamation in the 19th and 20th centuries. (Source: NBRS & Partners Pty Ltd, 2018).**

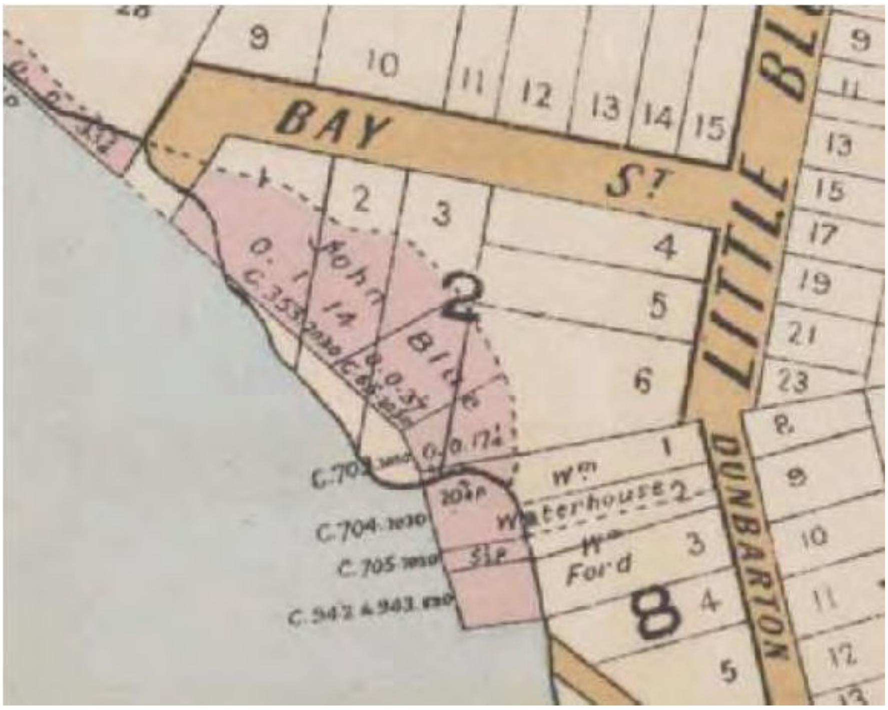


Plate 3.3 **A late 19th Century parish map (possibly 1887) showing areas of reclamation (in pink) between areas of high and low tide in the vicinity of the study area. The study area is broadly encompassed within Lots 1-3 and 6 presented here. (Source: NBRS & Partners Pty Ltd, 2018).**

4 Ethnography

4.1 Key findings

- The study area is within the country of the Cammeraygal (Gammeraigal) people. This group was the focus of early historical accounts and there are numerous observations of past activities and behaviours across Sydney Harbour. These include exploitation of fish and molluscs, habitation of sandstone overhangs, burning of bushland, making of weapons, types of clothing, the impact of smallpox, and a range of other societal activities. However, no specific events were documented in Berry's Bay.
- There is limited site specific information in the post-contact period. A single reference has been found of Aboriginal people living on the shores of Berrys Bay in 1878. This was as part of a discussion around their relocation of people to Goat Island and/or La Perouse. Specific information on how many people or which parts of the bay were not provided. The relocation of Aboriginal people from Berrys Bay and the establishment of industrial activities appeared to occur in the late 19th/early 20th Century.
- No project specific values or places of interest were identified during the site inspection.

4.2 Local background

Information about the socio-cultural structure of Aboriginal society prior to European contact largely comes from ethno-historical accounts made by colonial settlers. These accounts and observations were often made after significant social disruption due to disease and displacement. As a result, this information is often contentious, particularly in relation to language group boundaries. Therefore, it is likely that language group boundaries were far more diffuse and complex than the arbitrary demarcations drawn by colonial observers.

Over thirty separate Aboriginal groups populated the wider Sydney Basin in 1788, each with their own country, practices, diets, dress, and dialects. We now know of these groups as 'clans' and each identified with broader cultural-linguistic groups known as 'tribes' – Darug, Darkinjung, Gundungarra, Tharawal, Guringai (Coastal Darug), Eora (Coastal Darug) and Awabakal.

Tindale (1974) drew the boundary for the Eora tribal group around Port Jackson (Plate 4.1). Within this, over thirty Aboriginal groups occupied the wider Sydney Basin in 1788. Though connected though complex trade and social relationships each group had their own country, dialects, and practices. The study area is within the country of the Cammeraygal (Gammeraigal) people of this broader clan group (Hoskins 2019, p.2, 4). Cammeraygal country is believed to encompass the area from Middle Harbor in the north, to Cremorne in the east and Woodford Bay in the west (Hoskins 2019, p.2). It is estimated that the population of the Cammeraygal numbered between 50 and 60 in 1788 (Attenbrow, pp.17-23,29).

In February of 1790 Governor Arthur Phillip wrote of the Aboriginal groups around the Sydney Basin (*Historical Records of New South Wales*, Vol. 1, Part 2, p. 345). Governor Phillip's entry for the Cammeraygal notes "about the north-west part of this harbour there is a tribe mentioned as being very powerful, either from their numbers or the abilities of their chief. The district is called Cammera" (*Historical Records of New South Wales*, Vol. 1, Part 2, p.345). The population and power of the Cammeraygal was also mentioned by David Collins in 1802 and it has been suggested that the Cammeraygal may have been less affected by the smallpox epidemic than neighbouring groups (Hoskins 2019, p.14).

The believed power of the Cammeraygal also came from observations of ceremonies with several accounts suggesting members of the tribe presided over events which included other Port Jackson groups (Hoskins 2019, p.14). For example, in 1795 Collins observed a tooth evulsion (removal) imitation ceremony which occurred at a prepared oval-shaped site near the present day Royal Botanic Gardens.

Boys and men from the other coastal tribes waited for the 'Gommera' or spiritual leaders, from the north who performed the ceremony and Collins believed these individuals to be Cammeraygal (Collins 1798, p.456). The impacts of colonialism, however, mean specific belief systems for the Cammeraygal are not clear though a few early accounts also give an insight into other practices in the area. Tench observed a North Shore woman, known to him as Gooreedeeana, with her body painted in broad stripes of white ochre paddling her canoe to or from a ceremony (Hoskins 2019, p.16). Moreover, a Cammeraygal man named Carradah, who aided Lieutenant Lidgbird Ball in surveying the north was injured during ritual "payback" spearing ceremony in 1793 (Hoskins 2019, p.17).

Plate 4.1 Left: Tindale's map (1974) showing the location of the *Eora*

4.3 Contact and post contact

The First Fleet landed in Sydney Cove in January of 1788 settling in close proximity to Cammeraygal country. The belief in the superiority of European life and introduction of foreign food and drink, plants and animals, materials, and disease quickly unsettled the way of life of the local Aboriginal peoples. By the middle of 1788 local groups had begun to express dissatisfaction with the European colonisers and letters to England recounting violent encounters between convicts and Aboriginal people (Warren 2014, p.69-70). In April of 1789 a smallpox epidemic spread through the Aboriginal populations coming from western New South Wales (and originally from trepangers on the north coast of Australia a year or so earlier) (Campbell, 2002). Data available suggest that this disease may have killed up to 80% of the population (Campbell 2002). The first accounts of the Cammeraygal were recorded after the smallpox epidemic.

The landscape of the North Shore meant that the harbour was the focus of resource exploitation for the Cammeraygal people. Captain Watkin Tench (1979, p.285) believed the Cammeraygal possessed the best fishing grounds in Port Jackson. Early European observers noted that the coastal tribe men made spears, weapons and wooden tools and fished from the shore while women made line and shell hooks using these items to fish from their canoes (Hoskins 2019, p.12). George B. Worgan, a First Fleet Surgeon, wrote in his journal:

> 8 or 10 Natives passed not far from the Ship this Morning, in 5 Canoes, when they got near the Rocks, many of the Men got out, and by the help of a Spy-Glass, I could see them very busy in striking the Fish with their Spears, and I saw them take two or three tolerably large ones in this manner; the Women, remained in the Canoes employed in fishing with a Hook & Line, the Fish, they caught, appeared but small, after having caught a good many, they went on shore a little way up in the Wood, lit a Fire, and sat down round about it, in the Afternoon, they got into their Canoes, and returned, passing by the Ship again, they houllowed, jabbered & pointed (Worgan 9 February 1788).

The Europeans were particularly fascinated by the women's skill controlling their bark canoes in the open water along with managing the fishing tackle, the fires lit they lit on clay pads in the vessel as well as their small children on board (Collins 1798, p.48). As fish was the most readily available food source for coastal people, the women of the Cammeraygal and surrounding groups of the Eora nation were the primary food providers of their families meaning fishing was also an important status symbol (Karskens 2014). Cammeraygal fisherwoman Barangaroo became a notable figure in the Sydney settlement as a wife of Bennelong and the way she blatantly shunned the European way of life until her death in 1791 (Karskens 2014).

While fish and shellfish were the primary food source for the Cammeraygal, land-based resources were also exploited. Plant resources such as native fruits, yam and fern root as well as banksia flowers and honey were collected (Hoskins 2019, p.12). Moreover, in September 1790, John Hunter recorded Aboriginal people burning off the land on the north shore:

> The weather being now very dry, the natives were employed in burning the grass on the north shore opposite to Sydney, in order to catch rats and other animals, whilst the women were employed in fishing: this is their constant practice in dry weather (Hunter 1790).

Fishing has always been an important activity in Port Jackson although archaeological evidence suggests that the concentration of fish in the diet and extent to which fishing was carried out, varied across Port Jackson. It seems to have been mainly focused in the lower part of the harbour around the estuary mouth (Colley and Attenbrow 2012 p.70).

Country was burned to create open grassland and encourage marsupials and birds to graze in the open as well as clear paths for travel and as wildfire prevention (Hoskins 2019, p.12).

In 1795, the Government presented 30 acres of land at Kirribilli to Samuel Lightfoot and the increasing incursion of Europeans into the North Shore displaced the local population and increased tensions in the region. Aboriginal groups were noted to have raided farms at Lane Cove for food and European supplies between 1804 and 1816 (Hoskins 2019, p.19). Even so, mentions of the Cammeraygal decreased in the early 1800s and by 1820 more than half of the land in Cammeraygal country had been occupied by European settlers (Hoskins 2019, p.17-18). A group of Aboriginal people were observed participating in a ceremony a Kirribilli in 1820, but the group was identified as 'Burra Burra' possibly indicating the breakdown of traditional social structures and the merging of groups (Hoskins 2019, p.20-21).

4.4 Post-contact period in and around Berrys Bay

The first properties around Berrys Bay were reserved for discharged soldiers in 1794 but the land does not appear to have been taken up (Martin D. Carney Archaeological Management & Consulting Group Pty Ltd 1999, p.16). In 1817 Governor Macquarie granted 80 acres (32.4ha) to ex-convict William (Billy) Blue in the area now known as McMahon Point and Blue's Point (Martin D. Carney 1999, p.16). Blue named his farm *Northampton* and established a fleet of ferries on the harbour running between his farm and Sydney earning him the nickname "The Old Commodore" (Park 2005). In the 1860s Michael McMahon took up property on the point (Park 2008).

In 1821 merchant Edward Wollstonecraft was granted 524 acres (212 ha) on the North Shore "exclusive of rocks and sand" where he established *Crows Nest* estate (North Sydney Heritage Centre 2005). Wollstonecraft's grant encompassed the north and western section of Berrys Bay as well as present day Wollstonecraft, Waverton and Crows Nest (Plate 4.2) (Hoskins 2019, p.18). Wollstonecraft and his brother-in-law Dr. Alexander Berry had established a company shipping hay and cedar from the Shoalhaven constructing a stone wharf, warehouse and worker's accommodation on the western side of Berrys Bay to support their venture (Perry 1966; Hoskins 2019, p.22). Sometime in the 1820s Berry treated Bungaree at *Crows Nest* after he was injured in a fight (Hoskins 2019, p.22). The property passed to Wollstonecraft's sister Elizabeth and Berry after Edward's death in 1832 and the couple constructed "Crow's Nest House" at the head of the bay in the early 1840s (Hoskins 2010).

Plate 4.2 Berry Estate map c.1887, Source: North Sydney Council n.d. (Gooden Mackay 1993, p.1).

Following Elizabeth's death in 1845 Berry began subdividing the *Crows Nest* estate starting with 41 allotments around the present Edward, Miller and West streets in 1853 (North Sydney Council). Berry also leased the property's warehouses as a coal warehouse for shipping companies from the mid-1800s and the site was also used for ship repairs, storage and a distillery from 1872 (Hoskins 2010). Alexander Berry died in 1873 and the property passed to his brother David and then their cousin John Hay in 1889 (Hoskins 2010).

Further subdivision of the Berry estate occurred in the 1890s when a portion was given over to the government for the construction Milsons Point to Hornsby railway. In 1906 Berry Island and land around Balls Head was given over the New South Wales government and *Crows Nest* was subdivided in 1904, 1911, 1913, 1921, 1931, 1932 and 1934 (Hoskins 2010).

Aboriginal groups remained active, visible occupants in the region well into the middle of the nineteenth century (Hoskins 2019, p.20-21). Fishing continued to be an important practice within the communities, but European boats were used in favour of bark canoes (Hoskins 2019, p.25). In 1878 Aboriginal people occupied the foreshore of Berrys Bay and one local resident suggested that the Aboriginal people of Port Jackson be returned Goat Island "considering the vast territory which has been wrested from these poor people without compensation" (*Sydney Morning Herald*, 23 November 1878, p.6). In the 1890s the Aboriginal people of the North Shore were moved to the La Perouse reserve (Hoskins 2019, p.26).

Industrial activity in the area increased over the twentieth century. In 1906 the North Shore Gas Company established works on Balls Head Bay with the Sydney Coal Bunkering Company constructing a coal loader on Balls head point in 1917 (Hoskins 2010). The coal loader was in use until October 1992. Wollstonecraft and Berrys stone stores were removed in the 1930s to make way for fuel tanks for the Commonwealth Oil Refineries, now BP, which were dismantled in the 1980s (Hoskins 2010). Berrys House was demolished in the 1960s (North Sydney Council).

4.5 Information provided by RAPs

No project specific comments provided

5 Archaeological context

5.1 Key findings

- Port Jackson has been subject to numerous past investigations, and demonstrates a range of Aboriginal sites, objects and places along its foreshore. These are dominated by rockshelters and/or shell middens, with lesser occurrences of grinding grooves and artefact scatters. These occur despite extensive development over the last 200 years.

- To date, observations have been limited to the terrestrial portions of Port Jackson, with limited underwater Aboriginal investigations in the harbour or other parts of Sydney more generally. Previous investigations of Port Hacking and at Windsor on the Hawkesbury-Nepean River provide some of the only local consideration of underwater Aboriginal cultural materials in recent years. These found potential and/or disturbed cultural materials, often in the form of stone artefacts in secondary contexts (ie not from their original discarded location).

- A search of heritage databases identified 105 previously documented Aboriginal sites, objects and/or places in the general vicinity of the study area. No sites were documented within the study area, with the nearest being at Waverton Park, Ball's Head and Berry Island.

- Since 2010, there has been no Aboriginal heritage impact permit (AHIP) issued for the study area or immediate surrounds.

5.2 Regional background

The first peopling of Australia occurred ~50,000 years ago (50 ka), and likely consisted of reasonably large groups of technologically advanced hunter-gatherers (Bradshaw et al. 2019; O'Connell et al. 2018). The peopling of the continent was rapid, with sites such as Devil's Lair (WA), Warratyi (SA), and Lake Mungo (NSW) all occupied within a few thousand years of arrival (Bowler et al., 2003; Hamm et al., 2016; Turney et al., 2001). Genomic research has shown that following these initial explorations of the continent, regional populations or nomadic sedentism, was established by ~40 ka (Tobler et al. 2017). These small populations were highly mobile, but remained within a broad spatial geographic area, dictated in general by the nature of resources and water availability. In the case of some of the arid parts of the continent, mobility encompassed thousands of square kilometres (Gould 1977), while major riverine corridors such as the Murray River had near permanent settlements (Pardoe 1995).

In NSW, the earliest evidence of Aboriginal people are human remains recovered from the lunette in Lake Mungo and dating to ~42 ka (Bowler et al. 2003; O'Connell et al. 2018). The presence of red ochre covering the remains are suggestive of a society with significant cultural and symbolic complexity (Langley et al. 2011). Near the coastal edge, the earliest populations were found at Cranebrook Terrace, near Penrith (western Sydney). Here a handful of rudimentary stone tools were found in an alluvial unit, some 8 m below the current surface, and which were dated to ~40-45 ka (Williams et al. 2017). However, it is not until ~35 ka, that regional populations appear to have become established in the Sydney Basin, and which appeared to consist of small bands of people focussed mainly along major river systems, including the Parramatta River, Hawkesbury-Nepean River, Georges River, and Hunter River (GML 2019; AAJV 2016; Hughes et al. 2014; Williams et al. 2012; 2014). These rivers formed key ecological refuges that hunter-gatherer groups used to survive major climatic events such as the Last Glacial Maximum (21±3 ka) – a cool and arid climatic period. Well-established archaeological models suggest populations experienced a major reduction in size (by as much as 60%), and settlement contraction and abandonment across much of the continent during this time (Veth 1993; Williams et al. 2013), although recent research suggests that the story may be more complex than this (eg Tobler et al. 2017).

The terminal Pleistocene and early Holocene (~18-8 ka) was characterized by significant environmental change, notably the rapid inundation of much of the coastal shelf, resulting in the reduction of the continent by ~21% (~2 million km^2) (Williams et al. 2018), in tandem with improving climatic conditions – the Holocene climatic optimum (Williams et al., 2015a; 2015b). More broadly, these conditions resulted in increasing population growth, expansion of ranging territories, increasing sedentism (longer patch residence time) and the beginnings of low-level food production (eg aquaculture), and ultimately the initiation of social and cultural groupings observed in the late Holocene (Williams et al. 2015b). Within the Sydney Basin, a large number of sites are first initiated during this time, including Burrill Lake (~20 ka), Bass Point (~17 ka), and Loggers Shelter in Mangrove Creek (~11 ka) (Bowdler 1970; Lampert 1971; Attenbrow 2004; AMBS 2006). More broadly, we see a much broader range of archaeological site types occurring, such as the Roonka Flat burial ground on the banks of the Murray River within which some 147 individuals were interred through the Holocene (Pate et al. 1998), and the increasing use of marine resources. Many of the previous refuges were subject to abandonment or a re-structuring of land use (Dortch, 1979; Fitzsimmons et al., 2019). These activities suggest the ability to undertake large-scale movements to mitigate environmental distress was becoming increasingly difficult and was addressed through diversification of hunter-gathering behaviours and, at least in part, technological advances and investment (Williams et al. 2015b).

The late Holocene saw significant population increase, with hunter-gatherers reaching their zenith of ~1.2 million at 0.5 ka, a tenfold increase on Pleistocene levels (Williams 2013). Data suggests that the highest populations during this time were in the southeast of Australia. Williams et al. (2015b) suggest that this increase was likely a result of intensification of earlier technological advancements, including hafting technology, plant and seed processing, and localized landscape management (using fire), allowing climatic downturns to be successfully weathered. These included strong arid El Nino Southern Oscillation (ENSO) conditions between 4-2 ka, and increasingly turbulent climatic conditions during the Medieval Climatic Anomaly (1.3-1 ka) (generally wetter) and Little Ice Age (0.3-0.5 ka) (generally drier) (Williams et al. 2010; 2015b). A result of these denser populations was decreasing freedom of movement and the formation of strong classificatory kinship systems, complex cultural and symbolic landscapes based on geographic totemism (the 'Dreaming'), distinctive graphic art systems, land rights in the form of ritual property, and formalized exchange networks (Williams et al. 2015b). For the Sydney Basin, these conditions resulted in a significant increase in the archaeological visibility of past Aboriginal populations, with sites occurring in a much wider range of locations; and generally indicative of a more intensive use of the landscape.

5.3 The local archaeological record

There is general consistency in the types and distribution of Aboriginal archaeological sites throughout the Port Jackson estuary, drawing primarily on research undertaken the Port Jackson Archaeological Project (Attenbrow 1991, 2002). The distribution, density and size of sites are largely dependent on environmental context. For instance, middens are found in close proximity to marine, estuarine and less often, freshwater bodies. Shellfish species recorded at individual middens varies according to the location of the site. Most commonly represented species in the estuarine zones are rock oyster, Sydney cockles, hairy mussel, Hercules whelk, Australian horn shell, the wink, mud and spiny oyster. The Sydney cockle and mud oyster are now virtually extinct in Port Jackson (Hoskins 2019 p.7). Rockshelters are found in areas of exposed sandstone escarpment and benching, often with pigment art within, and grinding grooves are found in areas of exposed flat beds of sandstone near water sources. Pecked and abraded rock engravings are typically found on exposed, flat sandstone that may be on the rocky edges of the harbour. While extensive development around Sydney Harbour since 1788 has destroyed and disturbed an unknown number of Aboriginal sites, recent research has demonstrated that many sites still exist around the harbour.

In their thematic study of Australian rock art sites McDonald and Clayton (2016) note that the Sydney-Hawkesbury sandstone region (which extends from Wollemi and Yengo National Parks in the north, to the Royal National Park in the south and the Blue Mountains to the west), is rich in Aboriginal cultural heritage, with a high proportion of rock art sites. The rock art predominantly consists of pigment art sites in rockshelters and engraving sites on open horizontal platforms, representing an art tradition dating mostly to the mid-late Holocene (<5,000 years). The North Sydney's foreshore contains rockshelters with hand stencils and engravings.

On Berry Island there is an engraving of a whale or large fish and a nearby hollowed out rock basin with grinding grooves, and on a sandstone rock platform near Balls Head a whale or large fish is engraved with a human figure inside. A nearby rockshelter contained the skeleton of a woman and 450 stone artefacts, shellfish food remains was investigated by Sydney Museum in 1964 and 1971 (Hoskins 2019 p.7).

In the case of the study area, past Aboriginal occupation must be considered within the context of sea level change. The coastline of Australia has changed considerably during the last 50,000 years, ranging from -125 m below current levels to +1.5m in the mid Holocene (see Section 3.6). The study area would have been an exposed moderate to steep slope on the edges of a river valley (now Port Jackson) prior to ~8,000 years ago. Since that time, the study area and project footprint has been inundated. While this does not necessarily remove cultural materials, there is a greater chance of loss and/or disturbance from marine processes and activities.

To date, investigation of submerged cultural materials has been limited with research focus only recently shifting to underwater Aboriginal archaeology in Australia (eg Benjamin et al. 2020). Benjamin et al (2020) undertook investigations off the northwest coast of Australia and identified stone artefacts surviving on the ocean floor. Through various observations and indirect sampling provided a story on the past use and depositional history of the locale prior to sea-level rise in the early Holocene. In NSW, studies have been undertaken at Port Hacking, south of Sydney, and identified potential rockshelters underwater, although no excavation has occurred to date to demonstrate the condition or survivability of cultural materials if present (Nutley et al. 2016). Aboriginal objects, probably eroding from the adjacent riverbank, were also recovered during maritime excavations of the Windsor Bridge Replacement Project (AAJV, 2021). These retained no stratigraphic context being recovered from historical units, but typologically could be aligned with a more extensive terrestrial excavation near the site. Based on these studies, it can be concluded that some types of cultural materials (notably stone artefacts) may survive in submerged environments, although their condition and context will be heavily reliant on local conditions.

5.3.1 Previous investigations near the study area

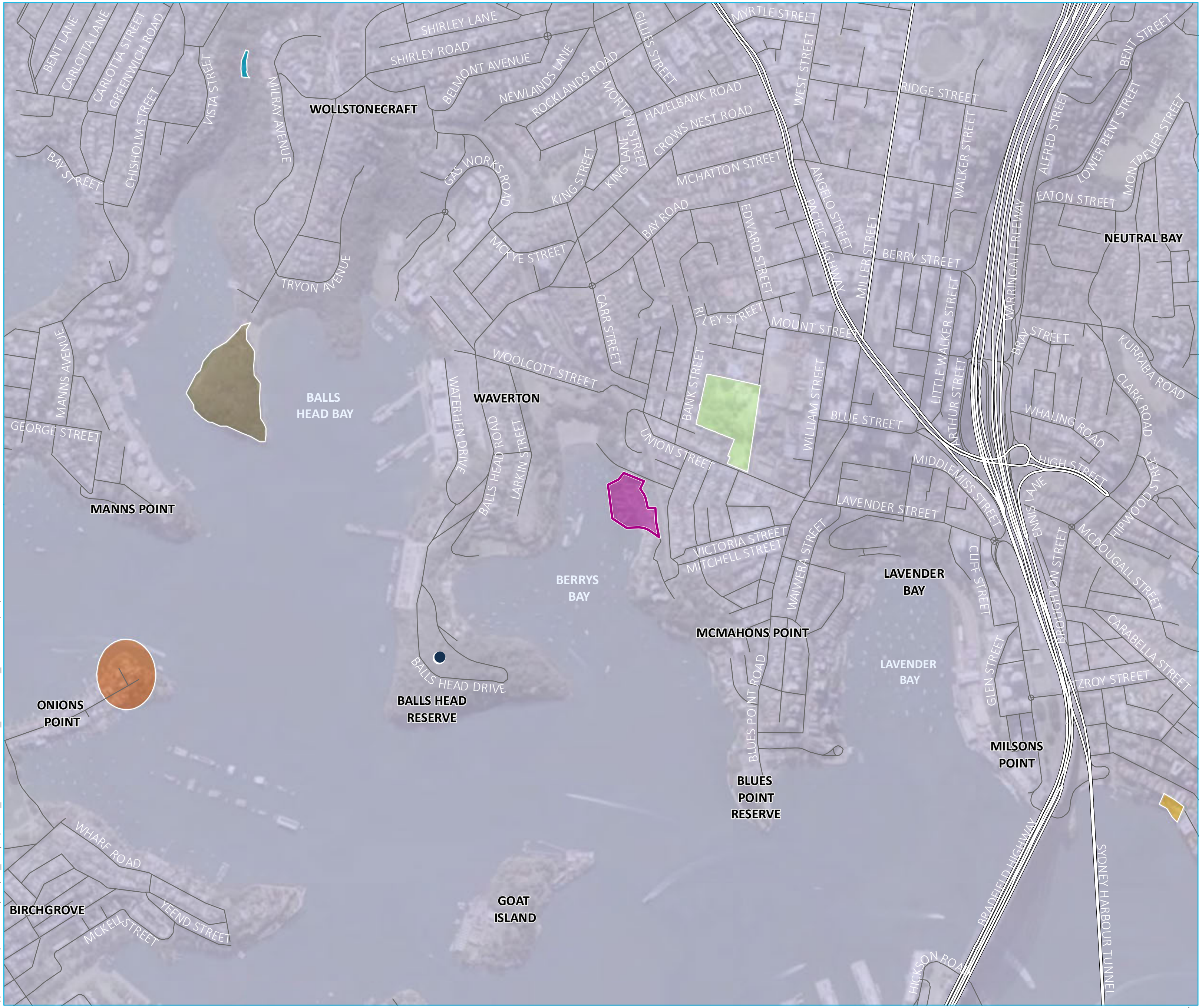
Table 5.1 and Figure 5.1 provides a summary of previous investigations undertaken in the proximity of the study area.

Table 5.1 Previous studies in the local area

Author	Project	Distance from study area	Findings
Bowdler 1971	Balls Head: excavation of a rockshelter	500 m south-west	The rockshelter at Balls Head had previously been excavated in 1964 during which skeletal remains were uncovered. Bowdler analysed the data from that excavation which included skeletal remains (female), shell, and over 450 artefacts. A macropod tooth with traces of vegetable gum was interpreted as a decoration worn by the deceased in the hair or as a necklace. The lithic assemblage comprised a high proportion of microliths of geometric form. The predominant shell in the midden was rock oyster. The next two dominant species were the Sydney cockle which reduced in number from bottom to top and hairy mussels that increased in number from bottom to top and. Suggesting that as one species became scarcer (nor extinct) people adapted to what was available. Bowdler proposes that the Balls Head shelter was predominantly a maintenance site, where hunting gear was manufactured and repaired while people subsisted on the easily gathered shellfish.

Table 5.1 Previous studies in the local area

Author	Project	Distance from study area	Findings
JMCHM 2000	Berry Island – salvage excavation	1.2 km north-west	An Aboriginal skeleton had been uncovered in the rockshelter in 1991. The excavation uncovered a partial intact shell midden containing estuarine and rocky shore species and five artefacts.
GML Heritage 2017	Loreto Kirribilli – Aboriginal due diligence assessment	1.5 km south-east	A visual inspection confirmed that the site has been significantly landscaped and developed, including terracing and excavation into the bedrock. It was therefore concluded that the potential for residual natural soil landscapes is low and that the majority of the site has no Aboriginal archaeological potential. The study did not find any specific associations with Aboriginal cultural heritage.
Comber 2021	Berrys Bay Marina: maritime archaeological assessment	Study area	The report focused on historical heritage items and did not address the issue of potential Aboriginal cultural heritage. The report concluded that extraction of the piles would result in significant upheaval of the surrounding sediment which creates a potential for relics, currently protected in an anerobic environment to be disturbed and in moving into an oxygenated environment, subject to increased rates of deterioration. As such they recommended an inspection of the seabed by an archaeologist following the extraction of the piles. As the FDD is a floating platform that would be berthed at the shoreline wharves, impacts to potential maritime archaeology are not anticipated. Therefore, the ongoing presence of the FDD, or during movements within the bay would have no impacts on underwater cultural heritage in Berrys Bay.
Hamptons Property Services 2019	Environmental Impact Statement	Study area	The EIS determined that the study area has low Aboriginal significance and that the proposed activity would not detract from the cultural places, values, customs, beliefs and traditional knowledge of Aboriginals.



KEY

- Study area
- Major road
- Minor road

Previous studies

- Salvage Excavation of Berry Island #3, (NPWS # 45-6-1512) at Berry Island, near Wollstonecraft, NSW by JMCHM, 2000
- Report on Test Excavations in Mary Booth Reserve, Kirribilli Foreshore by Shaun Mackey and Vanessa Hardy
- 64-68 Milray Avenue, Wollstonecraft - Archaeology Survey by Jo McDonald
- Preliminary Cultural Heritage Overview OPTUS Link From Sydney to Newcastle and Orange by Kelvin Officer and Kerry Navin
- An Archaeological Investigation of Aboriginal Sites at Callan Point and Yurulbin Point by Huys, Johnston and Wickman
- Graythwaite Site Aboriginal Heritage Assessment [for Tanner Architects Pty Ltd] prepared by Australian Museum Business Services
- Floating Dry Dock - Noaks Boat & Shipyard, Berrys Bay - Maritime Archaeological Assessment by Comber Consultants, 2021
- Balls Head: Excavation of a rockshelter by Sandra Bowdler, 1971

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Source: EMM (2021); DPC (2020); DFSI (2020); DPIE (2021); MetroMap (2021)

0 250 500 m
GDA 1994 MGA Zone 56
N

Map of previous studies in the local area

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 5.1

EMM creating opportunities

5.4 AHIMS data

Heritage NSW maintains the Aboriginal Heritage Information Management System (AHIMS), a database of known and registered Aboriginal sites in NSW. An AHIMS search was undertaken on 6 September 2021 encompassing a 16 km^2 centred on the study area. The results are summarised in Table 5.2 and Figure 5.2 and provided in full in Appendix C.

The search identified 105 Aboriginal sites, objects and/or places. Of these, four sites have been destroyed and one site has been investigated and determined to not be an Aboriginal site. This results in 100 valid sites that remain within the locale. The recorded sites within the search area are dominated by rockshelters (45%) and shell middens (36%), with lesser occurrences of other site types. Of these, 24 included art either as engravings and/or pigment, while 62% included stone artefacts.

Spatially, the sites are concentrated on the lower slopes beside the harbour, particularly on the headlands and along the riparian corridors of creeks and gullies. Numerous sites are documented at Berry Island, Balls Head Reserve and Waverton Park – many referenced in Section 5.3.

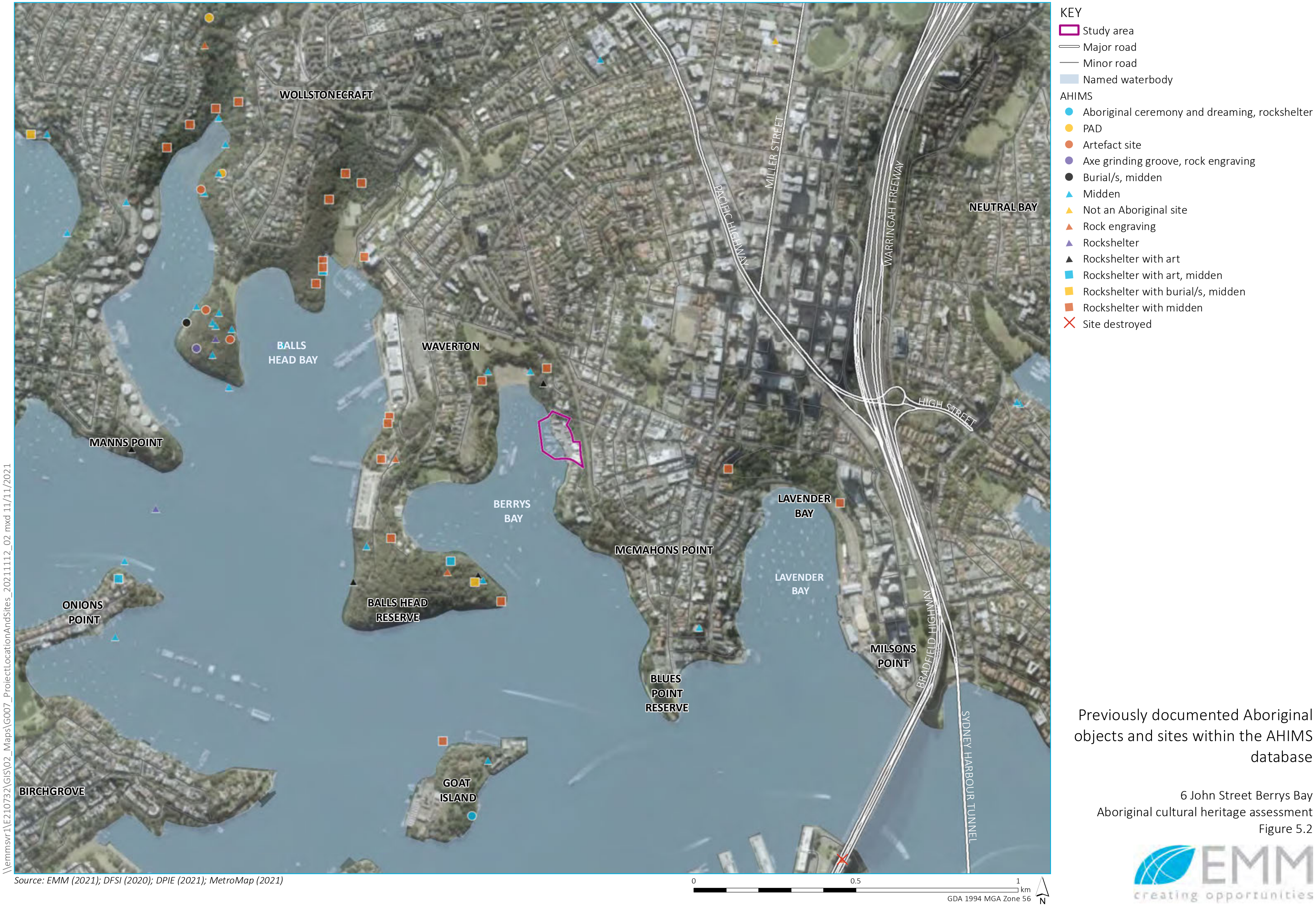
There are no recorded Aboriginal sites within the study area. The closest registered Aboriginal sites to the study area consist of three rockshelters with art or middens and two middens, all within Waverton Park.

Table 5.2 Summary of AHIMS site types within the search area

Site type	Subcategory	Total
Artefact site		5
– *Unspecified number of artefacts*	*4*	
– *Isolated find*	*1*	
Middens		38
– *middens*	*13*	
– *midden with artefacts*	*23*	
– *midden with PAD*	*1*	
– *midden with burial/s, artefacts*	*1*	
Rockshelters		47
– *rockshelter*	*1*	
– *rockshelter with artefacts*	*1*	
– *rockshelter with midden*	*4*	
– *rockshelter with midden, artefacts*	*25*	
– *rockshelter with midden, artefacts, Aboriginal ceremony and Dreaming*	*1*	
– *rockshelter with art*	*6*	
– *rockshelter with art, midden, artefacts*	*7*	
– *rockshelter with burial/s, midden, artefacts*	*1*	
– *rockshelter with burial/s, art, midden, artefacts*	*1*	
Rock engraving		9
Rock engraving, axe grinding grooves		1

Table 5.2 Summary of AHIMS site types within the search area

Site type	Subcategory	Total
PAD		4
Not an Aboriginal site		1
TOTAL		**105**



Source: EMM (2021); DFSI (2020); DPIE (2021); MetroMap (2021)

Previously documented Aboriginal objects and sites within the AHIMS database

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 5.2

EMM creating opportunities

5.5 Predictive model

Based on the environmental, ethnographic and archaeological context outlined in Sections 3-5, the following conclusions can therefore be drawn regarding the potential presence and location of Aboriginal sites and/or objects within the study area:

- Rockshelters and/or engravings are common to the region and have been found in nearby parks and reserves. These are constrained by exposed sandstone geology and outcropping that provide the surfaces Given the reclaimed nature of the study area and the submerged condition of the project footprint, it is considered that such sites if present would generally be heavily disturbed.

- Occupation deposits containing shell (midden) and stone artefacts either as open sites or within rockshelters are also common in the region and are most likely to be identified within the study area if present. Given the reclaimed nature of the study area and the submerged condition of the project footprint, it is considered that such cultural materials if present would generally be disturbed and/or in secondary contexts.

- Traditional Aboriginal burials can occur anywhere in the landscape, but in coastal areas they are most commonly found within soft, sandy sediment contexts. Burial sites have been historically noted in the region, and are commonly found within rockshelters. Given the reclaimed nature of the study area and the submerged condition of the project footprint, it is considered that such burials if present would generally be disturbed and/or in secondary contexts.

- Post-contact occupation deposits and cultural materials from campsites in the mid and late 19th Century may be present along parts of Berrys Bay foreshore. Given the reclaimed nature of the study area and the submerged condition of the project footprint, it is considered that such sites if present would generally be disturbed and/or in secondary contexts.

Other site types are documented in the broader region, but they are considered unlikely to be present within the study area given the current conditions.

6 Field investigation

6.1 Key findings

- On-site validation consisted of field survey undertaken by EMM archaeologist, Alan Williams, and representatives of four registered Aboriginal parties. The field investigations focussed on the study area, with observations of the project footprint being undertaken from the land. Inspection of the study area from Larkin Street on the opposite side of Berrys Bay was also undertaken to provide improved understanding of the cultural landscape.

- No Aboriginal objects, sites or deposits, or their potential to be present were identified during the field investigation. The Aboriginal participants identified no areas of intangible or cultural value within the study area. Discussions in relation to cultural landscape did not identify any specific concerns, with the bay already subject to various development.

- An underwater inspection of the project footprint was undertaken by Comber Consultants Pty Ltd (2021). This investigation was focussed on maritime and historical features but provided an indication of the condition of the seabed. While no Aboriginal objects were discernible from the photographs, there is no evidence of steep relief that may suggest former rockshelter features – the most common site type in the locale – are present.

6.2 Approach and methods

EMM conducted an archaeological field survey of the project footprint with the assistance of Aboriginal participants on 27 October 2021. The survey was directed by Dr Alan Williams (EMM archaeologist), with representatives of Didge Ngunawal Clan (Korri Carroll), Kamilaroi Yankuntjatjara Working Group (Adam Ring), Wailwan Aboriginal Group (Nathan Small), and Butucarbin Heritage (Lowanna Wilson).

The survey involved pedestrian inspection of the study area and observations of the project footprint. The primary aims of the survey were to:

- identify Aboriginal archaeological sites and/or places with the assistance of Aboriginal participants;

- characterise the landscape to aid predictions of archaeological potential and sensitivity;

- identify sites or areas that would require further investigation if planned for development as part of the project;

- identify sites or areas to be avoided by development, where possible; and

- identify areas with minor or negligible Aboriginal cultural heritage values that hold no constraint for development.

The archaeological survey and data collection methods followed Section 2.2 of the *Code of Practise for the Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010). Given the small scale, entirely developed land surface and submerged nature of the site, general observations rather than formal transects were documented.

Site recording was completed in accordance with the Code (DECCW 2010a). The course of survey transects were recorded as tracks on a hand-held non-differential GPS unit, whilst site locations and details were recorded with a smart phone using site recording forms created by EMM on the Survey123 application for ArcGIS (ESRI© software) where necessary.

6.3 Results

The study area is entirely encompassed by a working boat yard and lacked any evidence of natural surfaces or soil profiles that could be inspected for cultural materials (Plates 6.1-6.3 inclusive). The study area was large flat landform abounded to the east by steep moderate slopes and vertical cliffs (Plates 6.1 and 6.4) and to the west by Sydney Harbour (Plates 6.5 and 6.6). The land surface was entirely covered in bitumen or concrete with various industrial structures, including buildings, cranes, slipways, fencing, etc. At least a portion of the western side of the study area was an elevated concrete slab situated above the harbour's surface. The study area was some ~100 x 50 m in size, and could be encompassed within a single north-south transect (Table 6.1).

The eastern edge of the study area was characterised by moderate-steep slopes upon which Johns Street was situated, and steepening to cliffs in the south (Plate 6.1 and Plate 6.4). The moderate-steep slopes were considered too steep to be able to retain an intact soil profile, and appears generally disturbed – sandwiched between the boatyard and Johns Street. A shear sandstone cliff was observed behind several structures to the south of the study area (Plate 6.7). These appear to have been artificially created as a result of the nearby rail corridor, and retained no undulations, gaps or overhangs, where a past rockshelter or potential for one to be present was observed.

The project footprint was part of Sydney harbour and encompassed a number of small wharves or jetties situated on piers rising from the seabed (Plates 6.5 and 6.6). Investigation of the seabed was not feasible as part of the field investigation (see Section 6.3.1). These were surrounded by numerous large vessels being worked upon in the boatyard.

No Aboriginal objects, sites or deposits were identified within the study area, nor were they considered likely to be present given the level of past disturbance on the site; and the reclaimed nature of the site. No remnant vegetation that may contain cultural modification was observed.

Discussions were undertaken with the Aboriginal representatives both on the study area and at Larkin Street overlooking the site to explore intangible values and/or cultural landscape (Plate 6.8). None of the representatives identified any areas of cultural value or concern that they may be present. It was highlighted that the area would have been used by Aboriginal people for a range of socio-economic activities in the past, along with much of the harbour foreshore – a finding noted in previous sections of this report. There were no specific issues raised in relation to potential impacts to the cultural landscape, with many noting that the heavily urbanised nature of the harbour in this general area had already had irreversible impacts. Further, the boatyard contained a large number of boats being worked upon with the project footprint, and as such the introduction of the FDD was considered to align with the already industrial visual impacts present within the site.

Table 6.1 Field survey summary and effective coverage

Survey Unit	Landform	Survey Unit (m^2)	Visibility (%)	Exposure (%)	Effective Coverage (m^2)	Effective Coverage (%)
1	Open depression/modified	5,000	0	0	0	0

Notes: The study area was entirely covered in hard stands, and as such visibility of the natural surface was 0%.

Plate 6.1 **The northern portion of the study area looking northeast towards the steep slopes upon which John Street is situated.**

Plate 6.2 **The northern portion of the study area looking south across the active boatyard.**

Plate 6.3 The southern portion of the study area looking southeast.

Plate 6.4 The sandstone cliffs evident behind the boatyard, looking east.

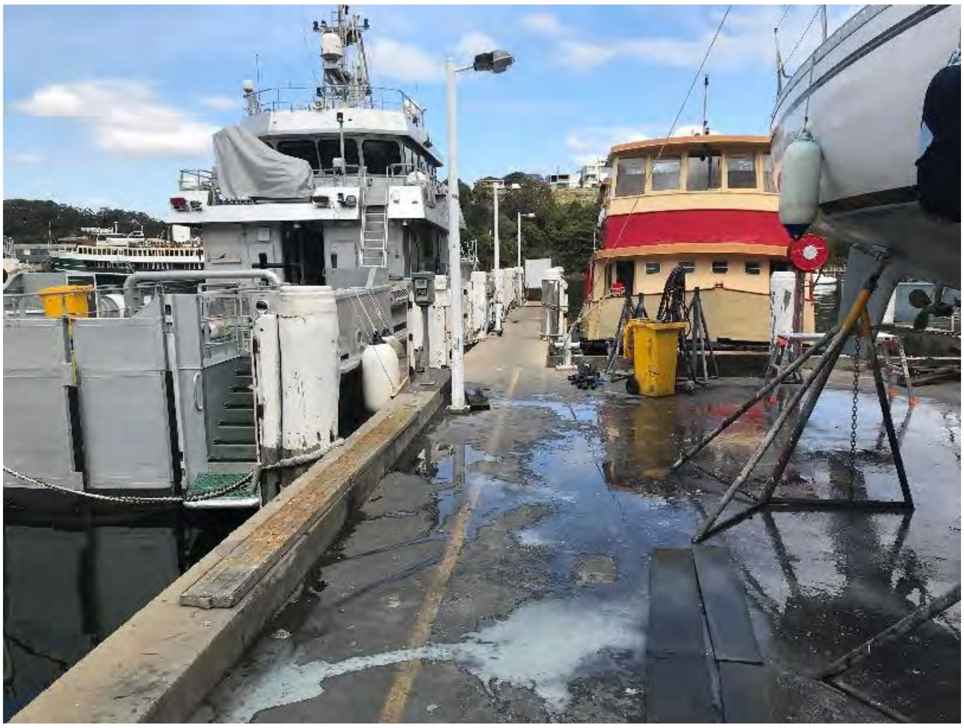


Plate 6.5 One of the proposed wharves proposed for modification to install the FDD, and general location of the project footprint, looking west.

Plate 6.6 One of the proposed wharves proposed for modification to install the FDD, and general location of the project footprint, looking west.

Plate 6.7 **A detailed photograph of the sandstone cliff behind the boatyard, and which appears artificially created, looking north.**

Plate 6.8 **The study area and proposed project footprint looking east from Larkin Street. Discussions were undertaken at this site to explore cultural landscape impacts.**

6.3.1 Maritime investigations

Comber Consultants (2021) undertook an underwater investigation of the project footprint as part of the broader assessment. These works were focussed on European and maritime cultural materials, but David Nutley who undertook the works is also well versed in the identification of submerged Aboriginal heritage (eg Nutley et al. 2016).

While the identification of discrete cultural materials, such as stone artefacts would not be expected from this investigation, nor does the photographs allow such interrogation, the inspection nonetheless provides a coarse understanding of the seabed encompassed by the project footprint. Of note is that the observations and photographs do not demonstrate any form of significant underwater relief or sandstone escarpment that may suggest that rockshelters – the most common and significant site type in the locale – would be present in the footprint (Plate 6.9). Rather, the photographs align with the desktop review of the project footprint that suggest prior to sea-level change the site would have been a moderate slope overlooking the broader Port Jackson valley.

Further, the observations indicated numerous disturbances were present on the seabed, including loose piles, girders, shopping trolleys, etc. However, the report concluded that:

> Extraction of each pile would be accompanied by upheaval of the surrounding sediment. This creates a potential for [historical] relics, currently protected in an anerobic environment to be disturbed and to be moved into an oxygenated environment, subject to abrasion and prone to increased rates of deterioration. The level of potential impact is assessed as moderate.
>
> Apart from the archaeological inspection following extraction of piles, no additional mitigation measures are required to protect underwater cultural heritage from berthing of the FDD.

The report ultimately recommends that the seabed is investigated following extraction of the piles to identify and recovery any cultural materials.

Consideration of the FDD settling the seabed was also undertaken in the report, but considered that the potential impacts to buried cultural materials was limited. A brief consideration was also given to the European and historical cultural material within the study area, and considered some potential for isolated relics or items may be present in the ~5 m of fill present beneath the hard stand.

Plate 6.9 An example of the seabed within the project footprint. (Source: Comber Consultants, 2021).

6.4 Sites Identified

No Aboriginal objects, sites or deposits were identified within the study area or project footprint.

7 The archaeological and cultural resource

The regional archaeological record of Port Jackson is well understood. Both archaeological and more recent ethnographic records have extensively demonstrated that the harbour formed an important locale for Aboriginal people for millennia. The types and distribution of Aboriginal archaeological sites throughout Port Jackson, are dependent on environmental context. Middens are found in close proximity to marine, estuarine and less often, freshwater bodies. Rockshelters are found in areas of exposed sandstone escarpment and benching, often with pigment art within. Grinding grooves are found in areas of exposed flat beds of sandstone near water sources. Pecked and abraded rock engravings are typically found on exposed, flat sandstone that may be on the rocky edges of the harbour.

The archaeological record of the harbour is dominated by activity over the last few thousand years. While Aboriginal people are well-documented to have been in the Sydney Basin since at least 36,000 years, there are no sites documented of this age in Port Jackson. This is probably as a result of sea-level change, with Port Jackson having been a large river valley until its inundation about 8-9,000 years ago. Areas such as Berrys Bay would have represented the high ground over-looking this river valley until this time. Areas of older activity may be expected following water courses within Port Jackson, and which are now underwater and part of the seabed. The survivability and/or condition of these cultural deposits if present are unknown, with investigations of submerged cultural material limited in Australia and only few examples in the Sydney Basin.

Early explorer and colonial records do not make specific reference to activities in Berrys Bay, although a range of socio-economic activities (eg fishing, etc) are documented as occurring along the foreshores of Port Jackson. More recent activity in Berrys Bay has been documented in the late 19th Century in which an Aboriginal camp was briefly noted. No further information on its exact location, size, or composition was mentioned however.

A review of the history of the study area suggests that the potential for cultural materials of these past activities would be limited. Prior to 8,000 years ago, the study area and project footprint would have represented a moderate slope over-looking the now drowned river valley of Port Jackson. The apparent relief and geomorphology of the site indicates that rockshelter-type environments were not present, and as such were likely characterised by shallow soil profiles still found along parts of Port Jackson today. Such soil profiles (and any associated cultural material) are prone to replacement and loss by natural and anthropogenic processes, which included both the process of inundation and subsequent marine activities, and the more recent reclamation of the locale in the last hundred years. After 8,000 years, the project footprint has been submerged, and the study area was also likely inter-tidal and frequently inundated. Geotechnical information indicates that that some 5 m of fill and overburden is present on the site as part of reclamation works in the 20th Century. As such, the natural soil profile if present is a significant depth below the current land surface. A site inspection of the study area reinforces these findings with a heavily urbanised and modified landscape observed.

Based on these conditions, it is expected that if cultural materials remain, they would be as isolated or disparate stone artefacts and/or shell found in a secondary context (ie not where it was initially discarded) in the 20th Century fill materials within the study area and/or the marine sediments in the project footprint. The potential for other more significant archaeological sites, such as rockshelters (and associated features such as art) or engravings are considered improbable based on the geomorphology of the site.

Discussions with the registered Aboriginal parties did not identify any parts of the site containing cultural or intangible values. Reference was made to the general importance and socio-economic use of the harbour in the past, but no site-specific information was provided. This was similarly the case with the potential impacts of the cultural landscape, with feedback suggesting that the proposed activity would result in limited change to the already heavily urbanised harbour foreshore.

Source: EMM (2021); DFSI (2020); GA (2011); MetroMap (2021)

0 25 50 m
GDA 1994 MGA Zone 56
N

KEY

Study area

Project footprint

Proposed demolition/removal

Proposed FDD

Existing environment

Rail

No Aboriginal objects, sites or deposits identified. If present, they would consist of disparate stone artefacts/shell within 20th Century fill units and be of low significance

No Aboriginal objects, sites or deposits identified. If present, they would consist of disparate stone artefacts/shell within active marine sediments units and be of low significance

The archaeological and cultural resource

6 John Street Berrys Bay
Aboriginal cultural heritage assessment
Figure 7.1

EMM
creating opportunities

8 Significance assessment

8.1 General

All Aboriginal objects in NSW are protected under the *National Parks and Wildlife Act 1974. It is* recognised that the destruction of sites may be necessary to allow other activities or developments to occur. In order for the consent authority to make informed decisions on such matters, an important element of cultural resource management is determining the significance of cultural heritage places and objects to understand what may be lost; and how best it can be mitigated.

Cultural significance is outlined in Article 1.2 of the *Burra Charter* - the best practise document for managing cultural heritage – as ‘aesthetic, historic, scientific, social or spiritual value for past, present or future generations’ (Australia ICOMOS 2013). These values are reiterated in the NSW guidelines, which determines cultural significance of a place can be assessed by identifying the values that are present across the subject area and assessing what is important and why (OEH 2011). In assessing the scientific significance of sites, aspects such as rarity and representativeness and the integrity must be considered. Generally speaking, a site or object that is rare will have a heightened significance, although a site that is suitable of conservation as ‘representative’ of its type will also be significant. Conversely an extremely rare site may no longer be significant if its integrity has been sufficiently compromised.

The criteria adopted for this report are defined in Table 8.1. The management implications of these sites’ significance are discussed in subsequent sections.

Table 8.1 A summary of criteria used to assess the cultural significance (OEH 2011, 8–10)

Criterion	Definition
Social value—Does the place have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons?	Social (or cultural) value refers to the spiritual, traditional, historical or contemporary associations and attachments the place or area has for Aboriginal people. Social or cultural value is how people express their connection with a place and the meaning that place has for them. Social or cultural value can only be identified through consultation with Aboriginal people.
Historic value—Is the place important to the cultural or natural history of the local area and/or region and/or state?	Historic value refers to the association of a place with a historically important person, event, phase or activity. Historic places do not always have physical evidence of their historical importance (such as structures, planted vegetation or landscape modifications). They may have ‘shared’ historic values with other (non-Aboriginal) communities.
Scientific (archaeological) value—Does the place have potential to yield information that will contribute to an understanding of the cultural or natural history of the local area and/or region and/or state?	Scientific (archaeological) value refers to the importance of a landscape, area, place or object because of its rarity, representativeness and the extent to which it may contribute to further understanding and information. Information about scientific values is gathered through archaeological investigation undertaken in this report.

Table 8.1 A summary of criteria used to assess the cultural significance (OEH 2011, 8–10)

Criterion	Definition
Aesthetic value—Is the place important in demonstrating aesthetic characteristics in the local, regional, and/or State environment?	Aesthetic value refers to the sensory, scenic, architectural and creative aspects of the place. It is often linked with social value, and can consider form, scale, colour, texture and material of the fabric or landscape, and the smell and sounds associated with the place and its use. This value is only relevant to archaeological sites on only rare occasions, such as rockshelters that contain art, or culturally modified trees in prominent positions, etc.

8.2 Statement of significance

The investigations of the study area and project footprint identified no Aboriginal objects, sites or deposits, and with limited potential for them to be present. The site has been subject to extensive natural and anthropogenic processes that would have resulted in the disturbance and/or loss of cultural materials if ever present. This includes the inundation of the study area and project footprint some 8-9,000 years ago, and more recently the reclamation of portions of the site in the 20th Century.

It is considered that any cultural material (if present) would consist of disparate stone artefacts and/or shell in secondary contexts, either within the 20th Century fill units and/or marine sediments. While these cultural materials would represent tangible evidence of past local Aboriginal inhabitants having visited and traversed through the study area, they would provide limited technological information, come from a disturbed and/or highly active soil profile, and would therefore be considered to have low archaeological significance.

There is only cursory reference to the use of the locale by Aboriginal people in the post-Contact period. However, the exact location of an Aboriginal camp in Berrys Bay is unknown, nor the people that lived there. As such, there is no evidence gathered to date that may suggest the site meets any historical significance thresholds through a particular individual or event in the past.

Aesthetic significance cannot be applied here, since no sites, places or objects were identified that would require consideration of this criterion. However, the fact that the study area and project footprint have changed substantively in the last hundred or so years – including the introduction of ≥5 m of fill – would suggest it unlikely that any cultural materials if found would have an aesthetic value.

Discussions with the registered Aboriginal parties did not identify any cultural values associated with the study area and project footprint.

9 Impact assessment

9.1 Key findings

- The proposed activity includes the removal of seven mooring poles and several wharves, and the establishment of a FDD on the surface of Berrys Bay. As such, the potential for impacts to undisturbed soil profiles is considered unlikely.

- No cultural materials have been identified within the proposed activity area. If present, cultural material may be exposed as a result of the extrusion of the mooring poles and wharf supports and the resulting disturbance of marine sediment, a probable area of ~33 m^2.

- No intangible or cultural values have been identified within or near the study area that would be adversely affected.

- The project is considered to result in no intergenerational/cumulative loss to material culture.

9.2 Project impacts

The proposed activity within the study area and project footprint would involve the removal of various extant infrastructure and the establishment of a FDD on the surface of Berrys Bay (Section 1.3). In terms of physical disturbance to the existing soil profiles (whether marine sediments or fill units depending on location), this would be limited to the works necessary to remove the seven mooring poles and the wharf supports. Assuming each pole requires a 1 m^2 footprint to allow extrusion, some 33 poles or a total of ~33 m^2 of disturbance may be expected. All other activities are proposed to be constrained to existing structures (eg fenders attached to the current hard stand) and would result in no impacts to the under-lying natural/historical deposits.

Operationally, the FDD is not proposed to touch the seafloor. Should inadvertent interaction or grounding occur, additional impact to the marine sediments of ~1,170 m^2 may occur. Such impacts would likely be constrained to the surface and/or near-surface portion of the seabed, which are currently subject to extensive natural processes currently (eg terrigenous inputs and mixing).

9.3 Potential Aboriginal heritage impact

Based on the available information, no Aboriginal objects, sites or deposits have been identified within the study area or project footprint. It is considered that there is limited potential for disparate stone artefacts and/or cultural shell to be present in these areas given the historical development and use of the locale. These would be in disturbed and/or active soil profiles, and as such their movement would have limited to no impact to their significance.

In the case of direct impacts, the works would be limited to the removal or extrusion of the seven moor piles and several wharf supports, some ~33 m^2, from the seabed. The removal of these piles would affect the surrounding sediment, and which may expose cultural materials if present. Typical stone artefact densities in the Port Jackson region range from 5-20/m^2, and this may indicate that between 165-660 artefacts *could* be adversely affected. This value would increase to ~1,203 m^2 or 6-24,000 artefacts should the FDD interact with the seabed. Although these values assume a substantial occupation site within the project footprint, which based on available information from the locale and site itself is considered unlikely.

There are not considered to be any indirect impacts from the proposed activity.

The establishment of the FDD would not result in any adverse impacts to any identified Aboriginal objects, sites or places, all of which are several hundred metres from the study area. The FDD is being considered from a visual impact perspective elsewhere, but the impacts to the cultural landscape are considered negligible given the current urbanisation of the study area and its immediate surrounds. The current replacement of a large number of accumulated boats moored along the boatyard edge for a single comparable sized structure would result in no substantive change to the current cultural landscape of the bay.

No intangible or cultural values were identified within the study area. As such there would be no impact by the proposed activity to these values.

9.4 Inter-generational equity

Intergenerational equity is the principle whereby the current generation should ensure the health, diversity and longevity of the environment for the benefit of future society. For Aboriginal heritage management, intergenerational equity can be considered primarily in terms of the cumulative impacts to Aboriginal objects, sites and/or places in a region. If few Aboriginal objects and places remain in a region (e.g. due to development impacts), there are fewer opportunities for future generations of Aboriginal people and the broader community to enjoy the cultural benefits. Information about the integrity, rarity and representativeness of the Aboriginal objects, sites and places that may be impacted, and how they inform the past visitation and occupation of land by Aboriginal people, are relevant to the consideration of intergenerational equity and the understanding of the cumulative impacts of a project.

As outlined in Section 9.3, the proposed activity are at least partially or entirely within areas of existing disturbance and/or active submerged sediments where there is a low likelihood of significant cultural material being present. If present, these artefacts would be within a secondary context and would be considered of low significance.

Overall, it is therefore considered that the project would have negligible intergenerational loss to the Aboriginal objects and/or areas of cultural value.

10 Management and recommendations

10.1 Key findings

- The ACHA concludes that no Aboriginal objects, sites or deposits have been identified within the study area or project footprint. It is considered that if present, cultural materials would reflect isolated or disparate stone artefacts and/or shell in a secondary context (either in marine sediments and/or introduced fill) and be of low significance. No intangible or cultural values, nor cultural landscape, was considered to be present or adversely affected by the proposed activity.

- The absence of identified cultural material and the location of potential impact areas in submerged environments limits the management and recommendations that can be applied to the project. Recommendations include the need for inspection of the seabed on removal of the extraction of the piles to determine whether cultural materials are present, and liaise with Heritage NSW on their management if identified.

10.2 Management Strategy

This ACHA process, which included consultation with the Aboriginal community via an on-site meeting and inspection, identified no Aboriginal objects, sites or deposits within the study area. Based on available information, we find that prior to 8,000 years ago, the study area was a gentle to moderate slope over-looking a river valley. This environmental context is not conducive to extensive past use by Aboriginal people, nor to the survivability of cultural materials if present. After 8,000 years ago, the study area was inundated by rising sea-levels, which would have resulted in disturbance and mixing of the former land-surface both through the mechanical process of submergence, and subsequent marine processes. The project footprint would have been, and remains, submerged under 3-8 m of water, while the eastern portion of the study area was probably inter-tidal until subject to reclamation in the early 20th Century.

Based on the regional archaeological record of Port Jackson, Aboriginal sites are dominated by rockshelters and/or shell middens, both found with various densities of stone artefacts. Where sandstone plateaus or rock platforms are present, engraved art is also well documented. A review of the study area suggests that there would be limited potential for these types of sites, either prior to, or after, 8,000 years ago. The bathymetry of the site (ie underwater topography), does not suggest any flat or steep relief where engravings or rockshelter features may be expected, while the majority of shell midden sites along the harbour foreshore formed only in the last few thousand years when the study area was entirely or regularly underwater; and therefore such sites would probably have been upslope and out of the water. However, it cannot be discounted that disparate stone artefacts and/or shell are present within the study area from earlier sites being reworked through inundation and/or subsequent marine processes, or through discard near the foreshore in the past. There is also some potential for more recent cultural materials from a 19th Century Aboriginal camp in Berrys Bay, although its location is unknown. As such, it is concluded that there is a very low potential for disparate stone artefacts, shell and/or more recent cultural materials to be found in the marine sediments in the project footprint and/or the 20th Century fill units beneath the boatyard itself.

In NSW, harm or destruction of cultural materials is only permissible where an Aboriginal heritage impact permit (AHIP) has been obtained from Heritage NSW. This permit issued under Section 90 of the *National Parks and Wildlife Act 1974*, allows for a proponent to destroy or relocate cultural materials. The AHIP usually comes with various mitigation conditions, such as cultural material collection, archaeological excavation and/or monitoring. To apply for an AHIP, however, an Aboriginal object, site or deposit must be identified. Since no cultural materials have been identified, and it is considered improbable that they would be present, an AHIP cannot be sought for this project currently.

In addition, further characterisation of the deposits to identify cultural materials at this time is not feasible. Given the only proposed disturbance to the soil profile (whether the submerged seabed or fill units under the boatyard) is the extrusion of a number of mooring piles and wharf supports, any form of archaeological excavations could only be undertaken once development had commenced (ie to investigate the area of the mooring pile, the mooring pile would need to be removed). While archaeological excavations could be undertaken around the mooring piles, this would arguably result in significantly more impact than the extrusion from the development activity itself; and it would further have the risk of de-stabilising the piles' foundations. It is also highlighted that to date underwater investigations for Aboriginal cultural materials has had little application across Australia, and met with limited success.

Given these current constraints, it is recommended that inspection of the seabed within the project footprint is undertaken during and/or after the proposed activity to identify cultural materials if present. If cultural material is identified, its management and any necessary approvals should be discussed with Heritage NSW and the registered Aboriginal parties. This may include the need for additional approval and mitigation measures, such as collection and analysis of the cultural materials, and/or the sieving of any dredged or recovered marine sediments through the works.

10.3 Recommendations

Based on the findings of the ACHA, the following recommendations are proposed:

- It is considered that there is a low risk of Aboriginal objects, sites or deposits being present within the study area. In the unlikely event that cultural materials are present, they would likely consist of isolated or low density stone artefact sites and/or shell material in a secondary context (either in active marine sediments or 20th Century fill units) and be of low significance. As such, it is considered that the development may proceed with caution.

- To ensure no inadvertent impacts to cultural materials occur and/or manage them if present, underwater inspection of the works should be undertaken at the completion of the extrusion of mooring piles and wharf supports. The inspection should specifically investigate the presence of stone artefacts and shell material. Where cultural materials are encountered, they should be flagged/recorded in place, and liaison with Heritage NSW and the RAPs undertaken to determine subsequent steps. This may include the need for further approvals, such as an Aboriginal heritage impact permit (AHIP), and additional mitigation measures such as recovery of the cultural material and/or sieving of extruded material for additional cultural material.

- Consideration should be given to the development of an Aboriginal interpretation strategy to explore opportunities for acknowledging and celebrating Aboriginal heritage of the study area.

- If human skeletal material less than 100 years old is discovered, the *Coroners Act 2009* requires that all works should cease and the NSW Police and the NSW Coroner's Office should be contacted. Traditional Aboriginal burials (older than 100 years) are protected under the *National Parks and Wildlife Act 1974* and should not be disturbed. Interpreting the age and nature of skeletal remains is a specialist field and an appropriately skilled archaeologist or physical anthropologist should therefore be contacted to inspect the find and recommend an appropriate course of action. Should the skeletal material prove to be archaeological Aboriginal remains, notification of Heritage NSW and the Local Aboriginal Land Council will be required. Notification should also be made to the Commonwealth Minister for the Environment, under the provisions of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

- Consultation should be maintained with the RAPs during the finalisation of the assessment process and throughout the project.

- A copy of the final ACHA should be lodged with AHIMS and provided to each of the RAPs.

- Where the heritage consultant changes through the project, suitable hand over should be undertaken to ensure no loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.
- Where the heritage consultant changes through the project, suitable hand over should be undertaken to ensure no loss or mistranslation of the intent of the information, findings and future steps in heritage management occur.

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Abbreviations

AHD	Australian Height Datum
ACHA/ACHAR	Aboriginal cultural heritage assessment report
AHIMS	Aboriginal Heritage Information Management System
ACHMP	Aboriginal Cultural Heritage Management Plan
BP	Years before present
c.	circa
cm	centimetres
DEC	Department of Environment and Conservation, now DPC
DECCW	Department of Environment Climate Change and Water, now DPC
DPC	Department of Premier and Cabinet
DPE	Department of Planning and Environment, now DPIE
DPIE	Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EMM	EMM Consulting
EP&A Act	*Environmental Planning and Assessment Act 1979*
ERM	Environmental Resources Management
ESD	Ecologically sustainable development
FGS	Fine grained siliceous
g	grams
GIS	geographical information system
GPS	global positioning system
ha	hectare
ICOMOS	International Council on Monuments and Sites
IMTC	Indurated mudstone/tuff/chert
ka	thousands of years ago (eg 1,000 = 1 ka)
km	kilometres
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
m	metres
m^2	square metres
mm	millimetres
NSW	New South Wales

OEH	Office of Environment and Heritage, now DPIE
PAD	Potential archaeological deposit
RAP	Registered Aboriginal Party
SEARs	Secretary's Environmental Assessment Requirements
t	Tonne
TP	Test pit

Glossary

Many of these definitions have been taken from the *Code of Practice for archaeological investigation of Aboriginal objects in NSW* (DECCW 2010).

Aboriginal object: A physical manifestation of past Aboriginal activity. The legal term is defined in the *National Parks and Wildlife Act 1974* section 5 as: any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.

Typical examples include stone artefacts, grinding grooves, Aboriginal rock shelters which by definition include physical evidence of occupation, midden shell, hearths, stone arrangements and other landscape features which derive from past Aboriginal activity.

Archaeological survey: A method of data collection for Aboriginal heritage assessment. It involved a survey team walking over the land in a systematic way, recording information. Activities are not invasive or destructive.

Aboriginal culturally modified tree: A tree of sufficient age to have been mature at the time of traditional Aboriginal hunter-gatherer life and therefore generally of more than 220 years ago with evidence of bark or cambium wood removal for the purpose of implement manufacture, footholds, bark sheet removal for shelter, or extraction of animals or other food. Care must be taken to distinguish Aboriginal scars from the much more common natural causes of branch tear, insect attack, animal impact, lightning strike and dieback. Culturally modified tree recognition guidelines exist to distinguish these features. Naturally scarred trees are often misidentified as Aboriginal culturally modified trees.

Aboriginal site: The location where a person in the present day can observe one or more Aboriginal objects. The boundaries of a site are limited to the extent of the observed evidence. In the context of this report a 'site' does not include the assumed extent of unobserved Aboriginal objects (such as archaeological deposit). Different archaeologists can have varying definitions of a 'site' and may use the term to reflect the assumed extent of past Aboriginal activity beyond visible Aboriginal objects. Such use of the term risks defining all of Australia as a single 'site'.

Aboriginal stone artefact: A stone object with morphological features derived from past Aboriginal activity such as intentional fracture, abrasion or impact. Artefacts are distinguished by morphology and context. Typically flaked stone artefacts are distinguished from naturally broken stone by recognition of clear marginal fracture initiation (typically herzian/conchoidal or wedging initiation) on highly siliceous stone types which can often be exotic to the area. Care must be taken to distinguish modern broken stone in machine impacted contexts and therefore context must be carefully considered as well as morphology.

Aggradation: a term used in geology for the increase in land elevation, typically in a river system, due to the deposition of sediment.

AHIMS: Aboriginal Heritage Information Management System — a computer software system employed by the Office of Environment and Heritage to manage many aspects of Aboriginal site recording and permitting. AHIMS includes an Aboriginal sites database which can be accessed via an internet portal.

Archaeological deposit: Aboriginal objects occurring in one or more soil strata. The most common form of archaeological deposit relates to the presence of a single conflated layer of Aboriginal stone artefacts worked into the topsoil through **bioturbation**.

Backed artefact: A thin flake or blade-flake that has been shaped by secondary flaking (**retouch**) along one lateral margin. The retouched margin is typically steep and bipolar to form a blunt 'back' in the manner of a modern scalpel blade. Distinctive symmetrical and asymmetrical forms are typically found called geometric **microliths** and Bondi points respectively. A thick symmetrical form, called an Elouera, is typically the size of a mandarin segment.

Bioturbation: is the reworking of soils and sediments by animals or plants. Its effects include changing texture of sediments (diagenetic), bioirrigation and displacement of microorganisms and non-living particles.

Bipolar flaking: Where the stone to be worked is rested on an anvil or other stone before being hit by the hammerstone. This results in the presence of negative flake scars on both ends of the core.

Bondi point: See backed artefact definition.

Brown podosols: Topsoils have loamy textures. A2 horizons are common, there is a clear boundary onto the B horizon. They have a sandy clay to heavy clay texture (typically occur on upper and mid-slopes).

Chocolate Soils: Soils that are typically formed in a basaltic parent material where slope or bedrock strata influence drainage. Surface horizons comprise loam, clay loam or silty clay loam. There is a gradual boundary to a brown or brownish black B horizon. There is no A2 horizons.

Conchoidal: A term used in relation to fracture surfaces on Aboriginal stone artefacts - bulb-like in the manner of a bulbous protrusion on a bivalve shell.

Elouera: See backed artefact definition.

Eraillure scar: The small flake scar on the dorsal side of a flake next to the platform. It is the result of rebounding force during percussion flaking.

Exposure: estimates the area with a likelihood of revealing buried artefacts or deposits, not just an observation of the amount of bare ground.

Geometric microlith: See backed artefact definition.

Grinding grooves: Grinding grooves typically derive from the sharpening of stone hatchet heads on sandstone rock. Grooves appear as elliptical depressions of around 25 cm length with smooth bases. Although mostly occurring in association with water to wash the abraded stone dust away from the groove, such sites have been recorded away from water. Narrow grooves or broad abraded areas may occur less commonly and may be derived from spear sharpening or other grinding activities.

Haematite: a pigment featured in ochre used for tinting with a permanent colour.

Holocene: A period of time generally 10,000 years, which marks the end of the last ice age, to the present.

Igneous: relating to or involving volcanic or plutonic processes.

Indurated mudstone/tuff (IMT): the fine textured, very hard, yellowish, orange, reddish-brown or grey rocks from which stone artefacts are made.

Isotropic: Having a physical property that has the same value when measured in different directions. In relation to stone used for stone tools a fracture path is not hindered by layer boundaries or other favoured plane of cleavage.

Keeping place: A room or facility with the express and exclusive purpose of storing Aboriginal cultural heritage materials with accompanying documentation in a secure and accessible manner which protects their cultural heritage values.

Knapping: This term is used in reference to stone tool production. Specifically it relates to the production and shaping of a block of stone (eg a cobble) into a stone tool. The process is called knapping, while the individual undertaking the task is often called a knapper. A knapping floor or event often referenced in the literature relates to an archaeological deposit, usually of high densities of stone artefacts, where researcher's believe this process has occurred in a given locale.

Krasnozems: Mainly loams, clay loams and silty clay loams with a clear or gradual boundary to a dark reddish brown B horizon. Clays are typically light to medium and occasionally heavy.

Lithosols: Soils that have little or no profile development. They occur on steep slopes and are usually shallow and are left mainly as uncleared native bushland.

Microlith: Very small fragments of flakes retouched into geometric shapes and usually present on tools like barbed spears, arrows and sickles.

Midden: A collection of shells and associated economic remains resulting from Aboriginal food gathering and processing activity. Middens comprise shellfish remains of consistent size in a rich dark earth matrix commonly associated with stone artefacts, fish bone and animal bone although shells are commonly the most obtrusive element.

Open stone artefact site/stone artefact site: An unenclosed area where Aboriginal stone artefacts occur – typically exposed from a topsoil archaeological deposit by erosion. Typically the term is used to refer to two or more artefacts although this is an arbitrary distinction. A general 'rule of thumb' boundary definition employed by archaeologists is that artefacts or features more than 50 m apart are regarded as separate sites, however there is no theoretical imperative dictating such as rule. (The 50 m separation rule is used for the most part in EMM's work).

Pirri point: A leaf-shaped stone implement with unifacial retouch extending from the lateral margins to a central keel running the length of the dorsal surface.

Pleistocene: A period of time 2.6 million years ago to 10,000 years ago. Reference to 'Pleistocene sites' generally means reference to sites older than 10,000 years.

Podosols: Soils with accumulations of organic matter, iron and aluminium. They are usually sand textured to depth. Yellow and red podosols are generally acid neutral. Yellow podosols have coarse to medium textured A horizons.

Point cluster: A group of GPS points used to identify the locations of individual artefacts in the field.

Potential Archaeological Deposit (PAD): An area where there is an inferred presence of Aboriginal objects in the soil based on the environmental context which is typically associated with discovery of Aboriginal objects in analogous areas. This is not strictly a 'site' type, although AHIMS records it as such for the purpose of associating Aboriginal heritage Impact Permits with geographical areas.

Red podosols: Podosols with a pronounced texture contrast and clear to abrupt boundaries between A and B horizons. A2 is often massive and gravelly.

Retouch: The modification of the edges of a flake or tool by the removal of a series of small flakes.

Siliceous Sands: Sands that are usually found on coarse-grained sandstones and in sandstone colluvium. They are often sandstone outcrops present in the landscape. The topsoil has a loamy sand to light sandy clay.

Scarp: a steep slope characterised by outcropping bedrock. In this report, scarp refers to a combination of landform elements including scarp foot slopes, scarps, and cliff lines where outcropping sandstone is present in the landscape 10% and above.

Spit/s: This term reflects an arbitrary unit of depth that archaeologists excavate when lacking evidence of a stratigraphy within the soil profile. Commonly, archaeologists remove vertical intervals of 5, 10 or 20cm, each representing a spit, down the soil profile. Through this process, archaeologists can determine the depth at which archaeological materials are found, even in soil profiles with no clear divisions or boundaries.

Spur: the lateral crests of land that descend from the summit of hills or ridges. Spurs typically extend, with decreasing elevation, closer to streams and valley floors than the main crest of a hill.

Taphonomic: the events and processes, such as burial in sediment, leading to the degradation, decomposition or preservation of objects.

Thumbnail scraper: A thumbnail sized thin flake with steep unidirectional retouch or use-wear around a convex working edge.

Transect: A sample unit which is walking line or corridor across the study area.

Upsidence: phenomena that occurs when mining approaches and undermines river valleys. It can result in cracking and buckling of river beds and rock bars and localised loss of water flow.

Visibility: The amount of bare ground on exposures which might reveal artefacts or other archaeological materials.

Yellow earths: predominantly sandy-textured soils with earthy porous fabric, weak profile differentiation and gradual or diffuse boundaries except for the darker A1 horizon.

Yellow podosols: Podosols which typically occur on the upper slopes of steep landscapes and on the mid to lower slopes of others. The A2 soil horizon is present in most profiles and the boundary change to the B horizon is generally clear. The B horizon is typically sandy clay to heavy clay.

Appendix A

Legislative context

A.1 Commonwealth

A.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* preserves and protects areas (especially sacred or intangible sites) and places of particular significance to Aboriginal people from damage or destruction. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10 of the Act). Section 9 provides temporary protection while the site is investigated, while Section 10 provide permanent protection. Once provided these protections, no further activities can be undertaken on the site.

In addition, the Act also protects objects by Declaration, notably Aboriginal skeletal remains (Section 12 of the Act). This can be applied at a State level where a State is unwilling or unable to provide such protection.

A.1.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* provides for protection of natural and cultural heritage places. The Act establishes a National Heritage List (NHL) and a Commonwealth Heritage List (CHL) upon which places of natural or cultural significance can be listed. Sites at a national level and can be in public or private ownership. The CHL is limited to places owned by the Commonwealth, and most frequently encompass Department of Defence sites. Sites and places listed on the NHL are considered to be of State and local heritage value, even if they are not listed or documented as such at a State level.

The values of sites and places on the NHL/ CHL are protected under this Act. The Act requires that the Minister administering the Act assess any action which has, will have, or is likely to have, a significant impact on the heritage values. Where relevant, a referral is made to the relevant Commonwealth Department, and either approval, approval with controls, or rejection of the proposed action is determined.

A.1.3 Native Title Act 1993

The *Native Title Act 1993* provides recognition and protection for native title. The Act establishes the managing body, National Native Title Tribunal, who administers native title claims to rights and interests over lands and waters by Aboriginal people. It also administers the future act processes that allow proponents to identify and manage potential native title issues for a given activity on a site where a claim has yet to be made or finalised. Typically, the provisions of this Act can only be applied to Crown land.

In addition, the Act provides for Indigenous Land Use Agreements (ILUA), which is an agreement between a native title group and others about the use and management of land and waters. ILUAs were introduced as a result of amendments to the Act in 1998. They allow people to negotiate flexible and bipartisan agreements to suit their particular circumstances often circumventing lengthy timeframes associated with the native title process. An ILUA can be negotiated over areas where native title has, or has not yet, been determined. They can be part of a broader determination or settled separately.

Where activities are occurring in areas subject to this Act, there is potential for native title claimants (if determined) to seek compensation for any impact that the works have had upon their rights outlined in the claim (access to land, hunting, fishing, etc). Under Section 24FA of the Act, an applicant undertaking work can seek a 'future act' protection that will effectively extinguish native title of the identified area. This process requires the notification of the application, and liaison with any identified Aboriginal parties, and can result in an ILUA in some situations. This process requires several months to complete.

A.2 State

A.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the over-arching Act that dictates the nature of assessment and management of the environment during a development project, and within which heritage forms a component. It requires that environmental and heritage impacts are considered by consent authorities prior to granting development approvals.

The Act has two main approval pathways within which heritage needs to be considered. Generally for smaller scale (either financially or spatially), Parts 4 (Division 4.1) and 5 (Division 5.1) of the Act are implemented. Part 4 requires that a proponent submits a Development Application (DA) to local council for a given development, and within this document a consideration of Aboriginal and historical heritage is required. The specific nature of the assessment is usually determined at a pre-DA meeting with the council, and in relation to the relevant heritage Acts. Where Aboriginal heritage is identified as an issue, the DA may become Integrated Development, whereby the State government, Heritage NSW, is also required to review and provide comments on the DA prior to its issue. Part 5 of the Act is a similar process, but only relates to approvals developed and issued by State government departments. Each State government department has their own internal approach to considering environmental issues, but ultimately must develop a Review of Environmental Factors (REF), which is comparable to a DA, and which requires consideration and management of heritage. Similarly where heritage is identified as an issue, liaison with relevant State consent authorities and approvals under other Acts may still be required.

The other approval pathway relates to State Significant Development and/or Infrastructure (Parts 4.7 and 5.2, respectively). These processes require an Environmental Impact Statement (EIS) to be developed for a project and assessed currently by the Heritage NSW. Importantly, the SSD and SSI processes turns off a number of pieces of other legislation, including parts of the *National Parks and Wildlife Act 1974*. In the case of Aboriginal heritage, both the assessment and approval for harm are dictated by the Secretary's Environmental Assessment Requirements (SEARs) outlining the contents and scope of the EIS, and the Project Approval that dictates controls on how a development should proceed.

A.2.2 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides protection for Aboriginal objects and places across NSW:

- An Aboriginal object is defined as: *Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.*

- An Aboriginal place is: *any place declared to be an Aboriginal place under section 84*. This is a very specific piece of legislation that provides process and management of Aboriginal sites of cultural, but not necessarily scientific, values. They are commonly, but not always associated with intangible values.

- any place declared to be an Aboriginal place by the Minister for the Environment, under Section 84 of the Act.

Heritage NSW provides a series of guidelines as a framework for identifying and managing Aboriginal heritage and the cultural heritage interests of Aboriginal parties within development planning contexts.

These consist of two main documents: i) a due diligence that is a first step in identifying whether or not a proposed activity has a risk of harming Aboriginal objects; and an Aboriginal cultural heritage assessment (ACHA) that forms a more detailed investigation of the Aboriginal objects within an area, and provides the necessary documentation for Heritage NSW when considering approvals if required.

Aboriginal objects, whether recorded or as yet undiscovered, are afforded statutory protection under the *National Parks and Wildlife Act 1974*. Under Section 86 of the Act it is an offence to disturb, destroy or deface Aboriginal objects without the approval of the Director General of the Department of Premier and Cabinet, Heritage NSW (formerly the Office of Environment and Heritage [OEH]). This approval is usually in the form of an Aboriginal Heritage Impact Permit (AHIP), which are outlined in Section 90 of the Act. A breach of Section 86 of the *National Parks and Wildlife Act 1974* could result in prosecution and fines in excess of $1 million.

To obtain an AHIP, certain assessment and documentation must be provided to Heritage NSW for their consideration. Once satisfied, they may endorse an AHIP to harm cultural heritage either conditionally or unconditionally. They can also refuse an application as outlined in Section 90C of the Act, and which can be appealed in accordance with Section 90L.

A.2.3 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* provides process and protocols for the transfer of vacant Crown land ownership to a Local Aboriginal Land Council, where the land is not for an essential purpose or for residential land. These lands are then managed and maintained by the Local Aboriginal Land Council.

For the purposes of this report, the Act is primarily important to inform relevant Aboriginal communities for consultation; and where Crown land forms part of the development area, this may require additional liaison with the LALC as a potential, or existing, landowner.


Appendix A

Legislative context




A.1 Commonwealth

A.1.1 Aboriginal and Torres Strait Islander Heritage Protection Act 1984

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* preserves and protects areas (especially sacred or intangible sites) and places of particular significance to Aboriginal people from damage or destruction. Steps necessary for the protection of a threatened place are outlined in a gazetted Ministerial Declaration (Sections 9 and 10 of the Act). Section 9 provides temporary protection while the site is investigated, while Section 10 provide permanent protection. Once provided these protections, no further activities can be undertaken on the site.

In addition, the Act also protects objects by Declaration, notably Aboriginal skeletal remains (Section 12 of the Act). This can be applied at a State level where a State is unwilling or unable to provide such protection.

A.1.2 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* provides for protection of natural and cultural heritage places. The Act establishes a National Heritage List (NHL) and a Commonwealth Heritage List (CHL) upon which places of natural or cultural significance can be listed. Sites at a national level and can be in public or private ownership. The CHL is limited to places owned by the Commonwealth, and most frequently encompass Department of Defence sites. Sites and places listed on the NHL are considered to be of State and local heritage value, even if they are not listed or documented as such at a State level.

The values of sites and places on the NHL/ CHL are protected under this Act. The Act requires that the Minister administering the Act assess any action which has, will have, or is likely to have, a significant impact on the heritage values. Where relevant, a referral is made to the relevant Commonwealth Department, and either approval, approval with controls, or rejection of the proposed action is determined.

A.1.3 Native Title Act 1993

The *Native Title Act 1993* provides recognition and protection for native title. The Act establishes the managing body, National Native Title Tribunal, who administers native title claims to rights and interests over lands and waters by Aboriginal people. It also administers the future act processes that allow proponents to identify and manage potential native title issues for a given activity on a site where a claim has yet to be made or finalised. Typically, the provisions of this Act can only be applied to Crown land.

In addition, the Act provides for Indigenous Land Use Agreements (ILUA), which is an agreement between a native title group and others about the use and management of land and waters. ILUAs were introduced as a result of amendments to the Act in 1998. They allow people to negotiate flexible and bipartisan agreements to suit their particular circumstances often circumventing lengthy timeframes associated with the native title process. An ILUA can be negotiated over areas where native title has, or has not yet, been determined. They can be part of a broader determination or settled separately.

Where activities are occurring in areas subject to this Act, there is potential for native title claimants (if determined) to seek compensation for any impact that the works have had upon their rights outlined in the claim (access to land, hunting, fishing, etc). Under Section 24FA of the Act, an applicant undertaking work can seek a 'future act' protection that will effectively extinguish native title of the identified area. This process requires the notification of the application, and liaison with any identified Aboriginal parties, and can result in an ILUA in some situations. This process requires several months to complete.

A.2 State

A.2.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) is the over-arching Act that dictates the nature of assessment and management of the environment during a development project, and within which heritage forms a component. It requires that environmental and heritage impacts are considered by consent authorities prior to granting development approvals.

The Act has two main approval pathways within which heritage needs to be considered. Generally for smaller scale (either financially or spatially), Parts 4 (Division 4.1) and 5 (Division 5.1) of the Act are implemented. Part 4 requires that a proponent submits a Development Application (DA) to local council for a given development, and within this document a consideration of Aboriginal and historical heritage is required. The specific nature of the assessment is usually determined at a pre-DA meeting with the council, and in relation to the relevant heritage Acts. Where Aboriginal heritage is identified as an issue, the DA may become Integrated Development, whereby the State government, Heritage NSW, is also required to review and provide comments on the DA prior to its issue. Part 5 of the Act is a similar process, but only relates to approvals developed and issued by State government departments. Each State government department has their own internal approach to considering environmental issues, but ultimately must develop a Review of Environmental Factors (REF), which is comparable to a DA, and which requires consideration and management of heritage. Similarly where heritage is identified as an issue, liaison with relevant State consent authorities and approvals under other Acts may still be required.

The other approval pathway relates to State Significant Development and/or Infrastructure (Parts 4.7 and 5.2, respectively). These processes require an Environmental Impact Statement (EIS) to be developed for a project and assessed currently by the Heritage NSW. Importantly, the SSD and SSI processes turns off a number of pieces of other legislation, including parts of the *National Parks and Wildlife Act 1974*. In the case of Aboriginal heritage, both the assessment and approval for harm are dictated by the Secretary's Environmental Assessment Requirements (SEARs) outlining the contents and scope of the EIS, and the Project Approval that dictates controls on how a development should proceed.

A.2.2 National Parks and Wildlife Act 1974

The National Parks and Wildlife Act 1974 (NPW Act) provides protection for Aboriginal objects and places across NSW:

- An Aboriginal object is defined as: *Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains.*

- An Aboriginal place is: *any place declared to be an Aboriginal place under section 84*. This is a very specific piece of legislation that provides process and management of Aboriginal sites of cultural, but not necessarily scientific, values. They are commonly, but not always associated with intangible values.

- any place declared to be an Aboriginal place by the Minister for the Environment, under Section 84 of the Act.

Heritage NSW provides a series of guidelines as a framework for identifying and managing Aboriginal heritage and the cultural heritage interests of Aboriginal parties within development planning contexts.

These consist of two main documents: i) a due diligence that is a first step in identifying whether or not a proposed activity has a risk of harming Aboriginal objects; and an Aboriginal cultural heritage assessment (ACHA) that forms a more detailed investigation of the Aboriginal objects within an area, and provides the necessary documentation for Heritage NSW when considering approvals if required.

Aboriginal objects, whether recorded or as yet undiscovered, are afforded statutory protection under the *National Parks and Wildlife Act 1974*. Under Section 86 of the Act it is an offence to disturb, destroy or deface Aboriginal objects without the approval of the Director General of the Department of Premier and Cabinet, Heritage NSW (formerly the Office of Environment and Heritage [OEH]). This approval is usually in the form of an Aboriginal Heritage Impact Permit (AHIP), which are outlined in Section 90 of the Act. A breach of Section 86 of the *National Parks and Wildlife Act 1974* could result in prosecution and fines in excess of $1 million.

To obtain an AHIP, certain assessment and documentation must be provided to Heritage NSW for their consideration. Once satisfied, they may endorse an AHIP to harm cultural heritage either conditionally or unconditionally. They can also refuse an application as outlined in Section 90C of the Act, and which can be appealed in accordance with Section 90L.

A.2.3 Aboriginal Land Rights Act 1983

The *Aboriginal Land Rights Act 1983* provides process and protocols for the transfer of vacant Crown land ownership to a Local Aboriginal Land Council, where the land is not for an essential purpose or for residential land. These lands are then managed and maintained by the Local Aboriginal Land Council.

For the purposes of this report, the Act is primarily important to inform relevant Aboriginal communities for consultation; and where Crown land forms part of the development area, this may require additional liaison with the LALC as a potential, or existing, landowner.

Appendix B

Aboriginal consultation

B.1 Consultation log and communications record

Aboriginal Consultation Requirements for Proponents* (DECCW 2010)

ABORIGINAL COMMUNICATIONS LOG

Project Name: 6 John Street, Berry Bay ACHA | **Project #:** E210732

DATE	OUTGOING / INCOMING	ORGANISATION	CONTACT MADE BY	CONTACT TO	CONTACT TYPE	COMMENTS
1-Sep-21	Outgoing	All agencies	Taylar Reid (EMM)		Email	Pre-notification stage, contacted agencies requesting any information on relevant Aboriginal parties in the area.
2-Sep-21	Incoming	Greater Sydney Local Land Services	GSLLS	Taylar Reid (EMM)	Email	Responded to agency request but did not provide any information on Aborignial parties in the area.
2-Sep-21	Incoming	National Native Title Tribunal	NNTT	Taylar Reid (EMM)	Email	Responded, no Native Title claims, agreements, or applications over the project area.
3-Sep-21	Incoming	The Office of the Registrar, Aboriginal Land Rights Act 1983	ORALRA	Taylar Reid (EMM)	Email	Requested current Title Search certificates for the project area. EMM sought Info Track to assist with obtaining certificates. These were provided to ORALRA on 8 September 2021.
8-Sep-21	Incoming	North Sydney Council	NSC	Taylar Reid (EMM)	Email	Responded, suggested contacting Metro LALC regarding potential Aboriginal stakeholders for the project.
8-Sep-21	Incoming	Heritage NSW	HNSW	Alan Williams (EMM)	Email	Responded, provided list of potential Aboriginal stakeholders.
10-Sep-21	Outgoing	All Aboriginal Parties	Taylar Reid (EMM)		Post and Email	Sent out Invitation to Register letters via email and post to all identified Aboriginal parties.
10-Sep-21	Incoming	Mura Indigenous Corporation		Taylar Reid (EMM)	Email	Email bounced, TR tried to call number but it is disconnected. Hard copy of letter was posted to address.
10-Sep-21	Incoming	Didge Nunawal Clan	Paul Boyd and Lilly Carroll	Taylar Reid (EMM)	Email	Registered for project.
13/Sep/21	Incoming	A1 Indigenous Services Pty Ltd	Carolyn Hickey	Taylar Reid (EMM)	Email	Registered for project, provided insurances.
14/Sep/21	Incoming	Kamilaroi Yankuntjatjara Working Group	Phil Khan	Taylar Reid (EMM)	Email	Registered for project, provided insurances.
15/Sep/21	Incoming	Wailwan Aboriginal Group	Philip Boney	Taylar Reid (EMM)	Email	Registered for project, provided insurances.
18/Sep/21	Incoming	Ngambaa Cultural Connections	Kaarina Slater	Taylar Reid (EMM)	Email	Registered for project.
24/Sep/21	Incoming	Wurrumay Pty Ltd	Kerrie Slater and Vicky Slater	Taylar Reid (EMM)	Email	Registered for project, provided insurances.
24/Sep/21	Incoming	Butucarbin Heritage	Lowanna Wilson	Taylar Reid (EMM)	Email	Registered for project.
26-Sep-21	Outgoing	All RAPs	Taylar Reid (EMM)		Email	Sent out Methodology letter to all RAPs for their review.
27-Sep-21	Incoming	Didge Nunawal Clan	Paul Boyd and Lilly Carroll	Taylar Reid (EMM)	Email	Supported the methodology.
1-Oct-21	Outgoing	Heritage NSW	Taylar Reid (EMM)		Email	Submited record of registrations.
1-Oct-21	Outgoing	Metropolitan LALC	Taylar Reid (EMM)		Email	Submited record of registrations.
11-Oct-21	Incoming	Kamilaroi Yankuntjatjara Working Group	Phil Khan	Taylar Reid (EMM)	Email	Supported the methodology, recommended further investigation in the form of test excavation and recommended incoroprating a cultural heritage interpretation plan.
19-Oct-21	Outgoing	All RAPs	Alan Williams		Email	Invited all RAPs to attend a site visit next week
19-Oct-21	Incoming	Kamilaroi Yankuntjatjara Working Group	Phil Khan	Alan Williams	Email	Confirmed attendance
19-Oct-21	Incoming	Didge Nunawal Clan	Paul Boyd and Lilly Carroll	Alan Williams	Email	Confirmed attendance
25-Oct-21	Outgoing	Metropolitan LALC	Alan Williams		Phone	Sought to confirm their invovlement in the project. They asked for the e-mail to be provided again, which was done. No furher response received.
27-Oct-21	-	Didge Nunawal Clan; Kamilaroi Yankuntjatjara Working Group; Wailwan Aboriginal Group; Butucarbin Heritage	Korri Carroll; Nathan Small, Lowanna Wilson; Adam Ring	Alan Williams	Site inspection	Undertook site inspection of the boat yard and project footprint, and of parts of Balls Head Reserve
27-Oct-21	Outgoing	All RAPs	Alan Williams	-	Email	Confirmed the field program was complete since there was some confusion over length of time on site
15-Nov-21	Outgoing	All RAPs	Alan Williams	-	Email	Distributed the draft ACHA for review and comment. Formal comment period for this extends to 12 December 2021, although payment offered to prioritse the review to meet required LEC timeframes.
18-Nov-21	Incoming	Kamilaroi Yankuntjatjara Working Group	Phil Khan	Alan Williams	Email	Provided a detailed reponse to the report, mostly focussing on the interpretive opportunities for the site.
25-Nov-21	Incoming	Butucarbin Heritage	Lowanna Wilson	Alan Williams	Email	Provided a detailed response reiterating the findings of the ACHA.

B.2 Pre-notification documentation

Victoria Mietchen

From: Taylar Reid
Sent: Friday, 10 September 2021 10:43 AM
Cc: Taylar Reid
Subject: E210732 6 John Street, Berry Bay ACHA - Invitation to Register
Attachments: E210732_InvitationtoRegister_V1.pdf

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating 'I agree to be contacted by email as the main source of consultation' is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021**.

6 John Street, Berry Bay ACHA
c/o EMM Consulting Pty Ltd
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM
creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300


EMM'S BUSINESS
CONTINUITY PLAN
FOR COVID-19

Victoria Mietchen

From: Taylar Reid
Sent: Wednesday, 1 September 2021 3:34 PM
Subject: E210732 6 John Street, Berry Bay Agency Request
Attachments: E210732_AgencyRequest.pdf

Hello,

Please see attached agency request seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area; 6 John Street, McMahons Point, North Sydney Local Government Area (LGA).

Please provide a list of relevant organisations or persons by 12 July 2021 to the details below:

6 John Street, Berry Bay ACHA
c/o EMM
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Thank you.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Taylar Reid
Sent: Wednesday, 1 September 2021 3:46 PM
To: Geospatial Search Requests
Subject: E210732 6 John Street, Berry Bay Agency Request
Attachments: Request for Spatial Search of Tribunal Registers_TR.docx

Hello,

Please see attached agency request seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area; 6 John Street, McMahons Point, North Sydney Local Government Area (LGA).

Please provide a list of relevant organisations or persons by 12 July 2021 to the details below:

6 John Street, Berry Bay ACHA
c/o EMM
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Thank you.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Taylar Reid
Sent: Wednesday, 1 September 2021 5:06 PM
To: adminofficer@oralra.nsw.gov.au
Subject: E210732 6 John Street, Berry Bay Agency Request
Attachments: Request-for-Search-of-Land-Claim-Register-2020_TR.pdf

Hello,

This is a follow up email with our completed ORALRA form for searches in the following areas for the 6 John Street, McMahons Point agency request:

- Lot 987 in DP 752067;
- Lot 2 in DP 77853;
- Lot 1 in DP 127195;
- Lot 1 in DP 4497331;
- Lot A and B in DP 420377;
- Lot 1 in DP 182585; and
- Lots 1-4 in DP 179730.

Thank you.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Alan Williams
Sent: Wednesday, 8 September 2021 9:48 AM
To: Taylar Reid
Subject: FW: RAP letter for "6 John Street, McMahons Point, NSW
Attachments: DOC21-767593-1 - 6 John Street, Berry's Bay, McMahons Point, NSW.pdf

Hi Tay,

Heritage NSW response attached. Please enact the notification as soon as possible.

Thanks
A

Dr Alan Williams FSA FRSA MAACAI
Associate Director | National Technical Leader, Aboriginal Heritage
T 02 9493 9584
M 0438 104 740
www.emmconsulting.com.au

I work flexibly. I'm sending you this message now because it's a good time for me, but do not expect you to read, respond or action it outside your regular hours

From: Paul Houston <Paul.Houston@environment.nsw.gov.au>
Sent: Wednesday, 8 September 2021 8:12 AM
To: Alan Williams <awilliams@emmconsulting.com.au>
Subject: RAP letter for "6 John Street, McMahons Point, NSW

Alan

Please see attached RAP letter for "6 John Street, McMahons Point, NSW".

If you have any questions please contact me.

Thanxs
Paul

Paul Houston, Aboriginal Heritage Planning Officer
Heritage NSW, Community Engagement, Department of Premier and Cabinet
142 Brisbane St, Dubbo NSW 2830
T: 02 68835361, M: 0427832205| Paul.Houston@environment.nsw.gov.au

Please lodge all Applications to Heritagemailbox@environment.nsw.gov.au

I acknowledge and respect the traditional custodians and ancestors of the lands I work across.

Heritage NSW and coronavirus (COVID-19)

Heritage NSW has taken steps to protect the safety, health and wellbeing of our staff, communities and customers. Whilst our offices remain open, we have put in place flexible working arrangements for our teams across NSW and continue to adapt our working arrangements as necessary. Face-to-face meetings and field work/site visits with our customers are subject to rules on gatherings and social distancing measures. We thank you for your patience and understanding at this time.

Victoria Mietchen

From: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Sent: Thursday, 2 September 2021 7:02 PM
To: Taylar Reid
Subject: RE: SR21/1353 - E210732 6 John Street, Berry Bay Agency Request - SR21/1353

CAUTION: This email originated outside of the Organisation.

UNCLASSIFIED

Native title search – *NSW Parcels – Multiple*
Your ref: *E210732* **- Our ref:** *SR21/1353*

Dear Taylar Reid,

Thank you for your search request received on 01 September 2021 in relation to the above area. Based on the records held by the National Native Title Tribunal as at 02 September 2021 it would appear that there are no Native Title Determination Applications, Determinations of Native Title, or Indigenous Land Use Agreements over the identified area.

Please note: The following parcel listed in your correspondence was not found on the National Native Title Tribunal's records as 02 September 2021 : *Lot 1 on DP4497331.* To enable us to complete the search appropriately and adequately please provide us with additional details e.g. **DETAILED** map, plan or shape file.

Search Results
The results provided are based on the information you supplied and are derived from a search of the following Tribunal databases:

- Schedule of Native Title Determination Applications
- Register of Native Title Claims
- Native Title Determinations
- Indigenous Land Use Agreements (Registered and notified)

At the time this search was carried out, there were **no relevant entries** in the above databases.

Cadastral data as at: 01/02/2021

Parcel ID	Feature Area SqKm	Overlapping Native Title Feature			
1//DP127195	0.0006	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		FREEHOLD	No overlap		
1//DP179730	0.0001	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		UNKNOWN	No overlap		
1//DP182585	0.0000	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		FREEHOLD	No overlap		

2//DP179730	0.0000	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		UNKNOWN	No overlap		
2//DP77853	0.0009	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		FREEHOLD	No overlap		
3//DP179730	0.0000	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		UNKNOWN	No overlap		
4//DP179730	0.0001	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		UNKNOWN	No overlap		
987//DP752067	0.0014	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		FREEHOLD	No overlap		
A//DP420377	0.0022	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		FREEHOLD	No overlap		
B//DP420377	0.0007	**Tenure**	**NNTT File Number**	**Name**	**Categ**
		FREEHOLD	No overlap		

These items not found in NNTT Cadastral data:

Parcel ID
1//DP4497331

For more information about the Tribunal's registers or to search the registers yourself and obtain copies of relevant register extracts, please visit our website.

Information on native title claims and freehold land can also be found on the Tribunal's website here: Native title claims and freehold land .

Please note: There may be a delay between a native title determination application being lodged in the Federal Court and its transfer to the Tribunal. As a result, some native title determination applications recently filed with the Federal Court may not appear on the Tribunal's databases.

The search results are based on analysis against external boundaries of applications only. Native title applications commonly contain exclusions clauses which remove areas from within the external boundary. To determine whether the areas described are in fact subject to claim, you need to refer to the "Area covered by claim" section of the relevant Register Extract or Schedule Extract and any maps attached.

Search results and the existence of native title
Please note that the enclosed information from the Register of Native Title Claims and/or the Schedule of Applications is **not** confirmation of the existence of native title in this area. This cannot be confirmed until the Federal Court makes a determination that native title does or does not exist in relation to the area. Such determinations are registered on the National Native Title Register.

The Tribunal accepts no liability for reliance placed on enclosed information
The enclosed information has been provided in good faith. Use of this information is at your sole risk. The National Native Title Tribunal makes no representation, either express or implied, as to the accuracy or suitability of the information enclosed for any particular purpose and accepts no liability for use of the information or reliance placed on it.

Cultural Heritage Searches in NSW
The National Native Title Tribunal (the Tribunal) has undertaken steps to remove itself from the formal list of sources for information about indigenous groups in development areas. The existence or otherwise of native title is quite separate to any matters relating to Aboriginal cultural heritage. Information on native title claims, native title determinations and Indigenous Land Use Agreements is available on the Tribunal's website.

Interested parties are invited to use Native Title Vision (NTV) the Tribunal's online mapping system to discover native title matters in their area of interest. Access to NTV is available at
http://www.nntt.gov.au/assistance/Geospatial/Pages/NTV.aspx
Training and self-help documents are available on the NTV web page under "Training and help documents". For additional assistance or general advice on NTV please contact GeospatialSearch@NNTT.gov.au

Additional information can be extracted from the Registers available at
http://www.nntt.gov.au/searchRegApps/Pages/default.aspx

If you have any further queries, please do not hesitate to contact us via GeospatialSearch@NNTT.gov.au

Regards,

Geospatial Searches
National Native Title Tribunal | Perth
Email: GeospatialSearch@nntt.gov.au **| www.nntt.gov.au**

From: Taylar Reid <treid@emmconsulting.com.au>
Sent: Wednesday, 1 September 2021 1:46 PM
To: Geospatial Search Requests <GeospatialSearch@NNTT.gov.au>
Subject: SR21/1353 - E210732 6 John Street, Berry Bay Agency Request

Hello,

Please see attached agency request seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area; 6 John Street, McMahons Point, North Sydney Local Government Area (LGA).

Please provide a list of relevant organisations or persons by 12 July 2021 to the details below:

6 John Street, Berry Bay ACHA
c/o EMM
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Thank you.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions

M 0428 280 542
T 02 4907 4828
Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From:	InfoTrack (Commercial) <helpdesk@infotrack.com.au>
Sent:	Wednesday, 8 September 2021 9:34 AM
To:	Taylar Reid
Subject:	Matter 6 John Street, Berry Bay ACHA Certificate of Title - Manual Services InfoTrack – NSW Manual Search - INFOTRACKMORRISHAYESEDGAR: Other - E210732

CAUTION: This email originated outside of the Organisation.

Your order has been updated. Please review the following:

Your Reference:	6 John Street, Berry Bay ACHA Certificate of Title
Date Ordered:	Wednesday, 8 September 2021 9:24 AM
Description:	Manual Services InfoTrack – NSW: Manual Search - INFOTRACKMORRISHAYESEDGAR: Other - E210732
Status:	Complete
Status Comment:	Your order has been successfully received.

Victoria Mietchen

From: LLS GS Service Mailbox <gs.service@lls.nsw.gov.au>
Sent: Thursday, 2 September 2021 8:53 AM
To: Taylar Reid
Subject: Re: E210732 6 John Street, Berry Bay Agency Request

CAUTION: This email originated outside of the Organisation.

Dear Ms Reid

Thank you for your recent letter seeking assistance to identify Aboriginal stakeholder organisations and persons who may hold an interest in Country at the project area designated in your correspondence.

Greater Sydney Local Land Services (GS LLS) acknowledges that Local Land Services (formerly as Catchment Management Authorities) has been listed in Section 4.1.3.(g) of the Aboriginal Cultural Heritage Consultation requirements for proponents 2010, to support Part 6, of the NSW National Parks and Wildlife Act 1974 as a source of information to obtain the 'names of Aboriginal people who may hold cultural knowledge relevant to determining the significance of Aboriginal objects and/or places'.

GS LLS understands and respects the significant role and values that tangible and intangible Aboriginal Cultural Heritage holds for First Nations/Aboriginal people with Country. GS LLS also partners with many First Nations communities on Caring for Country projects that aim to protect and enhance those tangible and intangible values in Country including Aboriginal Cultural Heritage. GS LLS considers Aboriginal Cultural Heritage matters in relation to its role in land management and considers cultural heritage issues in the context of Natural Resource Management.

However, GS LLS feels that it is not a primary source of contact for First Nations (Aboriginal) communities or persons that may inform or provide comment on development or planning issues.

GS LLS strongly recommends you contact Heritage NSW to seek their advice on all-inclusive contact lists of persons and organisations who 'speak for Country' and that may assist with your investigation.

Regards

Customer Service Team
Greater Sydney Local Land Services
Level 4, 2 - 6 Station St Penrith | PO Box 4515, Westfield Penrith NSW 2750
T: 02 4724 2100
E: gs.service@lls.nsw.gov.au | **W:** www.greatersydney.lls.nsw.gov.au

You can also contact us through our online enquiry form

Greater Sydney Local Land Services acknowledges we operate in and deliver services throughout Country of First Nations people in the Greater Sydney Region.
We recognise and respect Elders and cultural knowledge holders, past and present, while acknowledging the unique and diverse enduring cultures and histories of all First Nations people.
Always was and always will be Aboriginal land.

From: Taylar Reid <treid@emmconsulting.com.au>
Sent: Wednesday, 1 September 2021 4:36 PM
To: Taylar Reid <treid@emmconsulting.com.au>
Subject: RE: E210732 6 John Street, Berry Bay Agency Request

Apologies, disregard the date in the previous email. If possible, a response by 15 September 2021 would be appreciated.

Thank you.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

From: Taylar Reid
Sent: Wednesday, September 1, 2021 3:34 PM
Subject: E210732 6 John Street, Berry Bay Agency Request

Hello,

Please see attached agency request seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area; 6 John Street, McMahons Point, North Sydney Local Government Area (LGA).

Please provide a list of relevant organisations or persons by 12 July 2021 to the details below:

6 John Street, Berry Bay ACHA
c/o EMM
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Thank you.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
M 0428 280 542
T 02 4907 4828

Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Ian Robertson <Ian.Robertson@northsydney.nsw.gov.au>
Sent: Wednesday, 8 September 2021 10:10 AM
To: Taylar Reid
Subject: Your recent email to North Sydney Council regarding a referral in relation to 6 John Street

CAUTION: This email originated outside of the Organisation.

Good morning Ms Reid

I am responding to your request emailed to North Sydney Council regarding information pertaining to an Aboriginal Cultural Heritage Assessment (ACHA).

The most relevant organisation to approach in order to obtain information of this type would be the Metropolitan Local Aboriginal Land Council.
http://metrolalc.org.au/

Metropolitan Local Aboriginal Land Council

The Metropolitan Local Aboriginal Land Council is a significant organisation in our community, we seek to become the most highly visible and most recognised Aboriginal organisation in the Sydney Metropolitan Region.

metrolalc.org.au

You may also consider approaching the Northern Suburbs Aboriginal Heritage Office to seek any information they might have.
https://www.aboriginalheritage.org/

Aboriginal Heritage in North Sydney, Lane Cove, Willoughby, Ku-ring-gai, Nothern Beaches, Strathfield

NOTE: Museum is temporarily closed due to COVID. All EVENTS in WHATS ON are cancelled. Did you know there are over 1000 sites of Aboriginal culture and heritage in the areas of Sydney known as North Sydney, Ku-ring-gai, Lane Cove, Willoughby, Northern Beaches and Strathfield Councils?. The Aboriginal clans who once occupied this area left important evidence of their past and way of life before ...

www.aboriginalheritage.org

I hope this information assists.

Regards

Ian Robertson
Manager Customer Services
P 9936 8100 | **M** +61 435 967 433
customerservice@northsydney.nsw.gov.au

B.3 List of potential Aboriginal parties

- Guringai Tribal Link Aboriginal Corporation
- Metropolitan Local Aboriginal Land Council
- Darug Land Observations
- A1 Indigenous Services
- Kamilaroi Yankuntjatjara Working Group
- Tocomwall
- Amanda Hickey Cultural Services
- Gunyuu
- Walbunja
- Goobah Developments
- Yerramurra
- Nundagurri
- Murrumbul
- Jerringong
- Pemulwuy CHTS
- Bilinga
- Munyunga
- Wingikara
- Walgalu
- Thauaira
- Dharug
- Gulaga
- Biamanga
- Callendulla
- Murramarang

- DJMD Consultancy
- Butucarbin Aboriginal Corporation
- Didge Ngunawal Clan
- Ginninderra Aboriginal Corporation
- Wailwan Aboriginal Group
- Barking Owl Aboriginal Corporation
- Thoorga Nura
- Darug Boorooberongal Elders Aboriginal Corporation
- B.H. Heritage Consultants
- Ngambaa Cultural Connections
- Goodradigbee Cultural & Heritage Aboriginal Corporation
- Mura Indigenous Corporation
- Aragung Aboriginal Cultural Heritage Site Assessments
- Waawaar Awaa Aboriginal Corporation
- Darug Custodian Aboriginal Corporation
- Wurrumay Pty Ltd
- Minnamunnung
- Wullung
- Badu
- Individual
- Darug Aboriginal Cultural Heritage Assessments

B.4 Notification documentation and Newspaper advertisement

Victoria Mietchen

From: Taylar Reid
Sent: Friday, 10 September 2021 10:43 AM
Cc: Taylar Reid
Subject: E210732 6 John Street, Berry Bay ACHA - Invitation to Register
Attachments: E210732_InvitationtoRegister_V1.pdf

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating 'I agree to be contacted by email as the main source of consultation' is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021**.

6 John Street, Berry Bay ACHA
c/o EMM Consulting Pty Ltd
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300


EMM'S BUSINESS
CONTINUITY PLAN
FOR COVID-19

Victoria Mietchen

From:	News Concierge Customer Support <newsconciergesupport@e.newsdigitalmedia.com.au>
Sent:	Thursday, 9 September 2021 12:22 PM
To:	Taylar Reid
Subject:	Your News Concierge Tax Invoice - NewsConcierge_1234055327

CAUTION: This email originated outside of the Organisation.

Advertising. Made Easy.

To view this email as a web page, click here

Hi Taylar,
Here's your Tax Invoice / Receipt!

Thanks again for using News Concierge!

Booking reference: 1234055327
This is a booking confirmation.

Nationwide News Pty Ltd.
ABN 98 008 438 828.

Customer Details

EMM Consulting Pty Limited
Taylar Reid

Level 3/175 Scott Street
Newcastle NSW 2300
AUSTRALIA
ABN: 28141736558

Your booking details

The following products have successfully been submitted for review.

Category / Ad Type: PublicNotices
Plan Type / Ad Size: General Notices BSS V2

Product:	Run date	Deadline*
Buy Search Sell Standard	10 September 21	
Buy Search Sell PremiumPlus	10 September 21	
Buy Search Sell Featured	10 September 21	
Total (ex GST)	$459.09	

GST	$45.91
Total (incl GST)	$505.00

*The deadline time is based on the timezone of the State or Territory the newspaper is published in.

Payment Date	Payment Amount
09/09/2021	$505.00

To re-book this ad

Or to update your payment details, login to your account

Go to My Account

HAVE QUESTIONS YOU NEED ASSISTANCE WITH?

For sales related questions

Phone

13 11 13

If you are stuck or experiencing technical difficulties, the News Concierge support team are always happy to help.

Email

support@newsconcierge.com.au

OTHER ADVERTISING AND MARKETING SERVICES

PRINT ADVERTISING

Until next time, **The News Concierge Team**

News Concierge is a self service advertising and marketing platform for News Corp Australia

Victoria Mietchen

From: lilly carroll <didgengunawalclan@yahoo.com.au>
Sent: Friday, 10 September 2021 5:03 PM
To: Taylar Reid
Cc: Taylar Reid
Subject: Re: E210732 6 John Street, Berry Bay ACHA - Invitation to Register

CAUTION: This email originated outside of the Organisation.

Hi Taylor

Long time no hear and hope this email finds you well.
DNC would like to register an interest into 6John St Berry bay ACHA

KIND REGARDS
Paul Boyd & Lilly Carroll
Directors DNC
0426823944

Sent from Yahoo Mail for iPhone

On Friday, September 10, 2021, 10:43 am, Taylar Reid <treid@emmconsulting.com.au> wrote:

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating 'I agree to be contacted by email as the main source of consultation' is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021**.

6 John Street, Berry Bay ACHA

c/o EMM Consulting Pty Ltd

Attn: Taylar Reid

PO Box 506

Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist

Bushfire, Ecology, Heritage and Spatial Solutions

EMM
creating opportunities

M 0428 280 542

T 02 4907 4828
Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Please consider the environment before printing my email.

Victoria Mietchen

From: Carolyn .H <cazadirect@live.com>
Sent: Monday, 13 September 2021 4:38 PM
To: Taylar Reid
Subject: Re: E210732 6 John Street, Berry Bay ACHA - Invitation to Register
Attachments: A1.WC2022.pdf; A1.PL2022.pdf

CAUTION: This email originated outside of the Organisation.

A1 INDIGENOUS SERVICES PTY LTD

Contact: Carolyn Hickey
M: 0411650057
E: Cazadirect@live.com
A: 10 Marie Pitt Place, Glenmore Park, NSW 2745
ACN: 639 868 876
ABN: 31 639 868 876

Hi,
Thank you for your email, I would like to register in being involved in all levels of consultation for this project.
Including, Meetings, Reports, Sharing Cultural Information, and available Field Work.

Carolyn Hickey
I am a traditional custodian with over 20 years experience in helping preserve Aboriginal cultural heritage on projects.
I hold cultural knowledge relevant to determining the cultural significance of Aboriginal objects and values that exist in the project area.
I have attached A1 Indigenous Services Insurances.

We would like the Proponent to consider including **A1's, Kawalkan youth and the Women's Circle Employees** for all future field work.

KAWALKAN Youth Workforce Program
A1 INDIGENOUS SERVICES PTY LTD

The Kawalkan Youth Program is a designed program created to employ young indigenous youths between the ages of (18-29) years of age.

The Women's Circle was created with the need to always have Experienced Indigenous Women present in all field work.
To aim for not only gender equality in the workplace but, to help identify and protect any women's sacred places.

OUR MISSION

Building strength in aboriginal families, communities, and services.

It is our mission to commit to an innovative approach to a better future for indigenous employment.

Giving our people the opportunity to gain employment in a culturally sensitive work environment also giving them the opportunity to work on country and continue the tradition of protecting and passing down

Cultural knowledge from one generation to the next – continuing the importance of keeping culture.

Please feel free to contact me on details supplied

Kind Regards,
Carolyn Hickey
Managing Director

From: Taylar Reid <treid@emmconsulting.com.au>
Sent: Friday, 10 September 2021 10:43 AM
Cc: Taylar Reid <treid@emmconsulting.com.au>
Subject: E210732 6 John Street, Berry Bay ACHA - Invitation to Register

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating 'I agree to be contacted by email as the main source of consultation' is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021**.

6 John Street, Berry Bay ACHA
c/o EMM Consulting Pty Ltd
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions

EMM creating opportunities

M 0428 280 542
T 02 4907 4828
Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Philip khan <philipkhan.acn@live.com.au>
Sent: Tuesday, 14 September 2021 2:12 PM
To: Taylar Reid
Subject: RE: E210732 6 John Street, Berry Bay ACHA - Invitation to Register
Attachments: Public Liability Kamilaroi 2021 to 2022.pdf; ICARE workers comp. insurance Kamilaroi Yankuntjatjara Working Group 2021.pdf

CAUTION: This email originated outside of the Organisation.

Hi Taylar,

Thank you for informing us that **EMM Consulting** will be involved in an Aboriginal Cultural Heritage Assessment at **6 John Street, Berry Bay** &,that you are inviting Aboriginal organisations to register, if they wish too be involved in the community consultation process.

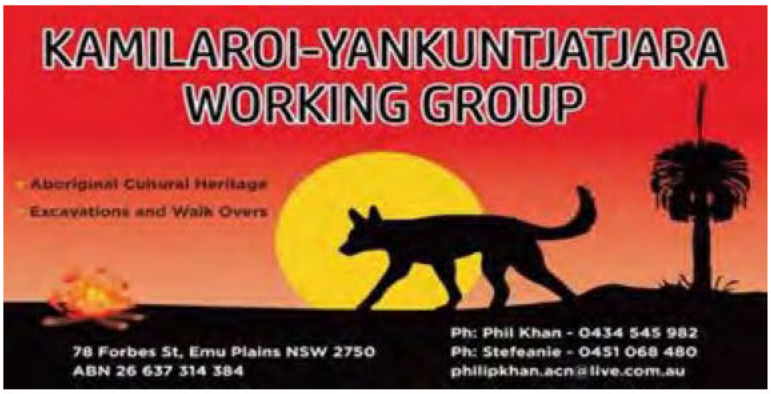
As a senior Aboriginal person for the past 50yrs, I actively participate in the protection of the Aboriginal Cultural Heritage throughout the Sydney Basin, & particularly throughout Western Sydney, on behalf of Kamilaroi Yankuntjatjara Working Group I wish to provide to you my organisation's registration of interest.

I wish to be involved & participate in all levels of consultation/project involvement. I wish to attend all meetings, participate in available field work & receive a copy of the report.

I have attached a copy of Kamilaroi Yankuntjatjara Working group's Public Liability Insurance & Workers Compensation certificate.
Our Rates - $100 per hour, $400 half day & $800 full day (Exc. GST)
Our RAPS have up to 15yrs Cultural Heritage experience in – field work which involves manual excavation (digging), sieving , identifying artefacts, setting up transits, setting up equipment, packing equipment, site surveys & attending meetings.

Should you wish me to provide further information, please do not hesitate to contact me on 0434545982 or Stefeanie on 0451068480.

Kind Regards
Phil Khan



Sent from Mail for Windows 10

From: Taylar Reid
Sent: Friday, 10 September 2021 10:43 AM
Cc: Taylar Reid
Subject: E210732 6 John Street, Berry Bay ACHA - Invitation to Register

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating ‘I agree to be contacted by email as the main source of consultation’ is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021**.

6 John Street, Berry Bay ACHA
c/o EMM Consulting Pty Ltd
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

are not the intended recipient, please notify the sender immediately and delete this email from your computer. You must not disclose, distribute, copy or use the information herein if you are not the intended recipient.

Victoria Mietchen

From: Phillip Boney <Waarlan12@outlook.com>
Sent: Wednesday, 15 September 2021 5:28 PM
To: Taylar Reid
Cc: Taylar Reid
Subject: Re: E210732 6 John Street, Berry Bay ACHA - Invitation to Register

CAUTION: This email originated outside of the Organisation.

Hi Taylar,

Phil Boney of Wailwan Aboriginal Group here. I would like to register my group for this project and any field works of this project.

My representative will me myself, Phil Boney.
My contact details are as followed:
Email: Waarlan12@outlook.com
Phone: 0492213073 and 0474422690
I look forward to hearing from you. Thank you.

Regards, Phil Boney
Wailwan Aboriginal Group

Get Outlook for iOS

From: Taylar Reid <treid@emmconsulting.com.au>
Sent: Friday, September 10, 2021 10:43:26 AM
Cc: Taylar Reid <treid@emmconsulting.com.au>
Subject: E210732 6 John Street, Berry Bay ACHA - Invitation to Register

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating 'I agree to be contacted by email as the main source of consultation' is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021**.

6 John Street, Berry Bay ACHA
c/o EMM Consulting Pty Ltd
Attn: Taylar Reid
PO Box 506
Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions

creating opportunities

M 0428 280 542
T 02 4907 4828
Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Vicky slater <wurrumay@hotmail.com>
Sent: Friday, 24 September 2021 11:13 AM
To: Taylar Reid
Subject: RE: EOI-E210732 6 John Street. Berry Bay
Attachments: Workers Comp - Certificate of Currency.pdf; Certificate of Currency Public Liability.pdf; Mollie Saunders_Reference.pdf

CAUTION: This email originated outside of the Organisation.

Good Morning Tara

Wurrumay Pty ltd would like to register for the above project.

Wurrumay Pty Ltd
89 Pyramid Street
Emu Plains NSW 2750
E: WURRUMAY@HOTMAIL.COM
M: 0421077521

Site Officer Mollie Saunders.

Attached Insurances & Mollie Saunders Work References of her experienced in Culture & Heritage.

Kind regards

Vicky Slater
Director
Wurrumay PTY-LTD

I would like to pay my respects to the traditional owners of this country; the elders past and present as well as future. Their knowledge and cultural heritage are just as important for all Australians living today. We honour their lore; the spiritual connection they have to their country and so proudly share with all people.

Victoria Mietchen

From: Butucarbin Heritage <butuheritage@gmail.com>
Sent: Friday, 24 September 2021 11:54 PM
To: Taylar Reid
Subject: Re: E210732 6 John Street, Berry Bay ACHA - Invitation to Register
Attachments: John Street EOI- EMM.docx

CAUTION: This email originated outside of the Organisation.

Hi Taylar,
Please see attached.

Kind regards,
Lowanna

On Fri, Sep 10, 2021 at 10:43 AM Taylar Reid <treid@emmconsulting.com.au> wrote:

Hello,

EMM Consulting on behalf of Stannards Marine Pty Ltd is seeking to identify Aboriginal organisations or Aboriginal persons who hold knowledge relevant to determining the cultural significance of Aboriginal objects and/or Aboriginal places in the project area, 6 John Street, Berry Bay within the North Sydney Local Government Area (LGA).

Please see attached an invitation to register.

If you wish to register your interest as an Aboriginal party your registration must be in writing (letter, fax or email) and include:

- your name/organisation;
- appointed representative; and
- current contact details (postal address, email, telephone number/s).

EMM is seeking to engage all future correspondence with registered Aboriginal parties (RAPs) via email. This method is considered the most reliable, cost-effective, and timely manner for consultation. As such, EMM requests your agreement to undertake the consultation via email as the official method of contact. A simple response in writing stating 'I agree to be contacted by email as the main source of consultation' is requested.

This information must be received by Taylar Reid (see contact details below) by close of business on **Friday 24 September 2021.**

6 John Street, Berry Bay ACHA

c/o EMM Consulting Pty Ltd

Attn: Taylar Reid

PO Box 506

Newcastle NSW 2300
Email: treid@emmconsulting.com.au

Kind regards,

Taylar Reid
Archaeologist

Bushfire, Ecology, Heritage and Spatial Solutions

M 0428 280 542

T 02 4907 4828

Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Please consider the environment before printing my email.

--
Lowanna Gibson
Project Manager for Butucarbin Cultural Heritage
B.A Archaeology/Anthropology USYD
Juris Doctor UTS

BUTUCARBIN ABORIGINAL CORPORATION
PO Box E18, Emerton NSW 2770
28 Pringle Road, Hebersham NSW 2770
Ph: 9832 7167 Fax: 9832 7263
koori@ozemail.com.au
ABN: 83 535 742 276

24th September 2021

To whom it may concern,
On behalf of Butucarbin, I would like to register for the consultation in relation to the project at 6 John Street, Berry Bay.

About Butucarbin
Butucarbin Aboriginal Corporation is a successful not for profit community organisation that was established in 1989 to provide Community Development, Education and Training to organisations and individuals in the Blacktown and Penrith LGA's of Western Sydney. The organisation has won many awards for outstanding service delivery over the past 23 years. The latest being our Executive Officer Jennifer Beale being a finalist in the 2014 NSW Australian of the Year awards.

Due to the changes in funding for Aboriginal organisations and for Butucarbin to continue the service that they have been providing, the organisation has developed an Aboriginal Cultural Heritage Assessment business. All profits go back into the organisation to provide services to the community. As community workers we believe it is our duty to involve the Aboriginal community of Western Sydney in this work, as it enables the community to be involved in decision-making in relation to their culture and therefore, promotes self-determination.

Butucarbin is a contemporary example of cultural heritage in that it is a product of the 1970's resettlement program and self-determination policy (see, Aboriginal Community Controlled Organisations). Due to this resettlement policy, there are generations of Aboriginal people who have been born in Western Sydney and have been raised in the Mount Druitt Community (which has the highest Aboriginal urban population in Australia) and thus, this is where their connection lies. Ultimately, our cultural connection lies in our community work and assistance to the people of wider Western Sydney.

In conclusion, we also believe it is essential to pass on knowledge from generation to generation. Butucarbin provides cultural knowledge to the wider community through Aboriginal Cultural workshops and community development programs.

Previous experience
We have participated in projects with such companies as, Extent, Niche, Kelleher Nightingale, Artefact, AMBS, Virtus Heritage, Navin Officer, Curio and Biosis. This work has involved activities such as, site-walkovers, surface collections, ACHA reviews and excavations.

When on site, our workers were on time, professional and participate in all tasks set for them. It is essential for our community members to participate in Aboriginal Community Consultations and other cultural work as we believe it is of the utmost importance that cultural heritage skills and knowledge are passed on to our younger Aboriginal generations.

Overall, our team is highly skilled and has over ten years' experience in cultural heritage assessment field work. Currently, our team consists of several skilled field officers. We ensure there is diversity amongst our workers in that we do not discriminate against gender and age, as it important to gain insight into cultural heritage from varying perspectives.

Schedule of Rates
In the event Butucarbin is selected for fieldwork or site meetings, please consider our rates. Ultimately, Butucarbin can negotiate fees however, our standard fee is $120 per hour.

Our rates are as follows:

Consultation Meetings/site inspection : $120 - $480 + expenses
Fieldwork: $120.00 per hour
Perusal and comment of reports: $120.00 per hour
Mileage Allowance: 0.75 cents per kilometre

Pursuant to section 3.4, 'the proponent may reimburse Aboriginal people for any demonstrated reasonable out-of-pocket expenses directly incurred in order to participate in the consultation process.' An example of 'a demonstrated reasonable expense' could be the 'documented loss of wages caused by the need to take time from paid employment to participate in meetings' or travel expenses. Ultimately, Butucarbin's consultation rate includes $120 per hour + reimbursed expenses.

If you require further information, you can contact Jennifer Beale on 0409924409 or Lowanna Gibson on 0458537666.

Yours Sincerely,

Lowanna Gibson
Project Manager for Butucarbin Cultural Heritage
B.A Archaeology/Anthropology USYD
Juris Doctor UTS

Victoria Mietchen

From: Taylar Reid
Sent: Friday, 1 October 2021 2:49 PM
To: heritagemailbox@environment.nsw.gov.au; metrolalc@metrolalc.org.au
Cc: Alice Spizzo; Alan Williams; Kristy Hodgkinson; Alan Williams
Subject: E210732 6 John Street, Berry Bay Notification of Registered Parties
Attachments: E210732_AgencyRequest.pdf; E210732_InvitationtoRegister_V1.pdf; EMM Consult Digi Tearsheet.jpg

Hello,

As previously advised, EMM is undertaking the Aboriginal heritage investigations for a proposed floating dry dock (FDD) within Berry's Bay at 6 John Street, McMahons Point within the North Sydney LGA. As part of these investigations, a formal notification process to identify the interest of local Aboriginal individuals and/or organisations in accordance with Heritage NSW guidelines was undertaken. This expired on 24 September 2021.

In accordance with Section 4.1.6 of the Heritage NSW consultation guidelines, please find a list of the Aboriginal individuals/organisations who are registered in the project below, and the notification documentation attached.

Aboriginal Consultation Requirements for Proponents (DECCW 2010)*		
ABORIGINAL REGISTERED PARTIES		
Project Name: 6 John Street, Berry Bay ACHA		
Registration Order	**Registration Date**	**Organisation/Person**
1	N/A	Metro Local Aboriginal Lands Council
2	10/Sep/21	Didge Ngunawal Clan
3	13/Sep/21	A1 Indigenous Services Pty Ltd
4	14/Sep/21	Kamilaroi Yankuntjatjara Working Group
5	15/Sep/21	Wailwan Aboriginal Group
6	18/Sep/21	Ngambaa Cultural Connections
7	24/Sep/21	Wurrumay Pty Ltd
8	24/Sep/21	Butucarbin Aboriginal Corporation

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions

creating opportunities

M 0428 280 542
T 02 4907 4828
Connect with us

NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

B.5 Assessment methodology documentation

Victoria Mietchen

From: Taylar Reid
Sent: Tuesday, 28 September 2021 5:45 PM
Cc: Taylar Reid
Subject: 6 John Street, Berry Bay Methodology Letter
Attachments: E210732_Methodology_V1.pdf

Dear Registered Aboriginal Party,

Thank you for registering your interest in the Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development at 6 John Street, McMahons Point within the North Sydney Local Government Area (LGA).

Attached to this email is a letter which outlines the proposed assessment methods for the ACHA. The letter includes information about the project itself and the design plans, as well as our proposed methods for undertaking survey within the project area. I would appreciate if you could please review the letter and let me know your thoughts or comments, if any. If you would like to make us aware of any cultural knowledge about the project area and its cultural value to you that would be appreciated.

Your response would be greatly appreciated, and please feel free to send any information or feedback to me via email, post or phone. As outlined in the letter, if you could provide any comments by **COB 26 October 2021**, that would be ideal.

Any questions, please let me know.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

28 September 2021

Level 3, 175 Scott Street
Newcastle NSW 2300

T 02 4907 4800
E info@emmconsulting.com.au

www.emmconsulting.com.au

Re: 6 John Street, Berry Bay - Aboriginal cultural heritage assessment - project information and assessment methodology

1 Introduction

Thank you for your registration in the Aboriginal cultural heritage assessment of 6 John Street, McMahons Point, North Sydney local government area (hereafter the 'study area'; Figure 1.1 and Figure 2.1). Stannards Marine Pty Ltd is proposing to install a floating dry dock (FDD) at the study area. The proposed installation was submitted to North Sydney Council (NSC) as an integrated development application (DA) (#03/2018) in March 2019 and following rejection by NSC is now being contested in the Land and Environment Court (LEC) (2021/00063136). One of the unresolved requirements outlined in the statement of facts and contentions was the need to consider the impacts to Aboriginal heritage by the proposed development. Subsequently, EMM Consulting Pty Ltd (EMM) has been engaged by Stannards Marine Pty Ltd to undertake an Aboriginal cultural heritage assessment (ACHA) for the project.

This document is provided in accordance with sections 4.2 and 4.3 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW 2010), which sets out the Aboriginal consultation requirements for the project.

The aims of this letter are to:

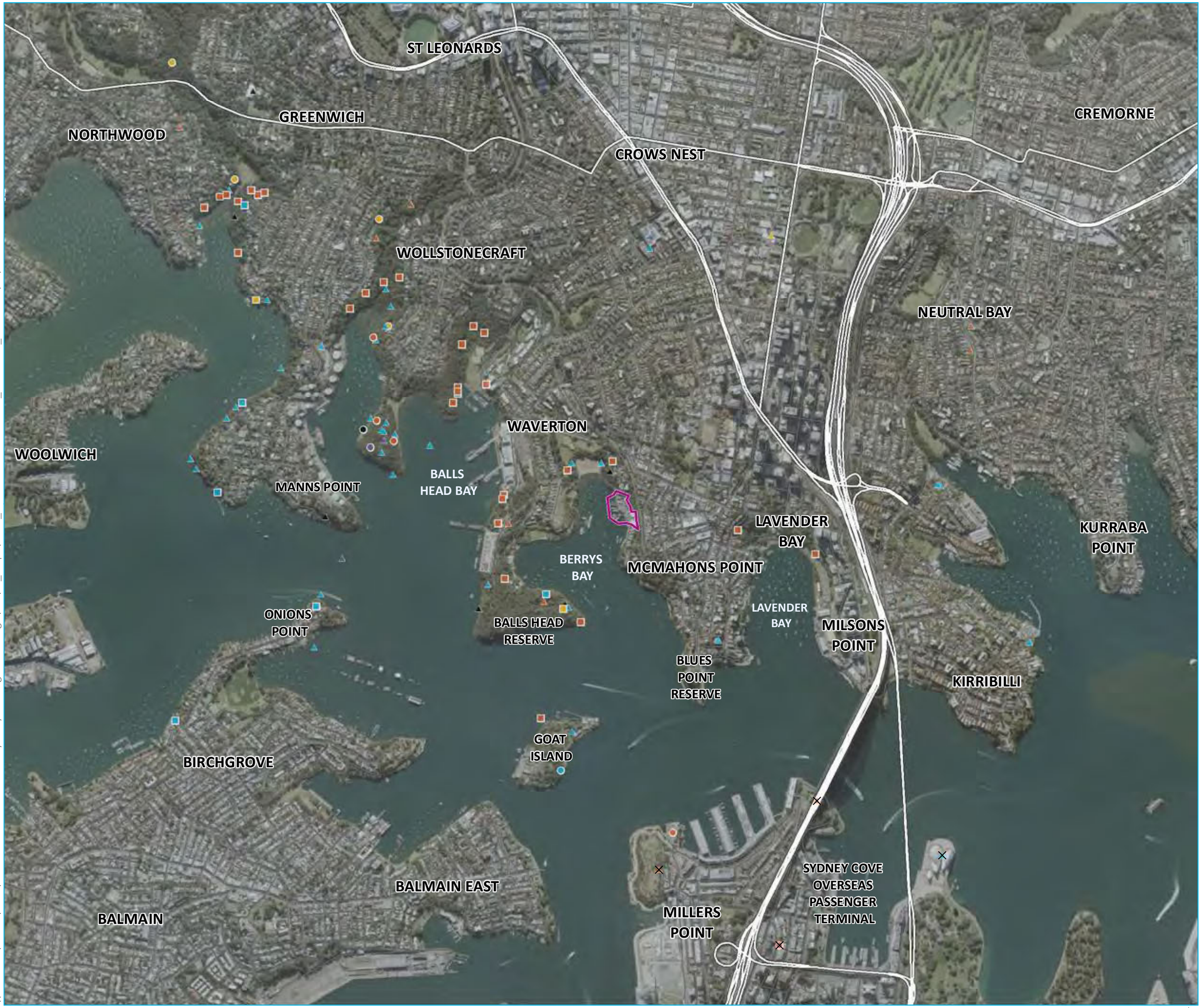
- provide an overview of the project and how it will be assessed;
- provide background on the project and investigations to date;
- establish the purpose and aims of the Aboriginal consultation process;
- seek information about any Aboriginal cultural heritage values associated with the project and how they may affect, inform or refine the project and/or assessment methods;
- seek information on any cultural activities (such as fishing and hunting) that has historically and/or is actively being undertaken in the project area;
- identify any culturally appropriate protocols that registered parties wish to be adopted during the information gathering process (eg protocols during field survey, or handling of culturally sensitive information); and
- present a draft of the intended assessment methods for your review and comment.

This letter presents information on the project and describes a draft ACHA method for your review and comment. We welcome your written feedback at your earliest convenience, and no later than **26 October 2021**.

At this time, we propose to conduct all consultation via teleconferencing, e-mail or phone due to the social distancing rules from the COVID-19 outbreak. However, where feasible, we would meet in person (face-to-face meetings), and would ensure appropriate protocols are in place as per government health advice at that time. We would like to hear from your organisation on this to ensure that you are able to contribute knowledge to the project and have the opportunity to be involved, whilst ensuring we comply with up-to-date social distancing requirements.

For reference, the proponent contact is: Kristy Hodgkins, Director, Hampton Property Service (PO Box 954, Edgecliff, NSW 2027; T: 02 9386 7009; E: kristyh@hamptonpropertyservices.com.au

EMM is working on the proponent's behalf, and all queries should be directed through EMM. Feedback can be provided to: Alan Williams, EMM Consulting Pty Ltd, 20 Chandos Street, St Leonards, NSW 2065; T: 02 9493 9500; E: awilliams@emmconsulting.com.au



\\emmsvr1\emm3\2021\E210732 - 6 John Street Berry's Bay - Aboriginal heritage\GIS\02_Maps\G007_ProjectLocationAndSites_20210927_01.mxd 27/09/2021

Source: EMM (2021); DFSI (2020); DPIE (2021); MetroMap (2021)

0 0.5 1 km
GDA 1994 MGA Zone 56
N

KEY
- Project area
- Major road
- Minor road
- NPWS reserve

AHIMS
- Aboriginal ceremony and dreaming, rockshelter
- PAD
- Artefact site
- Axe grinding groove, rock engraving
- Burial/s, midden
- Midden
- Not an Aboriginal site
- Rock engraving
- Rockshelter
- Rockshelter with art
- Rockshelter with art, midden
- Rockshelter with burial/s, midden
- Rockshelter with midden
- Site destroyed

Project location and previously documented sites

6 John Street Berrys Bay
Methodology Letter
Figure 1.1

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2 Project information

2.1 Project overview

Stannards Marine proposes to demolish existing water-based jetty structures, remove a small number of established submerged piers and establish a floating dry dock (FDD) (Figure 2.1).

The FDD would facilitate the maintenance and repair of maritime commercial vessels up to 750 tonne in association with the existing boat building and repair facility.

The FDD is proposed to be based entirely on Berry's Bay, with no impact to the adjacent marina envisaged. A small number of submerged piers, largely in the locations of those proposed for removal would also be required. Based on this, it is considered that impacts to tangible cultural material is unlikely, with the ACHA focussing on intangible/cultural values.

The approval pathway will be dictated by the outcomes of current LEC process. If approved, it is probable that the consent authority would be the NSC under Division 4.1 of the *Environmental Planning and Assessment Act 1979.* As such, the requirements of the *National Parks and Wildlife Act 1974* will remain in effect, with harm to cultural materials (if present) requiring an Aboriginal heritage impact permit (AHIP) from Heritage NSW.

2.2 Previous investigations

To date, there has been no Aboriginal heritage investigations for the project. A previous maritime archaeological assessment has been undertaken that primarily focussed on historical shipwrecks. It did not identify or document any Aboriginal cultural materials.

Initial desktop information accrued as part of the ACHA has included a review of environmental and archaeological data to allow a model of potential cultural materials for the project area to be developed (Figure 1.1). Port Jackson has been subject to numerous previous academic and cultural heritage management studies over last several decades, most notably Attenbrow (1990, 1993, 1995, 2002). These demonstrate that cultural materials are dominated by middens and rockshelters – caves or overhangs that contain various art and/or deposits such as shell and stone artefacts. A search of the Heritage NSW database surrounding the project area, identified 105 previously documented sites of which 44% are rockshelters and 37% are middens (Figure 1). None of these sites are within the project area with the nearest being a cluster of sites at Waverton Park and Ball's Head Reserve; and all primarily rockshelters and/or middens. While the entire project area is currently submerged, and such sites may have been present prior to sea-level rise about 7,000 years ago (Dougherty et al. 2019; Williams et al. 2018), an archaeological maritime investigation of the site did not indicate any sandstone outcropping or steep relief that may suggest the potential for rockshelters to have been present (Comber Consultants Pty Ltd 2018). Submerged midden sites would be hard to determine given the natural formation of shell beds, and to date investigation of underwater cultural material has had limited success (eg AAJV 2020; Benjamin et al. 2018).

There is also limited post-Contact evidence of past activity occurring within the project area. Numerous early Europeans made general observations about Aboriginal people living along the banks of Port Jackson, and describe spear-making, fishing from shore and boats, and making line and shell hooks. However, there is no specific description that can be linked to Berrys Bay. In the late 19th Century, there is a brief reference in the Sydney Morning Herald (23 November 1878, p.6) to Aboriginal people occupying the foreshore of Berry's Bay, but in the context of a suggested relocation to Goat Island, and hence little further information on where within the bay is provided. During the 1890s, many of the Aboriginal people along the north shore were relocated to the La Perouse reserve (Hoskins 2019).

Source: EMM (2021); DFSI (2020); GA (2011); MetroMap (2021)

KEY

- Project area
- Proposed demolition
- Proposed development
- Rail line

Proposed development

6 John Street Berrys Bay
Methodology Letter
Figure 2.1

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3 Aboriginal stakeholders and consultation to date

EMM initiated the consultation process in September 2021 and identified eight Registered Aboriginal party (RAP) organisations and/or individuals through formal notification as part of the Heritage NSW consultation requirements.

The following RAPs have responded to communication undertaken by EMM:

- A1 Indigenous Services Pty Ltd;
- Butucarbin Aboriginal Corporation;
- Didge Ngunawal Clan;
- Kamilaroi Yankuntjatjara Working Group;
- Metro Local Aboriginal Lands Council;
- Ngambaa Cultural Connections;
- Wailwan Aboriginal Group;
- Wurrumay Pty Ltd.

4 Assessment methodology

4.1 Legislative context

As a project assessed under Division 4.1 of the *Environmental Planning and Assessment Act 1979,* the assessment is being prepared in accordance with the requirements of Heritage NSW guidelines:

- *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in NSW* (OEH, 2011);
- *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW 2010);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010).

4.2 Overview

The purpose of the assessment is to identify and manage the Aboriginal cultural heritage values of all areas that will be affected by the study. In summary, this will involve.

- consultation with the Aboriginal stakeholders to identify socio-cultural values of the project area and places of special significance that should be considered;
- a search of the AHIMS register for records of previously registered Aboriginal sites;
- a review of past Aboriginal heritage reports covering the study area;
- environmental landscape analysis to identify past Aboriginal resources and suitable occupation areas;
- synthesis of background research to develop a predictive model of Aboriginal site location;

- field investigation to validate the findings of the desktop and identify any previously undocumented cultural material. This would include surface inspection and may extend to test excavations of areas of archaeological interest;
- an assessment of significance for Aboriginal cultural heritage values in the project area (with input from the registered Aboriginal stakeholders);
- an impact assessment of how the project will affect Aboriginal cultural heritage values in the project area; and
- development of management recommendations based on the results of the assessment and input from registered Aboriginal stakeholders during the consultation process and particularly from the draft ACHA review period.

4.2.1 Field investigation

The majority of the project area is within the current Berry's Bay and therefore under water. As such, investigation will include the nearby immediate foreshore encompassed by the adjacent marina to both explore cultural materials that may be in close proximity to the activity; and to discuss the cultural landscape within which the FDD would be situated. Where possible, surface investigation will occur along the shores edge any accessible parts of the study area, with a key focus on targeting areas of low disturbance. The focus of the team will be to both investigate soil exposures for extant Aboriginal objects and identify landforms that have potential for cultural material to be present (either surface or subsurface). All Aboriginal objects and/or landforms of interest would be mapped and documented using hand-held GPS, photographs, sketches and written description.

The survey will be undertaken in accordance with Requirements 5 to 10 of the Code of Practice. In summary, the Code of Practice requires the following general methodology:

- pedestrian survey;
- survey and recording according to survey unit and/or transect;
- recording of beginning and end points of transects or the boundaries of survey units, and the spacing between survey personnel;
- recording of landform, soil information, land surface, vegetation conditions, visibility and exposure, and survey coverage;
- recording of any identified Aboriginal sites identified according to Requirements 6-8, and recording of any identified Aboriginal objects in accordance with Requirements 18-24 of the Code of Practice;
- if any Aboriginal objects and/or sites are identified in the course of the survey, site cards will be completed and submitted to the AHIMS registrar; and
- in the event of Aboriginal heritage being identified within the project footprint, undertake discussions on site as to the potential further investigation and/or management of these finds.

At this stage, no test excavations are proposed for the study area.

5 Timeframes

The following indicative timeframes for the works would apply (noting these will be subject to test excavation requirements and may change depending on health advice relating to Covid-19):

- distribution of this document to the registered Aboriginal stakeholders: September 2021;
- field investigation of the study area: October 2021;
- distribution of the draft report: November 2021;
- input into recommendations and review of draft report: November 2021; and
- report finalisation: December 2021.

6 What we need from you

In addition to the archaeological evidence described above, Aboriginal heritage incorporates a wide range of values such as stories, traditions and cultural practices. EMM welcomes advice from the Aboriginal community about cultural values (which might include archaeological sites or other types of values) relevant to the project area and its surrounds. EMM is relying on the Aboriginal community for advice on non-archaeological and intangible Aboriginal values for the study area. We are happy to discuss any information which you are willing to share and will respect confidentiality where requested.

EMM would appreciate your feedback on the above methodology proposed for the investigation and assessment of the project area. In responding, please also consider the following questions:

- Are there any other knowledge-holders or traditional owner groups we should be contacting to obtain cultural information on this area?
- Are there any protocols in relation to community interaction and/or cultural heritage that you would like adopted during the project?
- Are you aware of any Aboriginal objects, places, sites or stories of cultural significance and/or importance that you are aware of within the project area? If so, please advise us how you wish them to be dealt with during the project.
- Are you aware of any past or current hunting/food procurement activities within the project area? Do you have any views on how these should be managed into the future?
- Is the information you are providing sensitive, gender specific, etc? If so, how would you like the information you provide to EMM to be managed? Noting that some documentation for the ACHA process will be required.
- Do you require any further information prior to EMM proceeding with the project?

In your response, can you please also clearly identify who you would like EMM to talk to within your organisation, and provide contact details for these individuals. Please also ensure your preferred method of communication (eg telephone call, email, letter, etc) is highlighted for subsequent stages of the project.

7 Closing

We look forward to receiving any response your organisation wishes to make about the proposed method by **26 October 2021**. Your response will be documented and considered in the assessment. Most importantly, your cultural information is also welcome within this timeframe; but it can also be submitted up until the completion of the draft ACHA.

Please feel free to contact me with any questions.

Yours sincerely

TReid

Taylar Reid
Archaeologist

treid@emmconsulting.com.au

Victoria Mietchen

From: lilly carroll <didgengunawalclan@yahoo.com.au>
Sent: Tuesday, 28 September 2021 6:14 PM
To: Taylar Reid
Cc: Taylar Reid
Subject: Re: 6 John Street, Berry Bay Methodology Letter

CAUTION: This email originated outside of the Organisation.

Hi Taylar,

DNC is happy with everything from our end For Berry Bay methodology. Just working with Georgia and Cam, and they said to say hi!
Hope to see you soon

Fully experienced and insured site officers

Kind regards
Paul Boyd & Lilly Carroll
Kind regards
0426823944

Sent from Yahoo Mail for iPhone

On Tuesday, September 28, 2021, 5:45 pm, Taylar Reid <treid@emmconsulting.com.au> wrote:

> Dear Registered Aboriginal Party,
>
> Thank you for registering your interest in the Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development at 6 John Street, McMahons Point within the North Sydney Local Government Area (LGA).
>
> Attached to this email is a letter which outlines the proposed assessment methods for the ACHA. The letter includes information about the project itself and the design plans, as well as our proposed methods for undertaking survey within the project area. I would appreciate if you could please review the letter and let me know your thoughts or comments, if any. If you would like to make us aware of any cultural knowledge about the project area and its cultural value to you that would be appreciated.
>
> Your response would be greatly appreciated, and please feel free to send any information or feedback to me via email, post or phone. As outlined in the letter, if you could provide any comments by **COB 26 October 2021**, that would be ideal.
>
> Any questions, please let me know.

Kind regards,

Taylar Reid
Archaeologist

Bushfire, Ecology, Heritage and Spatial Solutions

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T 02 4907 4828

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NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Please consider the environment before printing my email.

Victoria Mietchen

From: Philip khan <philipkhan.acn@live.com.au>
Sent: Monday, 11 October 2021 1:09 PM
To: Taylar Reid
Subject: Re: 6 John Street, Berry Bay Methodology Letter

CAUTION: This email originated outside of the Organisation.

Dear Taylar,

Thank you for your methodology for proposed project at 6 John Street, Berry Bay, Improvement Works. The whole study area and surrounding area is of high significance to us Aboriginal people, for tens of thousands of years the area has been occupied by Aboriginal people, in turn we have a deep connection to the sky, water ways and land. The area would have been utilised for daily activities such as camping, hunting, fishing and ceremonial practices etc. There are water ways within the area that are utilised by Aboriginal people.

Is there a cultural interpretation plan for this project? Ways in which this can be archived is through design, art, digital displays, apps, native gardens, or landscaping. It is important to incorporate interpretation into you project as it educates the wider community and our next generations about the traditional owners of the land, a keeping place should also be sort to house artefacts on country. this is a way in which to close the gap and better our understanding of one of the oldest continuing cultures in the world.

We recommend further investigation in the form of test excavation, and highly recommend interpretation plan. We would like to agree to your methodology, and we look forward to further consultation on this project.

Kind Regards
Kadibulla Khan

From: Taylar Reid <treid@emmconsulting.com.au>
Sent: Tuesday, 28 September 2021 5:45 PM
Cc: Taylar Reid <treid@emmconsulting.com.au>
Subject: 6 John Street, Berry Bay Methodology Letter

Dear Registered Aboriginal Party,

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Your response would be greatly appreciated, and please feel free to send any information or feedback to me via email, post or phone. As outlined in the letter, if you could provide any comments by **COB 26 October 2021**, that would be ideal.

Any questions, please let me know.

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions

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Victoria Mietchen

From: Taylar Reid
Sent: Tuesday, 12 October 2021 10:04 AM
To: Philip khan
Subject: RE: 6 John Street, Berry Bay Methodology Letter

Hi Phil,

Great thank you for your submission. I have made a note of you recommendations. As the docks and project works are proposed entirely within the bay itself and are underwater, I do not think test excavations will be conducted. There will be survey to inspect the area however, and this can be discussed further at that time.

Noted on the cultural interpretation plan as well, great idea and can be discussed further during the survey.

Let me know if you have any questions!

Kind regards,

Taylar Reid
Archaeologist
Bushfire, Ecology, Heritage and Spatial Solutions
EMM creating opportunities
M 0428 280 542
T 02 4907 4828
Connect with us
NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

From: Philip khan <philipkhan.acn@live.com.au>
Sent: Monday, October 11, 2021 1:09 PM
To: Taylar Reid <treid@emmconsulting.com.au>
Subject: Re: 6 John Street, Berry Bay Methodology Letter

CAUTION: This email originated outside of the Organisation.

Dear Taylar,

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The area would have been utilised for daily activities such as camping, hunting, fishing and ceremonial practices etc. There are water ways within the area that are utilised by Aboriginal people.

Is there a cultural interpretation plan for this project? Ways in which this can be archived is through design, art, digital displays, apps, native gardens, or landscaping. It is important to incorporate interpretation into you project as it educates the wider community and our next generations about the traditional owners of the land, a keeping place should also be sort to house artefacts on country. this is a way in which to close the gap and better our understanding of one of the oldest continuing cultures in the world.

We recommend further investigation in the form of test excavation, and highly recommend interpretation plan. We would like to agree to your methodology, and we look forward to further consultation on this project.

Kind Regards
Kadibulla Khan

From: Taylar Reid <treid@emmconsulting.com.au>
Sent: Tuesday, 28 September 2021 5:45 PM
Cc: Taylar Reid <treid@emmconsulting.com.au>
Subject: 6 John Street, Berry Bay Methodology Letter

Dear Registered Aboriginal Party,

Thank you for registering your interest in the Aboriginal Cultural Heritage Assessment (ACHA) for the proposed development at 6 John Street, McMahons Point within the North Sydney Local Government Area (LGA).

Attached to this email is a letter which outlines the proposed assessment methods for the ACHA. The letter includes information about the project itself and the design plans, as well as our proposed methods for undertaking survey within the project area. I would appreciate if you could please review the letter and let me know your thoughts or comments, if any. If you would like to make us aware of any cultural knowledge about the project area and its cultural value to you that would be appreciated.

Your response would be greatly appreciated, and please feel free to send any information or feedback to me via email, post or phone. As outlined in the letter, if you could provide any comments by **COB 26 October 2021**, that would be ideal.

Any questions, please let me know.

Kind regards,

Taylar Reid
Archaeologist

Bushfire, Ecology, Heritage and Spatial Solutions

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T 02 4907 4828
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NEWCASTLE | Level 3, 175 Scott Street, Newcastle NSW 2300

Victoria Mietchen

From: Alan Williams
Sent: Tuesday, 19 October 2021 1:34 PM
To: officeadmin@metrolalc.org.au; lilly carroll; cazadirect@live.com; Philip khan; waarlan12@outlook.com; Kaarina Slater; wurrumay@hotmail.com; butuheritage@gmail.com
Cc: Selina Timothy; Taylar Reid
Subject: 6 John Street, McMahon's Point - ACHA - Site inspection
Attachments: PRO_1530_COVID-19 Fieldwork Protocols - Subcontractors_v1_20210922.pdf; EMM Conditions of Engagement of Subconsultants_20201130.pdf

Dear All,

Thank you for registering an interest in the Aboriginal cultural heritage assessment for 6 John Street, McMahon's Point. This is the proposed installation of a floating dry dock within the bay and associated with the current boatyard on the site.

With the easing of COVID restrictions, I would like to propose a site visit. The development is entirely within the bay itself, so this will primarily be a discussion around concerns of any cultural values or cultural landscape aspects of the site. In addition to looking at the site itself, I'd like to have a quick look around the other side of the bay, which gives a better picture of the site and perhaps other interesting cultural heritage in the region (at Balls Head Reserve).

I invite a representative of your organisation to attend in accordance with the below scope and requirements.

Work scope

We require one sites officer from your organisation for up to two days to participate in the site inspection. We request that your officer has knowledge and/or experience of cultural values associated with the area and/or the identification of cultural materials (eg stone artefacts, scarred trees, etc); and any cultural knowledge of the site. The field survey will require walking on uneven terrain in the field.

We are proposing to undertake these works on **Wednesday 27 October.** I propose to meet at the **end of John Street, McMahon's Point at 8.30am**..

We are authorised to offer payment of up to [redacted] for your representative to participate in the site inspection, and up to a half day. Please submit your invoice once the fieldwork has been completed to Taylar Reid and myself, and we will endeavour to get it paid. Our official payment timeframe is 40-60 days I believe, but we usually can get them organised within 2-3 weeks.

Please ensure your sites officer has all necessary safety gear (steel toecaps, hi-vis, long sleeves/pants, rain jacket, sun hat, safety glasses/sunglasses) for the site visit.

Requirements and WHS

Please ensure the following has been undertaken/provided:

1. If not already done so, you have reviewed and signed the attached subcontractor agreement. Please advise us if there are any issues with the contract and we can explore updates/revisions where needed.
2. If not already done so, please ensure that you have provided the necessary proof of insurances to participate in the on-site activities (including workers compensation or equivalent; and public liability).
3. Please note that the proponent requires all personnel to **be double vaccinated** to participate. Please ensure your representative is double vaccinated prior to attending the site inspection and has proof of vaccination for the EMM representative on-site.

4. Your representative will be subject to a project specific SWMS that includes additional COVID requirements. This will include the completion of the attached questionnaire. Note undertaking and demonstrating a negative COVID test within 72 hours of the fieldwork is a requirement of this.

Happy to discuss
Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

Bushfire, Ecology, Heritage and Spatial Solutions

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M 0438 104 740
D 02 9493 9584
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B.6 ACHA review documentation

Victoria Mietchen

From: Alan Williams
Sent: Monday, 15 November 2021 9:57 AM
To: Alan Williams
Cc: Pamela Chauvel
Subject: 6 John Street, Berrys Bay - ACHA - review and comment

Dear All,

Thank you for your involvement in EMM's recent Aboriginal cultural heritage assessment (ACHA) of 6 John Street, Berrys Bay. As you will be aware, this is the consideration of potential Aboriginal heritage impacts of a proposed floating dry dock adjacent an existing boat yard in Berrys Bay. We have now completed the draft ACHA report and are seeking input/feedback from your organisation.

In brief, we conclude that no cultural materials were identified, and we do not expect any significant sites to be present within the proposed impact footprint (which primarily consists of some 35 sq m of the seabed in Berrys Bay). Specifically, the most important sites in this region are arguably rockshelters and/or engravings. Our available information from the seabed encompassed within the project footprint does not suggest that such features are present. If present, we suggest that cultural materials would consist of isolated or disparate stone artefacts in disturbed contexts.

Can I please ask your organisation to review the document and provide any input/concerns/issues/comments as soon as possible. In accordance with Heritage NSW guidelines, we provide 28 days to comment on the document, with finalisation proposed on 12 December 2021. However, as previously discussed, this project is currently being contested in the Land and Environment Court, and we have been asked to deliver the document prior to this date. As such the proponent is willing to offer [redacted] to all organisations to prioritise their review and comment of the report were provided by 26 November 2021.

The report can be downloaded from the below folder:

[John Street, Berrys Bay]

I am happy to send a hard copy for anyone that wants one, please just let me know.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

Bushfire, Ecology, Heritage and Spatial Solutions

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Victoria Mietchen

From: Butucarbin Heritage <butuheritage@gmail.com>
Sent: Thursday, 25 November 2021 5:10 PM
To: Alan Williams
Subject: Berry's Bay
Attachments: Berry's Bay ACHA comments..pdf

CAUTION: This email originated outside of the Organisation.

Hi Al,
Please see attached comments.

Kind regards,
--
Lowanna Gibson
Project Manager for Butucarbin Cultural Heritage
B.A Archaeology/Anthropology USYD
Juris Doctor UTS

BUTUCARBIN ABORIGINAL CORPORATION
PO Box E18, Emerton NSW 2770
28 Pringle Road, Hebersham NSW 2770
Ph: 9832 7167 Fax: 9832 7263
koori@ozemail.com.au
ABN: 83 535 742 276

25th November 2021

To whom it may concern,

Butucarbin Aboriginal Corporation agrees with EMM regarding the results (p. 35-41) of the Aboriginal Cultural Heritage Assessment, conducted at 6 John Street, Berry's Bay, Sydney NSW.

During the site inspection, Butucarbin's representative concluded that there were no First Nations objects or sites within the area. This conclusion coupled with the available information on the area – which also determines that there are no/limited First Nations objects, sites, or deposits – determines that the proposed activity - the installation of a Floating Dry Dock (FDD) - to be undertaken, will not result in any intergenerational or cumulative loss to material culture and will also not interfere with First Nations intangible culture.

Furthermore, Butucarbin also agrees with EMM's recommendations (p. 49-50). In the event skeletal remains are unearthed, the appropriate legislative Acts should be followed and upon completion of the extrusion of the mooring piles, underwater inspection should be conducted to investigate the presence of stone artefacts and shell material.

Yours Sincerely,

Lowanna Gibson
Project Manager for Butucarbin Cultural Heritage
B.A Archaeology/Anthropology USYD
Juris Doctor Candidate UTS

Victoria Mietchen

From: Philip khan <philipkhan.acn@live.com.au>
Sent: Thursday, 18 November 2021 10:04 AM
To: Alan Williams
Subject: Re: 6 John Street, Berrys Bay - ACHA - review and comment

CAUTION: This email originated outside of the Organisation.

Dear Alan,

Thank you for your updated ACHA for 6 John Street Berrys Bay. The whole study area is of importance to Aboriginal people, for thousands of years the land has been managed and cared for in a cultural manner. The area would have been utilised on daily basis before colonisation. Due to coloniastion and dispersion of our land, it saddens us that the study area has been highly disturbed by the Europeans and from modern construction leaving the land stripped and disturbed with fil. It has been proven time and time again that fil contains Aboriginal objects, for this reason we recommend further monitoring of any works where the ground will be further disturbed even if it is out of context and or not of archaeological potential. Aboriginal people are a continuing culture & one of the oldest cultures in the world and today we thrive as a minority group. For this reason, we also recommend a cultural interpretation plan one that complies with the connecting to country framework within design of your project. We highly recommend this as it is a way moving forward to educate the wider community and a way to pass down culture to our younger generations, teaching them the ways of the our elders and acknowledging the expertise and achievements in a more modern out look .

Our people have a deep connection to the land our mother earth, we care for her as she does for us providing resources, shelter, and a rich environment. There may not be tangible evidence of Aboriginal occupation on this site but, in saying that we must also think of the intangible and aesthetic aspects that comes along with our culture. We have creation and dreaming stories that shape the land, sky, water ways and fire. This knowledge system has been passed down for tens of thousands of years. This should be acknowledged through interpretation and made away to the wider community, we weren't just hunter gatherers or savages we are a civilised society, we follow lore and kinship, we must cancel out the myth of hunter gatherers all together. Moving forward interpretation can be achieved through native landscaping, digital displays, art, design, edible gardens, sky knowledge, sound scape, water features, Aboriginal playgrounds, keeping places and much more.

We look forward to working along side you on this project & we agree to your recommendations.

Kind Regards
Kadibulla Khan

From: Alan Williams <awilliams@emmconsulting.com.au>
Sent: Monday, 15 November 2021 9:57 AM
To: Alan Williams <awilliams@emmconsulting.com.au>
Cc: Pamela Chauvel <pchauvel@emmconsulting.com.au>
Subject: 6 John Street, Berrys Bay - ACHA - review and comment

Dear All,

Thank you for your involvement in EMM's recent Aboriginal cultural heritage assessment (ACHA) of 6 John Street, Berrys Bay. As you will be aware, this is the consideration of potential Aboriginal heritage impacts of a proposed floating dry dock adjacent an existing boat yard in Berrys Bay. We have now completed the draft ACHA report and are seeking input/feedback from your organisation.

In brief, we conclude that no cultural materials were identified, and we do not expect any significant sites to be present within the proposed impact footprint (which primarily consists of some 35 sq m of the seabed in Berrys Bay). Specifically, the most important sites in this region are arguably rockshelters and/or engravings. Our available information from the seabed encompassed within the project footprint does not suggest that such features are present. If present, we suggest that cultural materials would consist of isolated or disparate stone artefacts in disturbed contexts.

Can I please ask your organisation to review the document and provide any input/concerns/issues/comments as soon as possible. In accordance with Heritage NSW guidelines, we provide 28 days to comment on the document, with finalisation proposed on 12 December 2021. However, as previously discussed, this project is currently being contested in the Land and Environment Court, and we have been asked to deliver the document prior to this date. As such the proponent is willing to offer [redacted] to all organisations to prioritise their review and comment of the report were provided by 26 November 2021.

The report can be downloaded from the below folder:

[John Street, Berrys Bay]

I am happy to send a hard copy for anyone that wants one, please just let me know.

Happy to discuss

Thanks
Al

Dr Alan Williams FSA FRSA MAACAI
Associate Director
National Technical Leader, Aboriginal Heritage

Bushfire, Ecology, Heritage and Spatial Solutions

T 02 9493 9500
M 0438 104 740
D 02 9493 9584
Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

I work flexibly. I'm sending you this message now because it's a good time for me, but do not expect you to read, respond or actio

Please consider the environment before printing my email.


Appendix C

Historical aerial photographs




IMAGERY INSIGHT

Historic Aerial Photograph - 1930

LR-02044 Aerial Photograph 1930 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 1943

LR-02044 Aerial Photograph 1943 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 1955

LIR-02044 Aerial Photograph 1943 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 1961

LIR-02044 Aerial Photograph 1961 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 1965

LIR-02044 Aerial Photograph 1965 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 1970

LR-02044 Aerial Photograph 1970 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 1975

LIR-02044 Aerial Photograph 1975 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 1978

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 1986

LR-02044 Aerial Photograph 1986 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 1991

LIR-02044 Aerial Photograph 1986 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 1994

LR-02044 Aerial Photograph 1986 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 2002

LR-02044 Aerial Photograph 2002 20.08.2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 2004

LIR-02044 Aerial Photograph 2004 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 2007

LR-02044 Aerial Photograph 2007 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 2009

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 2012

LIR-02044 Aerial Photograph 2012 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 2015

LR-02044 Aerial Photograph 2012 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

IMAGERY INSIGHT

Historic Aerial Photograph - 2018

LR-02044 Aerial Photograph 2012 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Historic Aerial Photograph - 2021

LR-02044 Aerial Photograph 2021 20 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 200m

Land Insight

Appendix D

Archaeological information

D.1 Extensive report

AHIMS Web Services (AWS)

Extensive search - Site list report

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2192	Split Roof Cave;	AGD	56	332760	6254430	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1369	Gore Cove;Wollstonecraft;	AGD	56	332768	6254203	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0026	Whale Rock (Balls Head)	GDA	56	332969	6253770	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	D Earle,Michael Guider,D Lautrec,Mr.Phil Hunt,Aboriginal Heritage Office					**Permits**	2885	
45-6-0630	Berry Bay Balls Head Reserve; Campbells Cave	GDA	56	333224	6253410	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	**Recorders**	W.D Campbell,Michael Guider,Mr.Phil Hunt,Aboriginal Heritage Office					**Permits**		
45-6-1267	Balls Head Reserve	GDA	56	333294	6253330	Open site	Valid	Shell : -, Artefact : -	Midden	1809
	Contact	**Recorders**	Val Attenbrow,Michael Guider,Aboriginal Heritage Office					**Permits**		
45-6-3762	Harrington IFS01	GDA	56	334178	6251888	Open site	Destroyed	Artefact : 1		
	Contact	**Recorders**	AMAC Group P/L,Mr.Benjamin Streat					**Permits**		
45-6-2168	RSYS midden;	AGD	56	335190	6253050	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-3077	Adderstone Shelter 1 NSC-081	GDA	56	334895	6253940	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-1041	Crows Nest;	AGD	56	332034	6254371	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Mr.R Taplin					**Permits**		
45-6-2072	Iron works cave;Dalton's Iron Store;(duplicate copy of 45-6-2223)	AGD	56	332050	6253610	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	1809
	Contact	**Recorders**	Val Attenbrow,Michael Guider,Mr.Scott Mann					**Permits**		
45-6-1511	Berry Island 5;	AGD	56	332300	6253900	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Tranby College					**Permits**		
45-6-3873	Glenview Shelter 2 LCC091	GDA	56	332394	6255130	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	**Recorders**	Mr.Phil Hunt					**Permits**		
45-6-2266	Gore Cove 6;Wollstonecraft;	AGD	56	332340	6254550	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-2966	Balls Head shelter NSC-073	GDA	56	332879	6253500	Open site	Valid	Potential Archaeological Deposit (PAD) : -, Shell : -		
	Contact	**Recorders**	Mr.Phil Hunt,Mr.Phil Hunt,Aboriginal Heritage Office					**Permits**		

Report generated by AHIMS Web Service on 06/09/2021 for Pamela Chauvel for the following area at Datum :GDA, Zone : 56, Eastings : 331470.0 - 335470.0, Northings : 6251850.0 - 6255850.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 105

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2193	Honeycomb Hole Cave;	AGD	56	332760	6254430	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-1957	Goat Island Cave;	AGD	56	333010	6252710	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-1237	Yarra Bay;Captain Phillip Monument;	GDA	56	333294	6253330	Open site	Valid	Shell : -, Artefact : -	Midden	274,102147
	Contact	Recorders	Unknown Author,Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-1939	MSB Tower;	GDA	56	333640	6252227	Open site	Destroyed	Art (Pigment or Engraved) : -	Rock Engraving	102763
	Contact	Recorders	Michael Guider					Permits		
45-6-3678	Darling Walk Midden	GDA	56	333600	6255000	Open site	Valid	Aboriginal Resource and Gathering : 1, Shell : 1		
	Contact	Recorders	Comber Consultants Pty Limited,Ms.Jillian Comber					Permits		
45-6-0825	Myrtle Street	AGD	56	334036	6254867	Open site	Not a Site	Art (Pigment or Engraved) : -	Not an Aboriginal Site	
	Contact	Recorders	Australian Museum					Permits		
45-6-2993	Greenwich Path 2 LCC 018	GDA	56	331554	6254060	Open site	Valid	Shell : -		
	Contact	Recorders	Aboriginal Heritage Office					Permits		
45-6-2262	Gore Cove 1;Greenwich;	AGD	56	332160	6254540	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-2968	Berry Island 12 NSC-076	GDA	56	332384	6254230	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-2167	Manhole;	AGD	56	331650	6254100	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	1809
	Contact	Recorders	Val Attenbrow					Permits		
45-6-3589	Gore Creek 12 Hand Stencil - LLC 115	GDA	56	331750	6255140	Closed site	Valid	Art (Pigment or Engraved) : 1		
	Contact	Recorders	Mr.Phil Hunt					Permits		
45-6-2101	Nameless third visit cave / Gore ck;reserve 2;	AGD	56	331750	6255050	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Val Attenbrow					Permits		
45-6-3047	Badangi Reserve Shelter NSC 077	GDA	56	332724	6254310	Closed site	Valid	Shell : -		
	Contact	Recorders	Aboriginal Heritage Office					Permits		
45-6-2191	WB6 Cave;	AGD	56	332710	6254460	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-1232	Balls Head Unbelievable Cave	GDA	56	332839	6253390	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : E210732_5km

Client Service ID : 619845

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	Recorders	Michael Guider,D Lautrec,Aboriginal Heritage Office					Permits		
45-6-0635	Neutral Bay Ben Boyd Rd	GDA	56	335034	6254650	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	Recorders	Michael Guider,Aboriginal Heritage Office					Permits		
45-6-1615	Bennelong Point	AGD	56	334800	6252100	Open site	Destroyed	Shell : -, Artefact : -	Midden	102763
	Contact	Recorders	ASRSYS					Permits		
45-6-3091	Bushland Park 1 LCC095	GDA	56	331470	6255830	Open site	Valid	Potential Archaeological Deposit (PAD) : 1		
	Contact	Recorders	Aboriginal Heritage Office					Permits		
45-6-0264	Berry Island;Gore Cove/Crows Nest;	AGD	56	332250	6253920	Open site	Valid	Grinding Groove : -, Art (Pigment or Engraved) : -	Axe Grinding Groove,Rock Engraving	102201
	Contact	Recorders	Michael Guider					Permits		
45-6-1513	Berry Island 2;	AGD	56	332250	6254050	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	B Longbottom					Permits		
45-6-2962	Gore Cove 9 NSC-065	GDA	56	332379	6254590	Open site	Valid	Shell : -		
	Contact	Recorders	Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-0030	Dawes Point;Dawes Point Park;	GDA	56	334345	6252534	Open site	Destroyed	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	Recorders	Michael Guider					Permits		
45-6-2102	Sandy crumble Gore creek;reserve 5;	AGD	56	331660	6255020	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Val Attenbrow					Permits		
45-6-0269	Shell Park;Sanded Fire Cave;Greenwich;	AGD	56	331680	6254120	Closed site	Valid	Art (Pigment or Engraved) : -, Shell : -, Artefact : -	Shelter with Art,Shelter with Midden	1809
	Contact	Recorders	Michael Guider					Permits		
45-6-1042	Bay Street Park;Crows Nest;	AGD	56	331790	6254580	Open site	Valid	Shell : -, Artefact : -	Midden	1809
	Contact	Recorders	Val Attenbrow					Permits		
45-6-1039	Crows Nest;	AGD	56	331852	6254276	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	ASRSYS					Permits		
45-6-2264	Gore Cove 3;Greenwich;	AGD	56	332310	6254660	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-2965	Milray Shelter NSC-072	GDA	56	332434	6254650	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	Recorders	David Watts,Aboriginal Heritage Office					Permits		

Report generated by AHIMS Web Service on 06/09/2021 for Pamela Chauvel for the following area at Datum :GDA, Zone : 56, Eastings : 331470.0 - 335470.0, Northings : 6251850.0 - 6255850.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 105

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : E210732_5km

Client Service ID : 619845

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2186	WB1 Cave;	AGD	56	332640	6254160	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-2190	WB5 Cave;	AGD	56	332660	6254380	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-2764	Caltex 1	AGD	56	332845	6253710	Closed site	Valid	Shell : -		
	Contact T Russell	Recorders	Mary Dallas Consulting Archaeologists (MDCA),Mr.Phil Hunt,Aboriginal Heritage O					Permits		
45-6-2181	Waverton Park Cave;	AGD	56	333130	6253820	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider,Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-2147	Ivy Cliff (Waverton Park)	AGD	56	333330	6253860	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1809
	Contact	Recorders	Val Attenbrow,D Earle					Permits		
45-6-1901	Long Nose Point 1.;Birchgrove;9 Numa Street;	AGD	56	332000	6253030	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-2287	Yerroulbin Cave	AGD	56	332010	6253210	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-1512	Berry Island 3	AGD	56	332220	6254000	Open site	Valid	Burial : -, Shell : -, Artefact : -	Burial/s,Midden	97786
	Contact	Recorders	Michael Guider,Tranby College					Permits		
45-6-1268	Balls Head Reserve;	AGD	56	333800	6253060	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	Michael Guider,Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-0891	Balls Head Reserve 5 Hands Cave	GDA	56	333139	6253455	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Midden	
	Contact	Recorders	Michael Guider,D Lautrec,Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-2964	Milray Midden 1 NSC-071	GDA	56	332424	6254650	Open site	Valid	Shell : -		
	Contact	Recorders	Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-3880	Glenview Shelter 1 (LCC0110)	GDA	56	332535	6255195	Open site	Valid	Art (Pigment or Engraved) : 1		
	Contact	Recorders	Mr.Phil Hunt					Permits		
45-6-2188	WB3 Cave;	AGD	56	332640	6254180	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	Michael Guider					Permits		
45-6-2189	WB4 Cave;	AGD	56	332640	6254190	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	Recorders	Michael Guider					Permits		

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2180	Quarantine Cave;Waverton;	AGD	56	332850	6253335	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider,Mr.Phil Hunt,Aboriginal Heritage Office					**Permits**		
45-6-1269	Waverton Park Waverton	GDA	56	333384	6254040	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Unknown Author,Aboriginal Heritage Office					**Permits**		
45-6-1271	Lavender Bay Milsons Point	GDA	56	334339	6253635	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider,Aboriginal Heritage Office					**Permits**		
45-6-0760	Neutral Bay;	GDA	56	335029	6254545	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Michael Guider,Aboriginal Heritage Office					**Permits**		
45-6-3076	Adderstone Shelter 2 NSC-082	GDA	56	334885	6253945	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-0270	Upper Cliff Road;Northwood;	GDA	56	331504	6255540	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-3881	Glenview Shelter 3 (LCC0111)	GDA	56	332380	6255045	Open site	Valid	Art (Pigment or Engraved) : 1		
	Contact	**Recorders**	Mr.Phil Hunt					**Permits**		
45-6-2252	Gore Creek 10;	AGD	56	331490	6254910	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1037	Crows Nest;Greenwich Warf Cave;	AGD	56	331570	6253720	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Midden	1809
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-2146	Gore Creek Reserve 7 Gore CReek Reserve	AGD	56	331660	6254790	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1809,1911
	Contact	**Recorders**	Val Attenbrow					**Permits**		
45-6-1043	Crows Nest;Wharf Garden Cave;Bay St Wharf Cave;	AGD	56	331740	6254580	Closed site	Valid	Shell : -, Artefact : -, Burial : -	Burial/s,Shelter with Midden	1809
	Contact	**Recorders**	Val Attenbrow,Michael Guider					**Permits**		
45-6-1510	Berry Island 9;Wollstonecraft;	AGD	56	332310	6253950	Closed site	Valid	Artefact : -	Shelter with Deposit	
	Contact	**Recorders**	Michael Guider,L Bostock					**Permits**		
45-6-1509	Berrys Island;Wollstonecraft;	AGD	56	332360	6253980	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	D Morrissey					**Permits**		
45-6-3103	BADANGI RESERVE SHELTER 1	GDA	56	332620	6254120	Open site	Valid	Shell : 1		
	Contact	**Recorders**	Aboriginal Heritage Office,Ms.Viki Gordon					**Permits**		
45-6-2187	WB2 Cave;	AGD	56	332640	6254170	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2961	Balls Head Midden NSC-058	GDA	56	333239	6253395	Open site	Valid	Shell : -		
	Contact	Recorders	Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-1270	Waverton Park Waverton	GDA	56	333254	6254040	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	Unknown Author,Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-0906	Waverton Park	AGD	56	333320	6253813	Closed site	Valid	Art (Pigment or Engraved) : -	Shelter with Art	
	Contact	Recorders	Michael Guider					Permits		
45-6-3882	Gore Creek 11 (LCC 003)	GDA	56	331725	6255260	Open site	Valid	Shell : -		
	Contact	Recorders	Mr.Phil Hunt					Permits		
45-6-2967	5 Hands Shelter B NSC-074	GDA	56	332134	6253455	Open site	Valid	Shell : -		
	Contact	Recorders	Mr.Phil Hunt,Mr.Phil Hunt,Aboriginal Heritage Office					Permits		
45-6-2672	Shed Cave - Birchgrove	AGD	56	332125	6253425	Closed site	Valid	Habitation Structure : 1		
	Contact	Recorders	Michael Guider					Permits		
45-6-2267	Gore Cove 8 Wollstonecraft	GDA	56	332369	6254600	Open site	Valid	Artefact : -	Open Camp Site	
	Contact	Recorders	Michael Guider,Aboriginal Heritage Office					Permits		
45-6-2152	Gore Creek Reserve 6 Gore Creek Reserve	AGD	56	331580	6255040	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1809,1911
	Contact	Recorders	Val Attenbrow					Permits		
45-6-2096	Choked up cave /Gore ck reserve 1;	AGD	56	331780	6255060	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1809
	Contact	Recorders	Val Attenbrow,K Cutmore					Permits		
45-6-1266	Berry Island;	AGD	56	332300	6254000	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	Recorders	ASRSYS					Permits		
45-6-3166	BERRY ISLAND 13. NSC090	GDA	56	332459	6254138	Open site	Valid	Artefact : -		
	Contact	Recorders	Mr.Phil Hunt					Permits		
45-6-2762	Coal Loader 1 (Balls Head)	AGD	56	332820	6253580	Closed site	Valid	Shell : -, Non-Human Bone and Organic Material : -		
	Contact T Russell	Recorders	Mary Dallas Consulting Archaeologists (MDCA),Mr.Phil Hunt,Aboriginal Heritage O					Permits		
45-6-0519	Moores Wharf	AGD	56	333600	6252200	Open site	Valid	Artefact : -	Open Camp Site	808
	Contact	Recorders	R Lampert					Permits		
45-6-1809	Birchgrove	AGD	56	331380	6252700	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Midden,Shelter with Art	
	Contact	Recorders	Michael Guider					Permits		
45-6-0628	Balls Head Reserve Waverton	GDA	56	333129	6253420	Open site	Valid	Art (Pigment or Engraved) : -	Rock Engraving	
	Contact	Recorders	Michael Guider,D Lautrec,Mr.Phil Hunt,Mr.R Taplin,Aboriginal Heritage Office					Permits		

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2251	Gore Creek 9;	AGD	56	331510	6254990	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-3883	Gore Creek 13 (LCC 0116)	GDA	56	331750	6255310	Open site	Valid	Potential Archaeological Deposit (PAD) : -		
	Contact	**Recorders**	Mr.Phil Hunt					**Permits**		
45-6-0279	Greenwich;Gore Creek Reserve;Unpainted stair ladder cave;	AGD	56	331720	6255070	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1809
	Contact	**Recorders**	Val Attenbrow,Michael Guider,J Mecader,D Munro					**Permits**		
45-6-3341	Greenwich PS KL 01	GDA	56	331832	6255700	Closed site	Valid	Art (Pigment or Engraved) : -		
	Contact	**Recorders**	Ms.Vanessa Hardy,Cultural Heritage Connections Pty Ltd					**Permits**		
45-6-0268	Berry Island;	AGD	56	332320	6254030	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-1265	Berry Island;Berry Island 6;	AGD	56	332350	6253800	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider,K Murphy					**Permits**		
45-6-2265	Gore Cove 5;Greenwich;	AGD	56	332380	6254680	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-2763	Caltex 2	AGD	56	332840	6253690	Closed site	Valid	Shell : -		
	Contact T Russell	**Recorders**	Mary Dallas Consulting Archaeologists (MDCA)					**Permits**		
45-6-0027	Balls Head Berry Island	GDA	56	333214	6253390	Closed site	Valid	Art (Pigment or Engraved) : -, Shell : -, Artefact : -, Burial : -	Burial/s,Shelter with Art,Shelter with Midden	
	Contact	**Recorders**	Michael Guider,Mr.Phil Hunt,Aboriginal Heritage Office					**Permits**		
45-6-0811	Goat Island;Parramatta River;	AGD	56	333150	6252650	Open site	Valid	Artefact : -, Shell : -	Midden,Open Camp Site	
	Contact	**Recorders**	Elizabeth Rich					**Permits**		
45-6-2055	Lavender bay 2;	AGD	56	333890	6253550	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	1809
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-2250	Gore Creek 8;	AGD	56	331610	6255050	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-2263	Gore Cove 2;Greenwich;	AGD	56	332230	6254610	Closed site	Valid	Shell : -, Artefact : -	Shelter with Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
45-6-2382	Goat Island 2	AGD	56	333100	6252480	Closed site	Valid	Artefact : -, Shell : -, Aboriginal Ceremony and Dreaming : -		
	Contact	**Recorders**	Klim Gollan					**Permits**		
45-6-3049	Greenwich Path 3 LCC092	GDA	56	331579	6254015	Open site	Valid	Shell : -		
	Contact	**Recorders**	Aboriginal Heritage Office					**Permits**		
45-6-1038	Crows Nest;Greenwich Path;	AGD	56	331610	6254050	Open site	Valid	Shell : -, Artefact : -	Midden	1809
	Contact	**Recorders**	ASRSYS					**Permits**		
45-6-0280	Greenwich;Bicycle Tyre Cave;Gore Creek Reserve;Hole Cave;Gore creek 7;	AGD	56	331690	6255000	Closed site	Valid	Shell : -, Artefact : -, Art (Pigment or Engraved) : -	Shelter with Art,Shelter with Midden	1809
	Contact	**Recorders**	Val Attenbrow,Michael Guider,Mr.R Taplin					**Permits**		
45-6-2249	Berry Island 11;	AGD	56	332310	6253990	Open site	Valid	Shell : -, Artefact : -	Midden,Open Camp Site	
	Contact	**Recorders**	Michael Guider					**Permits**		
45-6-2273	Gore Cove 4;	GDA	56	332424	6254820	Open site	Valid	Shell : -, Artefact : -	Midden	
	Contact	**Recorders**	Michael Guider					**Permits**		

**** Site Status**

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AH MS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

D.2 AHIMS site feature data

i Aboriginal sites

In the AHIMS database, Aboriginal sites are defined in several ways. At the simplest level, sites are recorded as 'closed' or 'open'. Closed sites are associated with rockshelters and include other evidence of Aboriginal occupation that may be present, such as areas where subsurface Aboriginal objects may occur within the shelter ('potential archaeological deposit' (PAD)), faunal remains, and art on the shelter walls (paintings/engravings). Open sites are broadly defined and encompass all other types of Aboriginal site features that are located in areas where there is no rockshelter. The most common open site features found generally include artefacts, grinding grooves, art, culturally modified trees, and shell deposits (middens) (OEH 2012). The presence or absence of stone artefacts is often a defining factor in site identification, with almost every site likely to have at least some associated artefacts, as discard or loss of this most ubiquitous and practically indestructible marker of past Aboriginal visitation.

Any one site (or group of linked sites described as a 'complex') can contain several different site features. For example, a shelter may have art on the walls, artefacts on the floor surface or outside the shelter, and be predicted to contain faunal remains and further artefacts in the accumulated deposit inside.

A description of terms used to describe different site features known to occur in the vicinity of the study area is provided in Table D.1. Similarly, there may be places of contemporary significance to Aboriginal people in the region and that will require consultation with this community to identify.

Table D.1 Aboriginal site feature definitions (OEH 2012)

Site feature	Definition
Aboriginal ceremony and Dreaming	Previously referred to as mythological sites these are spiritual/story places where no physical evidence of previous use of the place may occur, eg natural unmodified landscape features, ceremonial or spiritual areas, men's/women's sites, dreaming (creation) tracks, marriage places, etc.
Artefacts	Objects such as stone tools, and associated flaked material, spears, manuports, grindstones, discarded stone flakes, modified glass or shell demonstrating evidence of use of the area by Aboriginal people.
Burials	A traditional or contemporary (post-contact) burial of an Aboriginal person, which may occur outside designated cemeteries and may not be marked, eg, in caves, marked by stone cairns, in sand areas, along creek banks, etc.
Fish trap	A modified area on watercourses where fish were trapped for short-term storage and gathering.
Habitation structure	Structures constructed by Aboriginal people for short- or long-term shelter. More temporary structures are commonly preserved away from the NSW coastline, may include historic camps of contemporary significance. Smaller structures may make use of natural materials such as branches, logs and bark sheets or manufactured materials such as corrugated iron to form shelters. Archaeological remains of a former structure such as chimney/fireplace, raised earth building platform, excavated pits, rubble mounds, etc.
Modified tree (carved or scarred)	Trees which show the marks of modification as a result of cutting of bark from the trunk for use in the production of shields, canoes, boomerangs, burials shrouds, for medicinal purposes, foot holds etc., or alternately intentional carving of the heartwood of the tree to form a permanent marker to indicate ceremonial use/significance of a nearby area, again these carvings may also act as territorial or burial markers.
Potential archaeological deposit (PAD)	An area where Aboriginal objects may occur below the ground surface. The term 'potential archaeological deposit' was first applied in Sydney regional archaeology in the 1980s, and referred to rockshelters that were large enough and contained enough accumulated deposit to allow archaeologists to predict that subsurface cultural material was likely to be present. Since then the term has come to include open sites where the same prediction can be made.

Table D.1 Aboriginal site feature definitions (OEH 2012)

Site feature	Definition
Restricted	Site information contained in the Aboriginal Heritage Information Management System is available only to certain authorised groups of people, as requested by the Aboriginal community. Detailed information may not be available in search reports.
Shell	An accumulation or deposit of shellfish from beach, estuarine, lacustrine or riverine species resulting from Aboriginal gathering or consumption. Usually found in deposits previously referred to as shell middens. Must be found in association with other objects like stone tools, fish bones, charcoal, fireplaces/hearths, and burials. Will vary greatly in size and composition.
Stone quarry	Usually a source of good quality stone which is quarried and used for the production of stone tools.

ii Stone artefacts

Aboriginal stone artefacts are an important source of archaeological information because stone is preserved for long periods of time, whereas organic materials (eg bone, shell, wood, etc) often decay. Stone artefacts provide valuable information about technology, economy, cultural change through time and settlement patterning. Stone has also been used for understanding how old a site is (a type of 'relative' dating) where direct chronological methods cannot be employed. A technological sequence for stone artefacts for the region was first described in the late 1940s by McCarthy (1948) and has since been refined over time into the 'Eastern Regional Sequence' (Hiscock and Attenbrow 1998; 2002).

Table D.2 Summary of key attributes in the Eastern Regional Sequence for the Sydney Region (Attenbrow 2002: 153-158)

Phase	Time period	Attributes
Capertian >5,000 years ago	Pleistocene: pre-Glacial to post-Glacial 60,000 - 10,000 years ago	Tools (stone tools with retouch and some usewear). Flakes produced by free-hand percussion and some limited bipolar flaking. Retouched flakes on average are larger than Bondaian phased retouched artefacts. Principal raw material local tuff/chert but other types also observed including silcrete, quartz and basalt.
	Early Holocene period 10,000 - 5,000 years ago	Stone tools of previous period continued. Small flakes are backed forming Bondi Points which appear in limited numbers in some areas (although not yet confirmed in Hunter Valley, they are present in Upper Mangrove Creek at 8500 years ago and Capertee 3 at 7500 BP).

Table D.2 Summary of key attributes in the Eastern Regional Sequence for the Sydney Region (Attenbrow 2002: 153-158)

Phase		Time period	Attributes
Bondaian 5,000 years ago to 1788 AD	Early Bondaian c.5,000 - c.3,000 years ago	Late Holocene period 5,000 - 1,600 years ago	Backed artefacts often the characteristic tool-type. Implements and associated debitage made (including Bondi Points, geometric microliths, Elouera and other retouched flakes) are much smaller in average size and weight than those from earlier assemblages. Silcrete, chert and tuff and other fine-grained siliceous material were the preferred materials for backed artefacts. Elouera and ground implements (such as hatchets) appear c.4,500 - 4,000 years ago.
	Middle Bondaian, c.3,000 - c.1,600 years ago		c.3,500 - 3,000 years ago; backed artefacts and thumbnail scrapers increasingly used and produced across the region and higher numbers of backed artefacts found in coastal locations in particular. Increasing use of the bipolar percussive technique over free-hand percussion over time (especially from 3,000 years ago to 1788 AD).
	Late Bondaian c.1,600 years ago to 1,788 AD		Elouera increase in number. Plain. Along coast and in sandstone country fewer Bondi Points and geometric microliths were used. Unmodified flakes, mainly of quartz, often produced by the bipolar technique (implements of bone and shell some probably as piercing, cutting and scraping components in tools and weapons found more often, but due to non-preservation in earlier levels). In Cumberland Plain, tool kit continued as earlier (with backed artefacts until at least 600 years ago) in places where silcrete and chert/tuff were the dominant raw materials. In these places quartz was a minor component and bipolar technique used infrequently. Change around 650 years ago with few backed artefacts being produced. Increase in ground edged hatchets from c. 1,000 years ago). Archaeological evidence of processing of plant foods from (c.1,150 years ago) again due to non-preservation in earlier levels. Fishing with shell hook & line from c.900 years ago.

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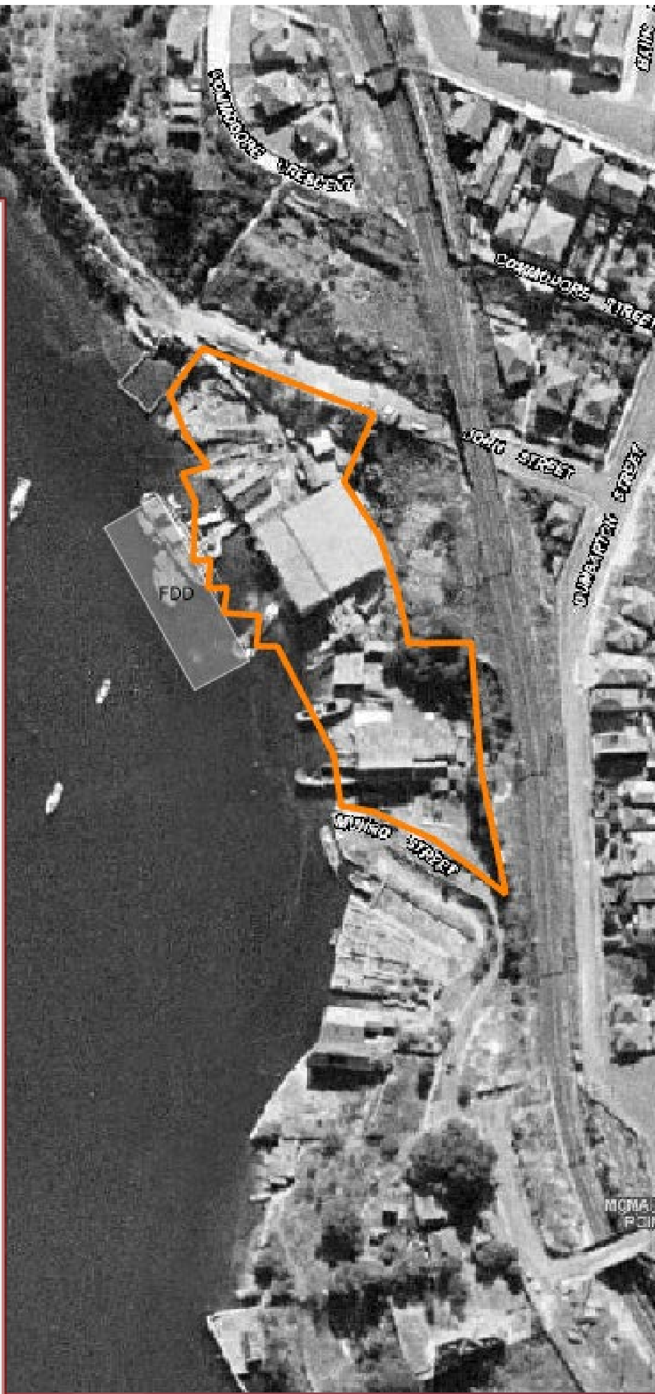

Floating Dry Dock – Noakes Boat & Shipyard – Berrys Bay

Historical Archaeological Assessment

29 NOVEMBER 2021

Report to: Stannards Marine Pty Ltd

Version: D.2021

ABN 96 109 670 573 | 76 EDWIN STREET NORTH | CROYDON, NSW, 2132 | T 02 9799 6000 | F 02 9799 6011 www.comber.net.au

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Traditional Custodians of the land that we live and work on.

We pay our respects to the Elders, past, present and emerging, for they hold the memories, the traditions, the culture and hopes of Aboriginal people.

We honour and acknowledge the stories, traditions and living cultures of Aboriginal and Torres Strait Islander peoples on this land and commit to building a brighter future together.

A better understanding and respect for Aboriginal and Torres Strait Islander cultures develops an enriched appreciation of Australia's cultural heritage and can lead to reconciliation. This is essential to the maturity of Australia as a nation and fundamental to the development of an Australian identity.

DOCUMENT CONTROL

PROJECT NO: SM421 **STATUS**: FINAL

Rev	Date	Prepared by	Edited by	Approved by
A	29/10/2021	David Nutley Master of Built Environment Master of Marit Archaeology Grad. Dip Marit. Archaeology Grad Dip Aboriginal Ed	Dr Jillian Comber	Dr Jillian Comber
B	23/11/2021	David Nutley	Dr Jillian Comber	Dr Jillian Comber
C	24/11/2021	David Nutley	Dr Jillian Comber	Dr Jillian Comber
d	29/11/2021	David Nutley	Dr Jillian Comber	Dr Jillian Comber

INTEGRATED MANAGEMENT SYSTEM

Comber Consultants has a certified integrated management system to the requirements of ISO 9001 (quality), ISO 14001 (environmental) and ISO 45001 (health and safety). This is your assurance that Comber Consultants is committed to excellence, quality, and best practice and that we are regularly subjected to rigorous, independent assessments to ensure that we comply with stringent Management System Standards.

ECAAS ISO 9001 CERTIFIED QUALITY MANAGEMENT | ECAAS ISO 45001 CERTIFIED SAFETY MANAGEMENT | ECAAS ISO 14001 CERTIFIED ENVIRONMENTAL MANAGEMENT | JAS-ANZ

COVER PHOTOGRAPH

1943 aerial photograph showing the study area edged in orange.

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EXECUTIVE SUMMARY

Stannards Marine Pty Ltd, (the applicant), is seeking to develop berthing facilities for a floating dry dock (FDD) at its wharves on the western side of Berrys Bay. Noakes Group Pty Ltd is the tenant and would be operating the facility. A requirement of The Secretary's Environmental Assessment Requirements (SEARS 1166, 31 August 2017), includes the requirement for an historical archaeological assessment in accordance with the then Office of Environment and Heritage guidelines (now Heritage NSW).

Comber Consultants were engaged to undertake this historical archaeological assessment and to provide appropriate management recommendations in accordance with the SEARS requirement. This report assesses the impact of the proposal on the terrestrial component of Noakes Boat and Shipyard as described in the legal description of the property in Section 1.2, which contains a concrete slab and brick paving over reclamation and fill.

The archaeological potential of the study area has been assessed as low and that evidence would be below the concrete slab and brick paving. No archaeological features or relics were recorded on the hardstand. The proposal does not include any works that will penetrate the concrete and brick hardstand. Therefore, there is no potential for any adverse impacts on any relics or features that may be present beneath that slab.

However, if any previously unrecorded relics are unexpectedly uncovered, works must stop in the vicinity of that relic and a suitably qualified and experienced archaeologist must be engaged to assess the significance of the relic and to provide management recommendations.

A separate maritime archaeological assessment of FDD impacts on the adjacent marine licenced area has been prepared in accordance with the requirements of the SEARS (Comber Consultants 2021).

1 INTRODUCTION

1.1 Background

Stannards Marine Pty Ltd, (the applicant), is seeking to develop berthing facilities for a floating dry dock (FDD) at its wharves on the western side of Berrys Bay. Noakes Group Pty Ltd is the tenant and would be operating the facility. A requirement of The Secretary's Environmental Assessment Requirements (SEARS 1166, 31 August 2017), includes the requirement for an historical archaeological assessment in accordance with the then Office of Environment and Heritage guidelines (now Heritage NSW).

Comber Consultants were engaged to undertake this historical archaeological assessment and to provide appropriate management recommendations in accordance with the SEARS requirement. This report assesses the impact of the proposal on the terrestrial component of Noakes Boat and Shipyard as described in the legal description of the property in Section 1.2.

A separate maritime archaeological assessment was undertaken by Comber Consultants for the marine licenced component of the area (Comber 2021). That report assessed potential impacts arising from the proposed installation of the FDD and removal of portions of the 1993 wharves.

1.2 Location

The study area, which is accessed via 6 John Street, McMahons Point, is within Berrys Bay and on the western side of McMahons Point (Figure 1).

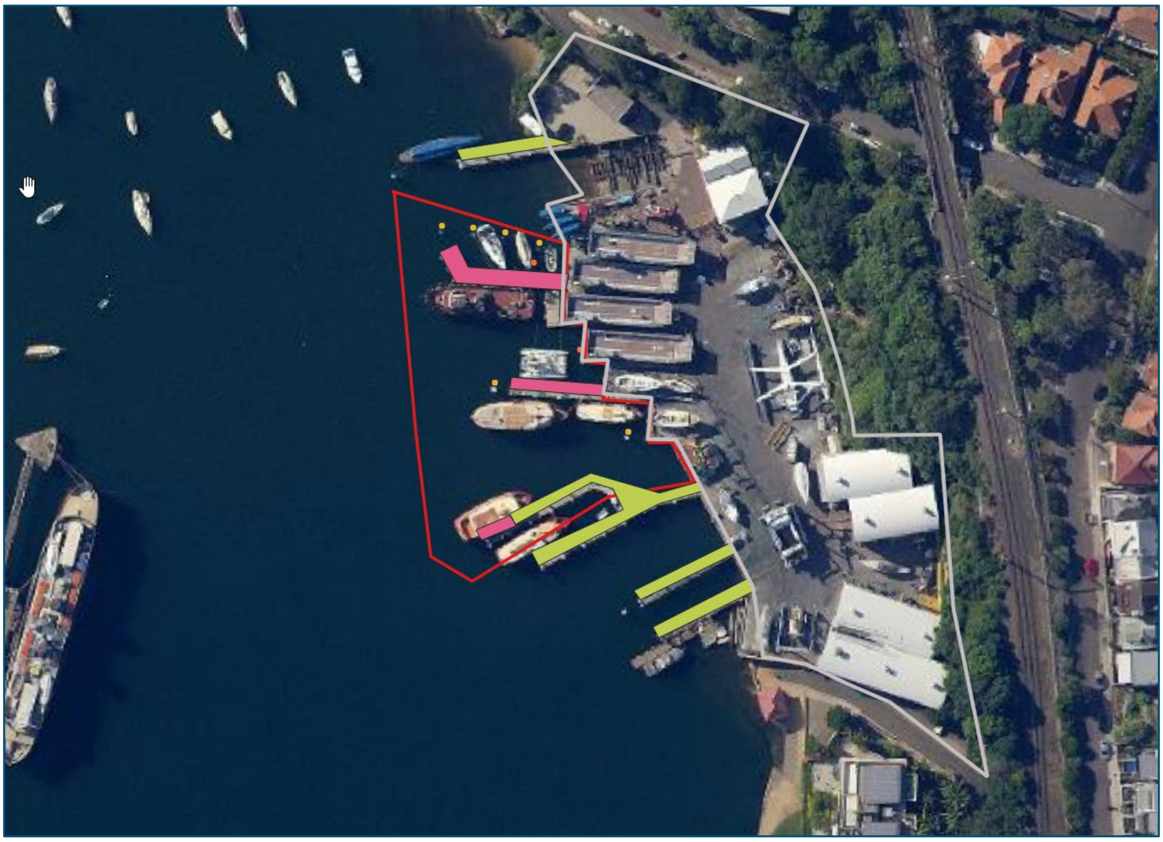


Figure 1: Location map: white polygon is the land based historical archaeological study area. Red polygon location of area covered by the maritime archaeological assessment.

The legal description of the site is (Figure 2):

1) Lot 987 DP752067
2) Lot 2 DP 77853
3) Lot 1 DP 127195
4) Lot 1 DP 449731
5) Lot A DP 420377
6) Lot B DP 420377
7) Lot 1 DP 179730
8) Lot 2 DP 179730
9) Lot 3 DP 179730
10) Lot 4 DP 179730

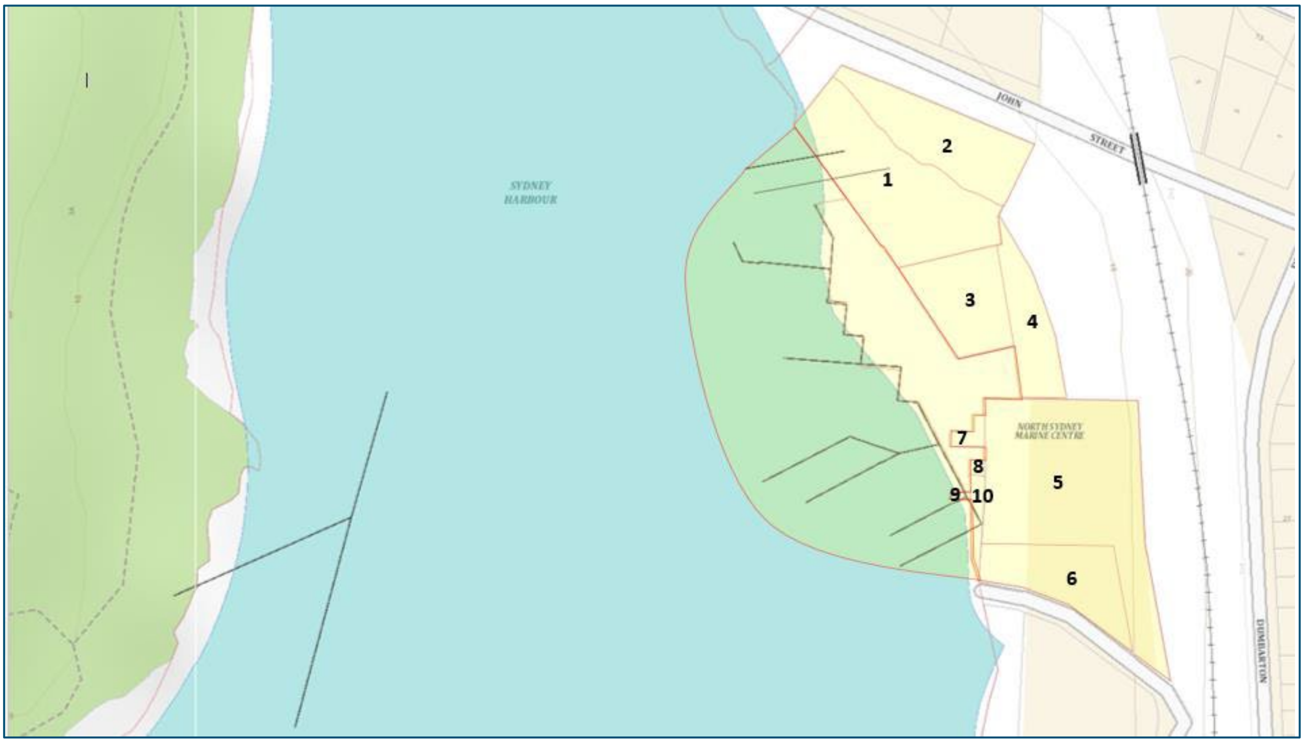


Figure 2: Location of the lots that comprise the landward component of Noakes Boat & Shipyard

2 LEGISLATION

2.1 *Heritage Act* 1977

State Heritage Register
s31 of the NSW *Heritage Act 1977* provides for the establishment and maintenance of the State Heritage Register by the Heritage Council. s32 allows the Minister to direct the listing of an item which is of State heritage significance and sets out the procedure for listing an item.

Under s57 of the Heritage Act a person must not "demolish, despoil, excavate, alter, move, damage or destroy" an item listed on the State Heritage Register without a permit under s60 of the Act.

Noakes Boat and Shipyard is not listed on the State Heritage Register.

Relics Provisions NSW Heritage Act, 1977
Division 9: Section 139, 140–146 - Relics Provisions Under Section 139:
A person must not disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit.

A person must not disturb or excavate any land on which the person has discovered or exposed a relic except in accordance with an excavation permit.

A relic is described under the Act as:

..any deposit, object or material evidence –

(a) which relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement; and
(b) is of State or local heritage significance.

Any item identified as a relic cannot be disturbed without an excavation permit, under s140 of the Act. An excavation permit forms an approval from the Heritage Council for permission to disturb a relic.

However, as no disturbance is proposed to the hardstand of Noakes Boat and Shipyard and no relics will be disturbed, a Section 140 permit will not be required.

2.2 Environmental Planning & Assessment Act 1979

SEARS 1166 were issued on 31st August 2017. As a key issue, the SEARS requires an historical archaeological assessment to be undertaken in accordance with the then Office of Environment and Heritage (now Heritage NSW) guidelines. This historical archaeological report has been written to satisfy the SEARS requirement and is written in accordance with:

- *Archaeological Assessments Guidelines* (Heritage Office and Department of Urban Affairs and Planning 1996)
- *Historical Archaeological Sites - Investigation and Conservation Guidelines* (NSW Department of Planning 1993)
- *Historical Archaeology Code of Practice,* (Heritage Office, Department of Planning 2006)
- *Assessing Heritage Significance (*NSW Heritage Office 2001).

2.3 North Sydney Council Local Environmental Plan (LEP) 2013

Section 5.10 of the LEP details the provisions for heritage protection. Development Consent is required from North Sydney Council to demolish or alter an item listed on the Heritage Schedule of the LEP, or to demolish or move an Aboriginal object, except if the work is of a minor nature for the maintenance of the item and would not adversely affect the heritage significance of the item.

Noakes Boat & Shipyard is listed in the Environmental Schedule of the LEP, as 'Stannards Bros Shipyard and associated industrial buildings' Item No. I0484 and is protected by the provisions of s5.10 Heritage Conservation.

The objectives of the LEP are:

(1) Objectives

The objectives of this clause are as follows:

(a) to conserve the environmental heritage of North Sydney Council

(b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,

(c) to conserve archaeological sites,

(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.

(2) Requirement for consent

Development consent is required for any of the following:

(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):

(i) a heritage item,

(ii) an Aboriginal object,

(iii) a building, work, relic or tree within a heritage conservation area,

(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,

(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,

(d) disturbing or excavating an Aboriginal place of heritage significance,

(e) erecting a building on land:

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,

(f) subdividing land:

(i) on which a heritage item is located or that is within a heritage conservation area, or

(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.

(3) When consent not required

However, development consent under this clause is not required if:

(a) the applicant has notified the consent authority of the proposed development and the consent authority has advised the applicant in writing before any work is carried out that it is satisfied that the proposed development:

(i) is of a minor nature or is for the maintenance of the heritage item, Aboriginal object, Aboriginal place of heritage significance or archaeological site or a building, work, relic, tree or place within the heritage conservation area, and

(ii) would not adversely affect the heritage significance of the heritage item, Aboriginal object, Aboriginal place, archaeological site or heritage conservation area, or

(b) the development is in a cemetery or burial ground and the proposed development:

(i) is the creation of a new grave or monument, or excavation or disturbance of land for the purpose of conserving or repairing monuments or grave markers, and

(ii) would not cause disturbance to human remains, relics, Aboriginal objects in the form of grave goods, or to an Aboriginal place of heritage significance, or

(c) the development is limited to the removal of a tree or other vegetation that the Council is satisfied is a risk to human life or property, or

(d) the development is exempt development.

(4) Effect of proposed development on heritage significance

The consent authority must, before granting consent under this clause in respect of a heritage item or heritage conservation area, consider the effect of the proposed development on the heritage significance of the item or area concerned. This subclause applies regardless of whether a heritage management document is prepared under subclause (5) or a heritage conservation management plan is submitted under subclause (6).

(5) Heritage assessment

The consent authority may, before granting consent to any development:

(a) on land on which a heritage item is located, or

(b) on land that is within a heritage conservation area, or

(c) on land that is within the vicinity of land referred to in paragraph (a) or (b), require a heritage management document to be prepared that assesses the extent to which the carrying out of the proposed development would affect the heritage significance of the heritage item or heritage conservation area concerned.

(6) Heritage conservation management plans

The consent authority may require, after considering the heritage significance of a heritage item and the extent of change proposed to it, the submission of a heritage conservation management plan before granting consent under this clause.

(7) Archaeological sites

The consent authority must, before granting consent under this clause to the carrying out of development on an archaeological site (other than land listed on the State Heritage Register or to which an interim heritage order under the *Heritage Act 1977* applies):

(a) notify the Heritage Council of its intention to grant consent, and

(b) take into consideration any response received from the Heritage Council within 28 days after the notice is sent.

This report contains an assessment of the impact of the proposal on Item No. I0484 and concludes that there will be no adverse impact on the heritage significance within or in the vicinity of the proposed works.

3 HISTORY

A comprehensive history of the study area and its evolution since the early eighteenth century was included in the Statement of Heritage Impact of Noakes Boat and Shipyard, Berrys Bay (NBRS 2018). That history provides the basis for this assessment and is not repeated in full in this report. Following is a summary history.

The subject property was part of an allotment within the Blues Point Estate, a part of an 80-acre grant to William 'Billy' Blue after whom the southern extremity of McMahons Point, (Blues Point), is named. William Blue, described as possibly being born in Jamaica, played an important role in the subject area's early connection with boating services in Sydney Harbour.

While living at The Rocks, William Blue married Elizabeth, a 30 year old convict, with whom he was to have six children. The youngest of these, John Blue, eventually inherited a portion of his father's estate that included the area now occupied by Noakes Boat & Shipyard. William Blue, with the assistance of his sons, established a fleet of eleven row boat ferries and Macquarie dubbed him 'Commodore'. (Masson 2012:7; Park 2005). John Blue was the youngest of his children. He became an alderman of the Borough of Victoria from 1869 until the 1880s. He was also landlord of the "Old Commodore Inn" in 1850-1866 (NBRS2018:21).

An 1869 map prior to later reclamation work, shows John Street terminating at the bay with two series of steps leading down to the water's edge. This is outside of the northern end of the current boatyard. A stone retaining wall is shown extending along the southern side of John St (Figure 4). (NBRS2018:22-23).

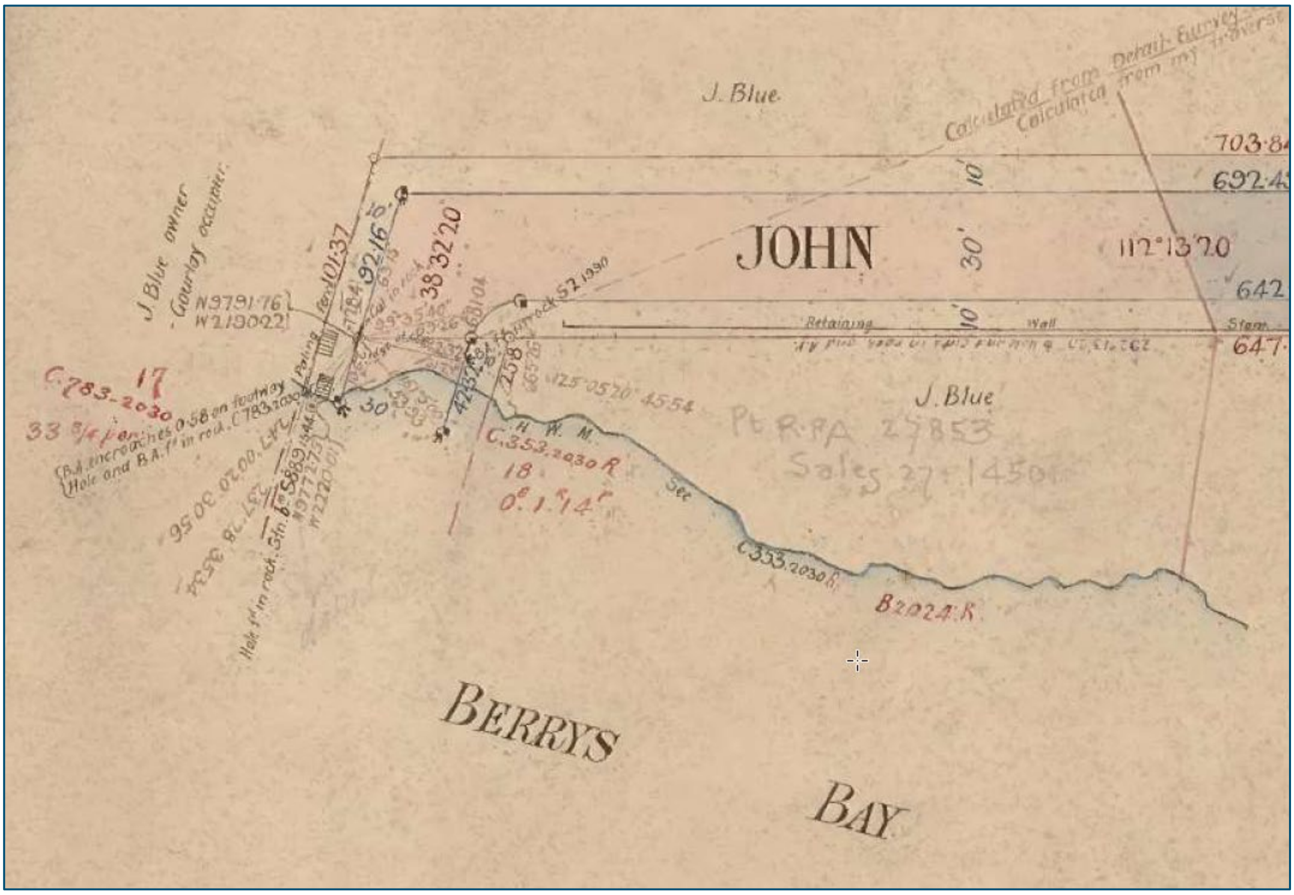


Figure 3: Portion of 1869 Crown Plan showing termination of John St and stone retaining wall (Source: NSW Land & Property Information, Crown Plan S2-1990a)

In 1882, John Blue subdivided and sold the land he had inherited from his father. Further subdivisions occurred in the 1850 and, from the 1870s Berrys Bay developed into a thriving centre of maritime industry. Boatsheds and wharves stretched around the foreshores of Berrys Bay from the tip of Blues Point around the head of the bay to Balls Head. Notable boatbuilders included William Dunn, Walter Ford and William Langford. (NBRS 2018:17)

A 1926 map (Figure 4) shows the original shoreline as well as the reclaimed land behind a concrete seawall. By 1926, this land was owned by W L Chambers and occupied by William Dunn. By 1929, further expansion of reclaimed land had completed the transformation and potential encasement of any archaeological evidence of the former phases of industrial activity on the subject area (Figure 5). The 1929 map also shows a pathway leading to 'Public Baths' at the northern termination of John Street. These baths were removed in the 1980s (Sean Langman, pers comm 22/10.2021). Two boat sheds are shown on the reclaimed land, one at the end of John Street and 'Dunn's Boat Shed' at the southern end of Lot 4.

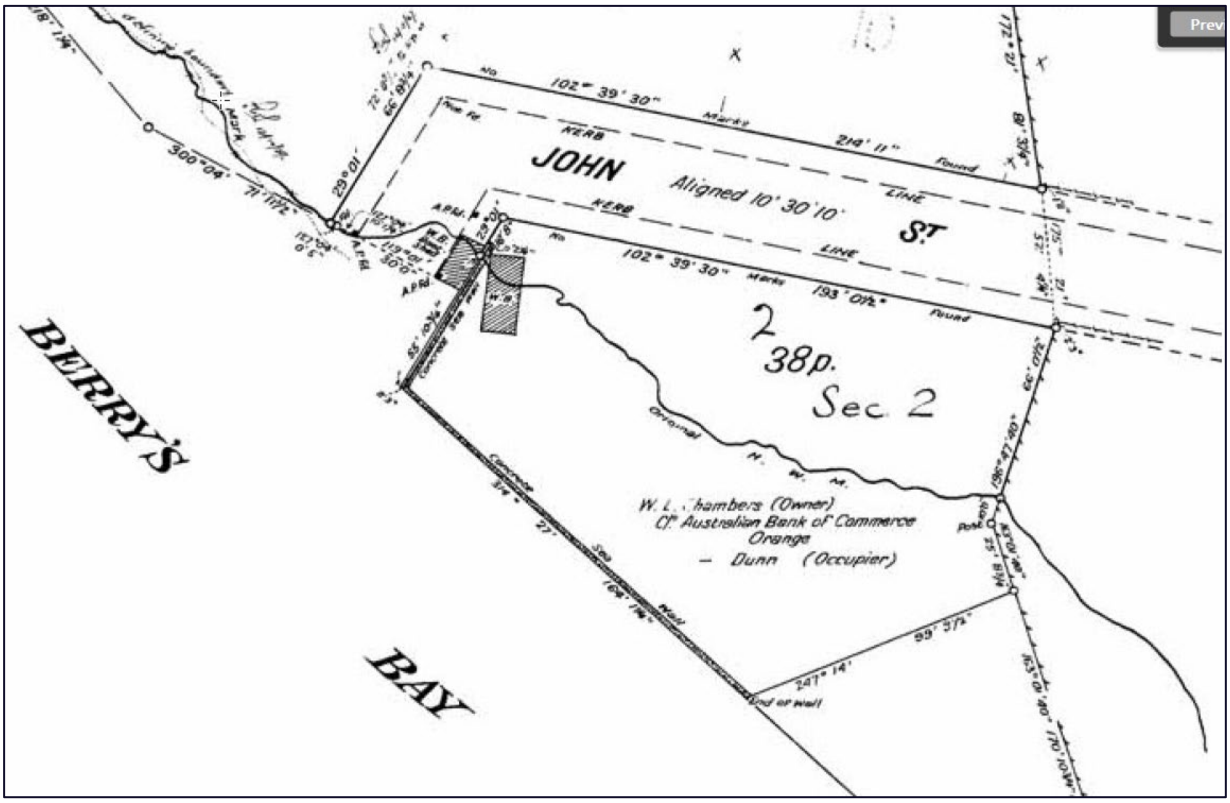


Figure 4: Portion of 1926 subdivision showing structures at end of John Street, original shoreline & concrete seawall (Source: NSW Land & Property Information, DP 77853)

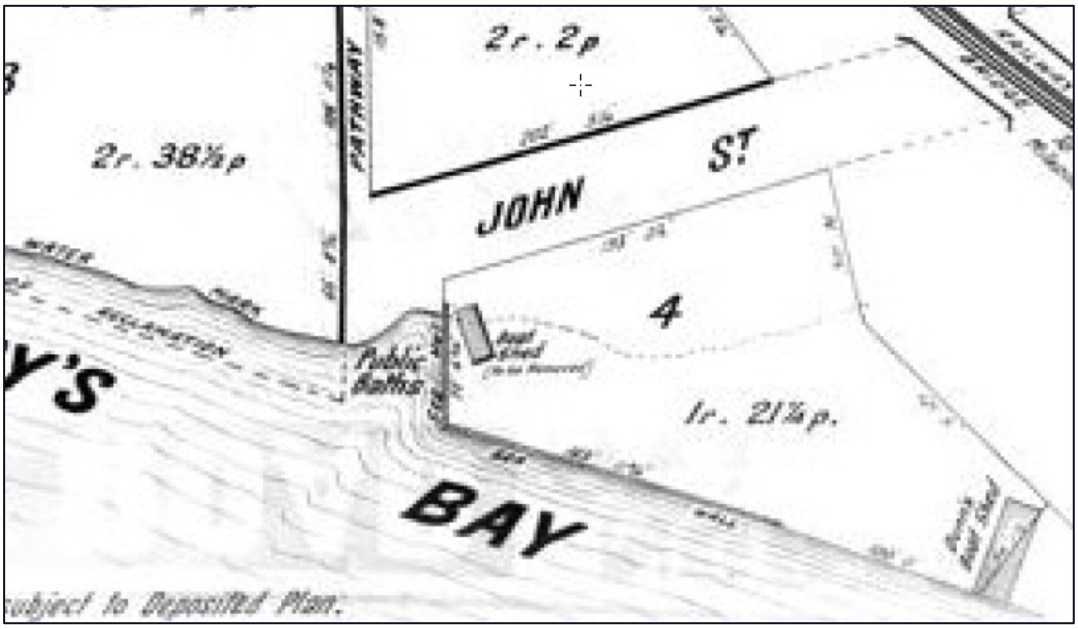


Figure 5: 1929 map showing the public baths next to one boat shed and, to the far right 'Dunn's Boat Shed' (Source: North Sydney Heritage Centre Stanton Library, LH REF SP 78)

4 PROPOSAL

The development proposal is for installation of a FDD at the Noakes Group wharves on the western side of Berrys Bay. As a floating vessel, the FDD can be moved into the bay to enable the entry of larger vessels. The FDD would then be brought back to the wharves alongside the shipyard works area.

To facilitate the berthing of the FDD, two existing jetty wharves would be demolished and a third would be shortened (Figure 6). The removal of these structures would enable the FDD to be berthed close to shore and minimise its profile within the bay. The removal of these structures has been assessed in the maritime archaeology report (Nutley 2021) and that assessment is not repeated in this report.

In addition, it is proposed to increase the capacity of the existing waste retention basin (WWTP) (Appendix A) by increasing its pumping capacity. There will be no increase in the physical size of the basin or the drains leading to and from the WWTP. No land-based excavations or ground disturbance works are part of the proposal.

This report assesses the potential for the proposal to impact upon the heritage significance of the landward component of the proposal as shown in Figure 7.

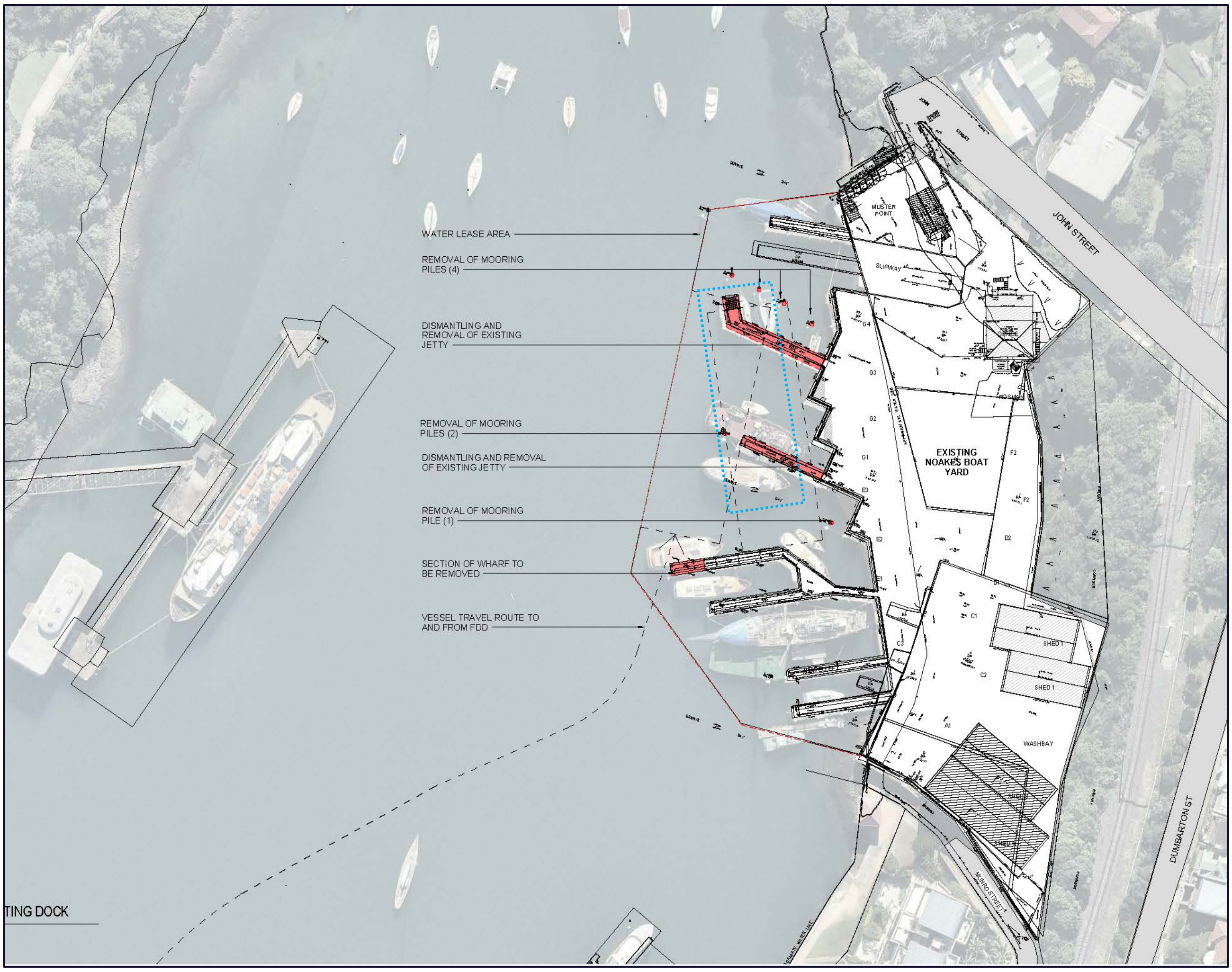


Figure 6: Proposed site plan. Wharves and mooring piles to be removed in red. Location of FDD in blue (extract from plan by Altis Architecture 2017)

Figure 7: Aerial view of the historical archaeological study area (edged in grey), 1875 shoreline and existing WWTP which is to be expanded (Base map from SixMaps; Georeferenced overlays by Comber Consultants)

5 PREVIOUS ARCHAEOLOGICAL STUDY

The previous archaeological assessment on this property was undertaken by Godden Mackay in 1993. The Godden Mackay report documents archaeological monitoring on the Noakes Boat and Shipyard site during the development of the current hardstand. It includes observations of excavated areas across a large portion of the site. Excavation to bedrock was undertaken to depths of 600-800mm in Area 1 at the southern end of the property.

The monitoring included areas 1-9, (Figure 8), and covered locations from the south to the north of the property. In most areas, the typical observations were of broken up sandstone, sandstone bedrock and twentieth century fill that was often diesel soaked. Anthropogenic (cultural) material included plastic, broken wood, glass containers, cinter, coke and numerous pieces of corroded iron, dry press bricks and steel reinforcing'. Elsewhere, there was 'soot, ash cinter, coke, along with wood, masses of rusted metal and with considerable amounts of clay and sandstone'. Most excavated areas were about 600mm in depth (Godden Mackay 1993:2).

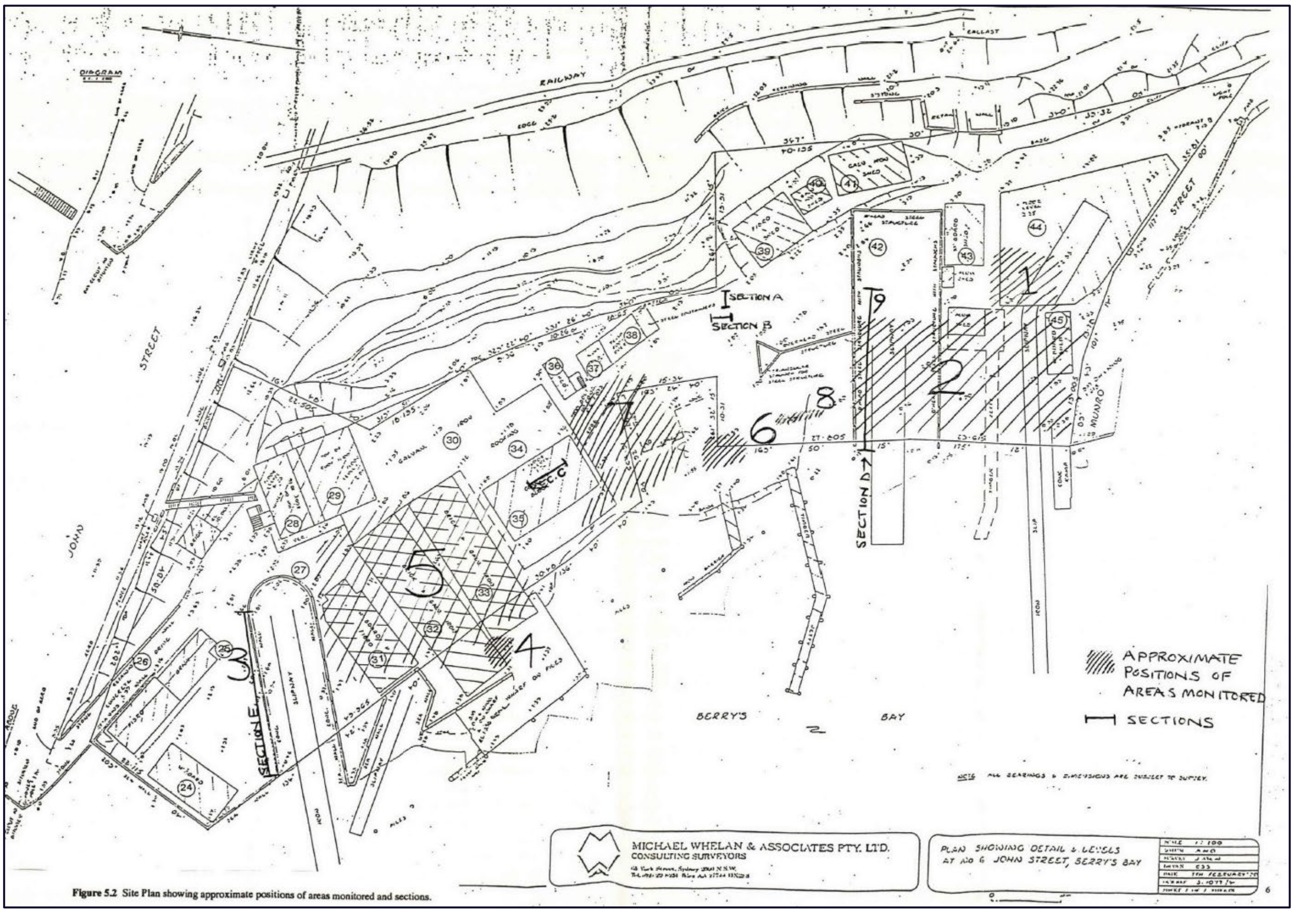


Figure 8: Map from Godden Mackay's 1993 archaeological monitoring report showing 9 areas monitored (Dillane 1993:6)

Area 6 was at the western edge of the site close to the water, where the excavation was 12m x 12m and 4m deep. Two distinct layers of fill were recorded. The lower layer was similar to elsewhere on the site and the upper layer contained 'clear and brown glass, plastics, corroded metal and a large amount of worked wooden piles and supports' (Godden Mackay 1993:2). The report describes a small section that had three courses of blocks semi-submerged in the water, with a total of five or six roughly dressed sandstone blocks. The instability of these items prevented them from being examined in place and they were removed for measuring – each about 400 x 250 x 25Omm. The sandstone blocks are described as running parallel to the shoreline and without differentiation within the deposits on either side (Godden Mackay 1993:3). They are no longer a feature on the site as these blocks were removed in 1993.

At the northern end of Area 7 the concrete slab had been cut through and diesel-soaked fill included lenses of sandstone and what was speculated as possible early mortar made with shell lime. It was suggested in the 1993 report that this may have been vestiges of a pier owned by John Blue. That area was not excavated however and the report noted that the structure could remain in situ within fill (Godden Mackay 1993:3).

The archaeological monitoring report concluded that the archaeological strata were of limited value as they consisted of twentieth century fills that were introduced to increase space for boat building activities. It noted that there had been extensive cutting back of the natural sandstone cliffs and dumping of sandstone waste into the sea. No structures that could be definitively attributed to earlier boatyards were identified (Godden Mackay 1993:3).

6 SITE INSPECTION AND RESULTS

6.1 Site inspection

A site inspection was conducted on Saturday 23 October by Mr David Nutley of Comber Consultants in company with Mr Sean Langman, Managing Director of Noakes Group Pty Ltd.

The site consists of:

- offices at the northern end of the site near the entrance driveway from John Street
- large sheds and vessels undergoing repairs along the eastern perimeter
- an open hardstand providing access through the centre of the site
- vessels undergoing maintenance on the hardstand adjacent to the wharves that extend into the marine licenced area.

The site inspection was undertaken of the area of hardstand across the full extent of the tenancy occupied by Noakes Boat and Shipyards. A photographic record was obtained.

6.2 Results

The site consists of two forms of hardstand. One contains reinforced concrete slabs and the other is brick paving. No works are proposed that would require excavation or other disturbance to these areas.

Construction of the existing hardstand was undertaken between 1991-1994. Photographs of these works are shown in Table 1. They show the introduction of deep layers of fill across most of the site before laying the concrete slab. This fill was in addition to earlier twentieth century reclamation and fill as detailed in Section 3 and Section 5.

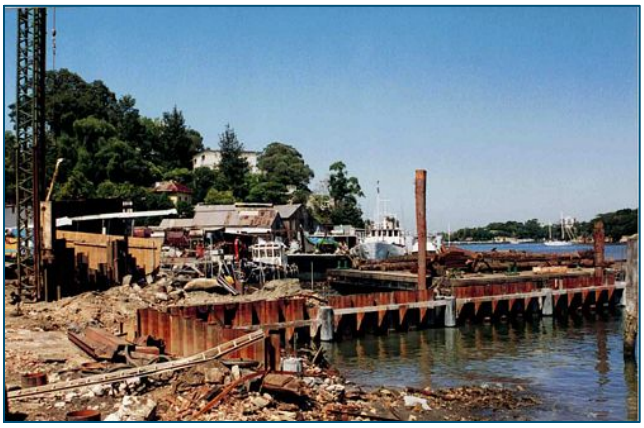
Table 2 contains photographs taken during the site inspection on 23rd October for this report and show the current appearance of Noakes Boat and Shipyard.

Table 1: Photographs of 1991-1994 works (Source: Noakes Boat and Shipyard Managing Director, Sean Langman)

Photograph 1: View to north along site showing extent of earth works

Photograph 2: View to north-east showing excavated rock wall and laying of concrete slab for large, open, work sheds

Photograph 3: View to north-west of introduced fill



Photograph 4: View to south-east of cofferdam piling for new wharf reclamation

Photograph 5: Introduced fill for new wharf

Photograph 6: Concrete slab wharf hardstand

Photograph 7: Spreading of fill behind concrete retaining walls

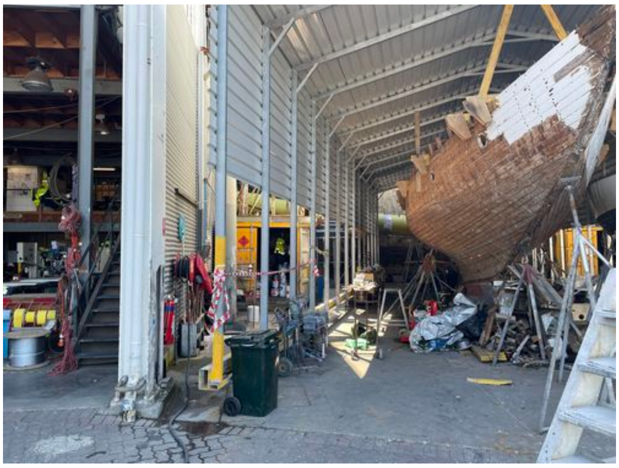
Photograph 8: New sheds on hardstand at rear of wharves

Table 2: Photographs of the study area during the archaeological site inspection (Source: David Nutley)

Photograph 9: Concrete slabs and brick paved areas across site with grated cover over existing WWTP. View to north-north-west

Photograph 10: Vehicular entrance and paved area at northern end of site. Brick paving is onto fill. View to south-south-west.

Photograph 11: Brick paving and elevated shed beside entrance drive



Photograph 12: Moveable work shed on concrete hardstand at southern end of site

The property contains two stormwater drainage lines and a retention basin (Appendix A). One follows the base of the excavated sandstone cliffs along the eastern border of the property. The other runs north to south through the centre of the property and the retention basin (Appendix A, Photograph 9 and Figure 7). There is no proposal to change the size or direction of the existing drains nor size or location of the retention basin. The capacity of the drainage lines will be augmented by increased pumping capacity.

During the site inspection the Managing Director of Noakes Boat and Shipyard confirmed that no changes to the existing hardstand are included in the proposed works.

7 ARCHAEOLOGICAL ASSESSMENT

7.1 Archaeological Potential

To undertake an archaeological assessment, it is necessary to assess whether an area contains archaeological potential. For the purposes of this report "archaeological potential" is the likelihood of a site to contain archaeological deposits that are protected by the relics provisions of the NSW Heritage Act 1977.

Such an assessment is guided by an understanding of the site as revealed through historical research and a site inspection. This report contains historical research and the results of the site inspection.

It is useful to identify the level of archaeological potential as low, medium or high. This indicates the level of impact on the potential archaeological resource and hence the likelihood of intact archaeological deposits remaining. The degree of archaeological potential does not necessarily equate with the identified level of significance. An area may be mostly intact but it may be assessed as having minimal heritage significance.

The following definitions of high, medium and low archaeological potential will be used to assess the archaeological potential of individual items identified through the historical research.

High: A high level of archaeological potential indicates that there is a high probability that the archaeological remains of a structure or structures are reasonably intact as there have been little or no impact following the demolition of the known structures.

Medium: A medium level of archaeological potential indicates that there is a medium probability that the archaeological remains of a structure are partially or mostly intact but there has been some impact on its integrity through later development.

Low: A low level of archaeological potential indicates that there is a low probability that the archaeological remains survive as there have been extensive impacts by known later development or works

7.2 Assessment of Archaeological Potential

As indicated in section 4.1, there is potential for remnants of John Blue's stone pier to be present beneath the concrete slab at the northern end of the site. This item was not excavated during the 1993 monitoring to enable confirmation of its nature or whether any in situ structural evidence of the pier had survived. (Godden Mackay 1993:3). The archaeological potential for this pier is low.

There is very little potential for other relics to be present on the property due to the cutting down of bedrock to form the expanded work area in the late twentieth century. This will have damaged or destroyed any such relics that may once have existed or displaced them as part of land fill.

In consideration of the history and the results of the 1993 archaeological monitoring of later twentieth century works, the archaeological potential for the study area is assessed as low.

8 SIGNIFICANCE ASSESSMENT

8.1 Preamble

Significance Assessment is the process whereby buildings, items or landscapes are assessed to determine their value or importance to the community.

The following criteria have been developed by Heritage NSW and embody the values contained in the Burra Charter. The Burra Charter provides principles and guidelines for the conservation and management of cultural heritage places within Australia.

8.2 Assessment

Historical

Criterion (a) – an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area)

Apart from the possible survival of a portion of John Blues' stone pier, the site is not anticipated to contain items of an archaeological nature that would fulfill this criterion at a State or local level of significance.

The site itself is historically significant as a continuing operating, ship building site in Sydney Harbour due to associations with the John Blue, the Dunn family and Ford family, and the boats and ships built there.

Association

Criterion (b) – an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area)

Apart from the possible survival of a portion of John Blues' stone pier, the site is not anticipated to contain items that would fulfill this criterion at a State or local level of significance.

Aesthetic/Technical

Criterion (c) – an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area)

Apart from the possible survival of a portion of John Blues' stone pier, it is not anticipated that the site contains items of archaeological significance at a State or local level of significance.

Social

Criterion (d) – an item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons

It is not anticipated that the site contains items of at a State or local level of significance under this criterion.

Research

Criterion (e) – an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area)

Apart from the possible survival of a portion of John Blues' stone pier, the site is not anticipated to contain items that would fulfill this criterion at a State or local level of significance.

Rarity

Criterion (f) – an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area)

The site would not attain the level of State or local significance under this criterion.

Representative

Criterion (g) – an item is important in demonstrating the principal characteristics of a class of NSW's

- *cultural or natural places; or*
- *cultural or natural environments.*

or a class of the local area's

- *cultural or natural places; or*
- *cultural or natural environments*

The boatbuilding yard on the northern shore of Berry's Bay is highly representative of activities that once were common along the north shore and, on this site, represent a continuity of that activity from the nineteenth to the twenty-first century.

8.3 Statement of Significance

Historically important as a continuing operating, ship building site in Sydney Harbour and holding associations with the John Blue, the Dunn family and Ford family shipbuilding and maintenance services.

9 IMPACT AND MITIGATION

9.1 Impacts

The proposal does not include any disturbance to or below the hardstand.

The archaeological potential of the study area has been assessed as low and that evidence would be below the concrete slab. In the absence of any works that will penetrate the concrete hardstand on the site adjacent to the proposed FDD, there is no potential for adverse impacts on any surviving relics or structures that may be present beneath that slab.

9.2 Mitigation

As this report has assessed that archaeological relics will not be disturbed by the proposed works, no specific mitigation measures are required.

However, if any previously unrecorded relics are unexpectedly uncovered, works must stop in the vicinity of that relic and a suitably qualified and experienced archaeologist must be engaged to assess the significance of the relic and to provide management recommendations.

10 SUMMARY

This report assesses the impact of the FDD installation at Noakes Boat and Shipyard on the historical archaeology on the landward side of the proposal., ie., beneath adjacent hardstand of the property at 6 Johns Street, McMahons Point. The maritime archaeology has been assessed in a separate report.

The report concludes that, due to disturbances associated with extensive twentieth century developments on the site, the archaeological potential is low and that such evidence would be located beneath the concrete slab. No excavation is proposed through the concrete slab. Therefore, this assessment concludes that the proposed works for the FDD will have no impact on archaeological evidence of earlier wharves or shoreline activities.

No specific mitigation measures are required, however, if any previously unrecorded relics are unexpectedly uncovered, works must stop in the vicinity of that relic and a suitably qualified and experienced archaeologist must be engaged to assess the significance of the relic and to provide management recommendations.

REFERENCES

Comber Consultants 2021. 'Floating Dry Dock – Noakes Boat & Shipyard - Berrys Bay' – Maritime archaeological assessment'. Report Prepared for Stannards Marine Pty Ltd

Godden Mackay, 1993. 'Berrys Bay – Stannards Boatyard Archaeological Monitoring. Report prepared by Godden Mackay Pty Ltd for Concrete Constructions Pty Ltd, Stannard Bros, the Heritage Council of NSW.

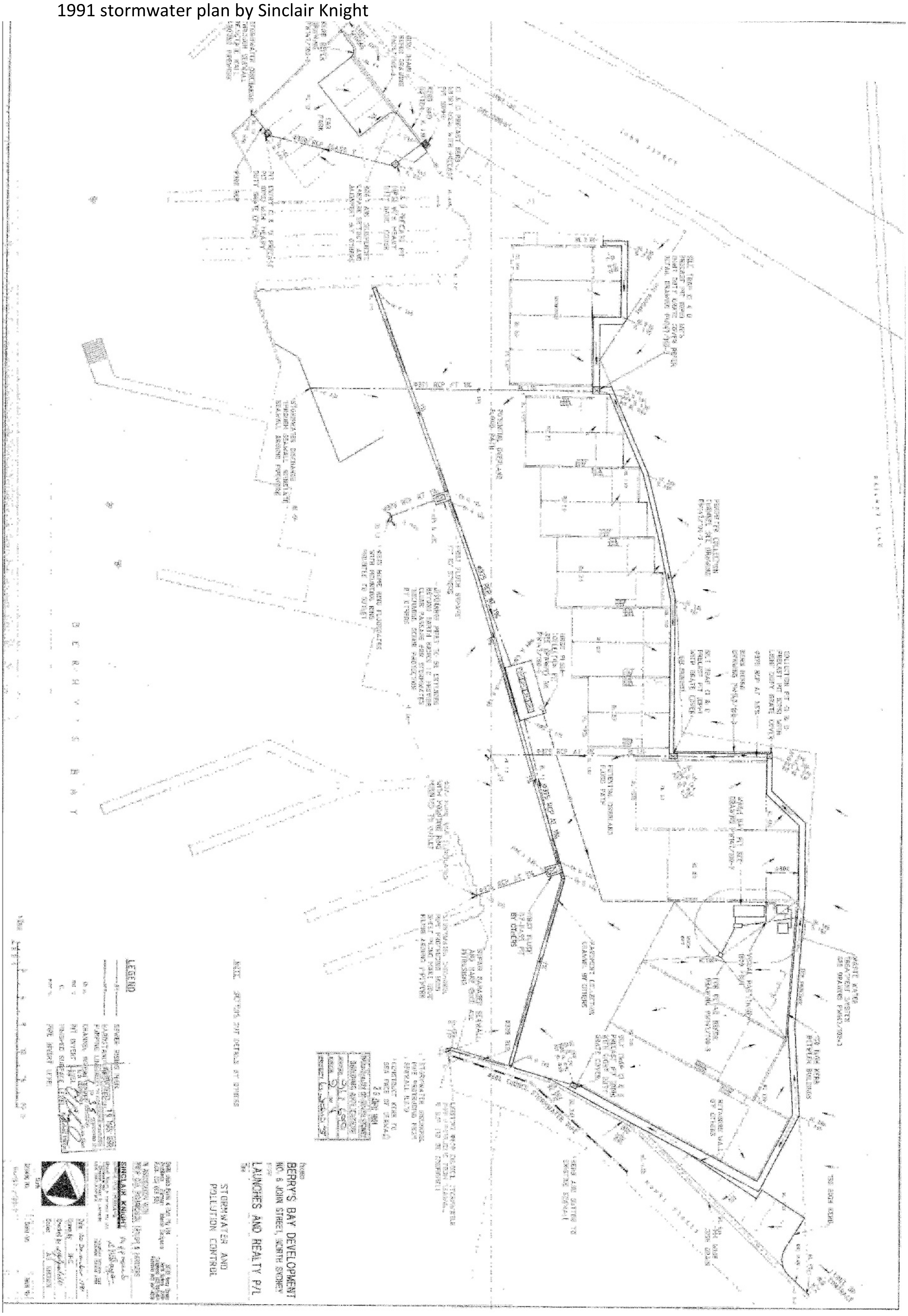
NBRS Heritage, 2018a. 'Statement of Heritage Impact of Noakes Boat and Shipyard, Berrys Bay'. Report prepared for the Noakes Group.

NBRS Heritage, 2018b. Sparks, C 1988. 'The BP Site in Berry's Bay'. In *North Shore Historical Society Journal*, Vol. 38, No. 1

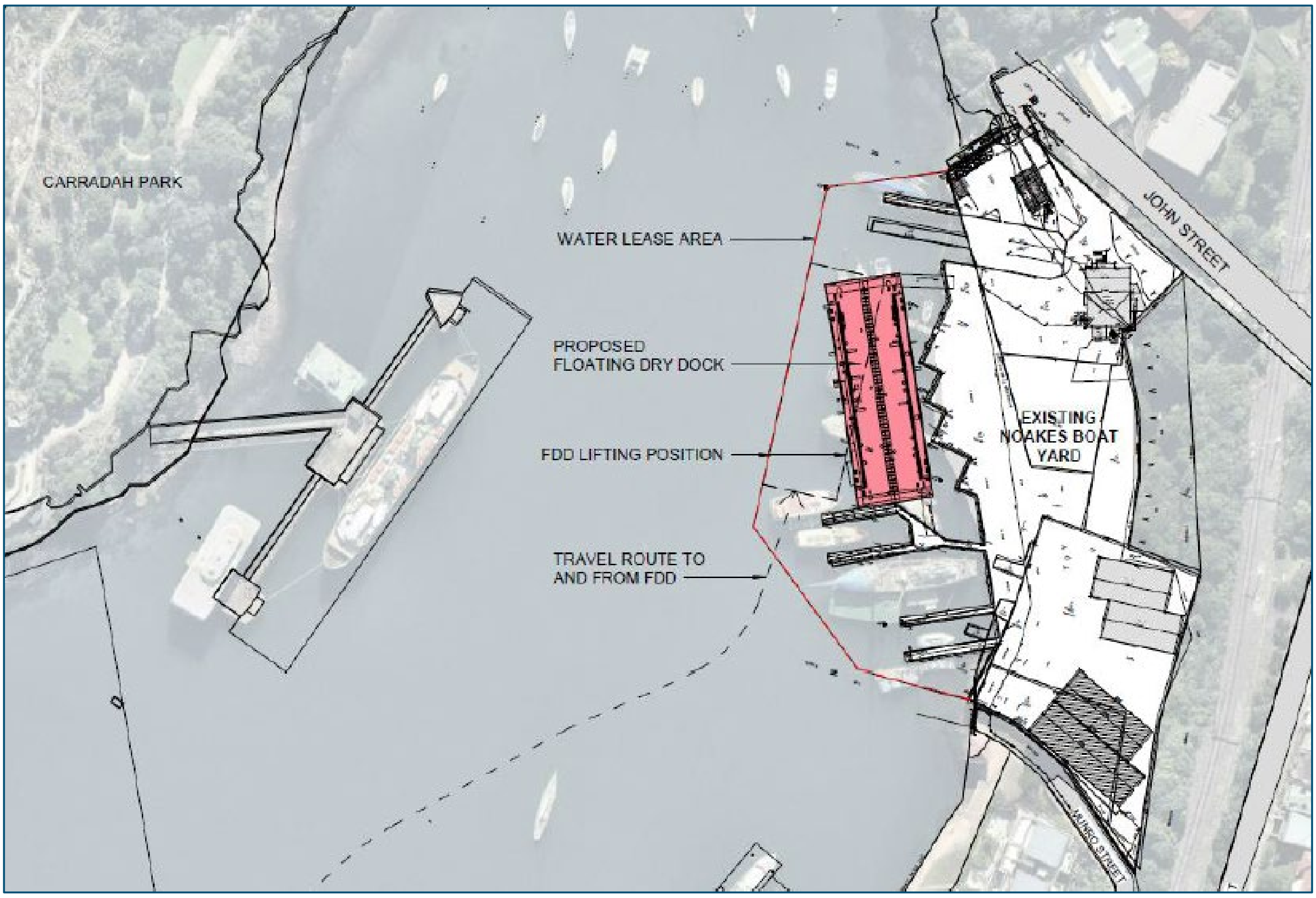
Oultram, J 2021. 'Report on Heritage'. Prepared by John Oultram Heritage & Design in response to the Statement of Facts and Contentions filed on 13TH May 2021 and prepared by North Sydney Council in the matter of Stannards Marine Pty Limited v North Sydney Council (Land and Environment Court of New South Wales No. 00063136 of 2021) (the SOFAC)

APPENDIX A: PLANS

1991 stormwater plan by Sinclair Knight



EIS Fig 3.1


CARRADAH PARK
WATER LEASE AREA
PROPOSED
FLOATING DRY DOCK
FDD LIFTING POSITION
TRAVEL ROUTE TO
AND FROM FDD
EXISTING
NOAKES BOAT
YARD
JOHN STREET

COMBER CONSULTANTS

ARCHAEOLOGY - HERITAGE - MEDIATION - ARBITRATION

Floating Dry Dock – Noakes Boat & Shipyard - Berrys Bay

Maritime Archaeological Assessment

05 NOVEMBER **2021**

Report to: Stannards Marine Pty Ltd

Version: E.2021

ABN 96 109 670 573 | 76 EDWIN STREET NORTH | CROYDON, NSW, 2132 | T 02 9799 6000 | F 02 9799 6011 www.comber.net.au

ACKNOWLEDGEMENT OF COUNTRY

We acknowledge the Traditional Custodians of the land that we live and work on.

We pay our respects to the Elders, past, present and emerging, for they hold the memories, the traditions, the culture and hopes of Aboriginal people.

We honour and acknowledge the stories, traditions and living cultures of Aboriginal and Torres Strait Islander peoples on this land and commit to building a brighter future together.

A better understanding and respect for Aboriginal and Torres Strait Islander cultures develops an enriched appreciation of Australia's cultural heritage and can lead to reconciliation. This is essential to the maturity of Australia as a nation and fundamental to the development of an Australian identity.

DOCUMENT CONTROL

PROJECT NO: SM421 **STATUS:** FINAL

REV	DATE	PREPARED BY	EDITED BY	APPROVED BY
A	09/11/2018	David Nutley	Dr Jillian Comber	Dr Jillian Comber
B	17/12/2018	David Nutley	Dr Jillian Comber	Dr Jillian Comber
C	18/12/2018	David Nutley	Dr Jillian Comber	Dr Jillian Comber
D	19/12/2018	David Nutley	Dr Jillian Comber	Dr Jillian Comber
E	05/11/2021	David Nutley	Dr Jillian Comber	Dr Jillian Comber

INTEGRATED MANAGEMENT SYSTEM

Comber Consultants has a certified integrated management system to the requirements of ISO 9001 (quality), ISO 14001 (environmental) and ISO 45001 (health and safety). This is your assurance that Comber Consultants is committed to excellence, quality, and best practice and that we are regularly subjected to rigorous, independent assessments to ensure that we comply with stringent Management System Standards.

ECAAS ISO 9001 CERTIFIED QUALITY MANAGEMENT | ECAAS ISO 45001 CERTIFIED SAFETY MANAGEMENT | ECAAS ISO 14001 CERTIFIED ENVIRONMENTAL MANAGEMENT | JAS-ANZ

COVER PHOTOGRAPH

Photograph of typical portion of the seabed within the study area. Photographer: David Nutley

CONTENTS

FIGURES

TABLES

EXECUTIVE SUMMARY

Stannards Marine Pty Ltd, (the applicant), is seeking to develop berthing facilities for a floating dry dock (FDD) at its wharves on the western side of Berrys Bay. Noakes Group Pty Ltd is the tenant and would be operating the facility. A requirement of The Secretary's Environmental Assessment Requirements (SEARS 1166), included an historical archaeological assessment in accordance with the then Office of Environment and Heritage guidelines (Section 1.2 below). The applicant engaged Comber Consultants to undertake that assessment and to provide appropriate management recommendations.

The FDD is a floating platform that would be berthed at the shoreline wharves. No dredging is required to provide that access. This maritime archaeological assessment has not identified any relics of local or State significance on the seabed.

A separate assessment of impacts on historical archaeological heritage adjacent to the study area for the FDD has been prepared (Comber Consultants 2021).

This report concludes that:

1. The potential impacts on any relics in the study area is limited to the extraction of existing piles by lifting them from the seabed. The mitigation measure for that disturbance is an inspection of the seabed by an archaeologist immediately after extraction of the piles.
2. The ongoing presence of the FDD in the study area, or during movements within the bay would have no impacts on underwater cultural heritage in Berrys Bay.
3. Except for the mitigation measures identified for extraction of existing piles during reconfiguration of the existing wharfage, no further mitigation measures are required to protect underwater cultural heritage during reconfiguration of berthing facilities for the FDD.

1 INTRODUCTION

1.1. Background

Stannards Marine Pty Ltd, (the applicant), is seeking to develop berthing facilities for a floating dry dock (FDD) at its wharves on the western side of Berrys Bay. Noakes Group Pty Ltd is the tenant and would be operating the facility. A requirement of The Secretary's Environmental Assessment Requirements (SEARS 1166), included an historical archaeological assessment in accordance with the then Office of Environment and Heritage guidelines (Section 1.2 below). The applicant engaged Comber Consultants to undertake that assessment and to provide appropriate management recommendations.

The investigation was undertaken by David Nutley (Grad.Dip/Marit.Arch., M.B.Env., M.Marit.Arch., M.ICOMOS) with dive support provided by The Dive Company Pty Ltd with Colin Browne as Dive Supervisor.

1.2. Office of Environment and Heritage (OEH) guidelines

The OEH guidelines that accompanied SEAR 1166 noted that:

> *Given the extensive maritime history of the bay, it is highly likely that underwater cultural heritage relics and possible sites may exist adjacent to or nearby the proposed development application area.*

Table 1 lists the specific issues raised by OEH and identifies the relevant sections where they are addressed:

Table 1: Issues and locations where addressed in this report

Issue raised by OEH	Section/s of this report
'Relics associated with use of the boat building/maintenance and slipway/docks areas which have been lost or discarded from those facilities'	5
'A number of other known wrecks in Berrys Bay which have not been mentioned in the DA assessment, which are included on the Maritime Heritage Online website database.'	5.2
'Potential impacts to the *Sobraon* (ex HMAS *Tingira*) shipwreck. The report contains a 1942 image (Figure 73) showing what is probably the wreck of the *Sobraon* in the upper reaches/head of Berrys Bay but does not discuss it. The *Sobraon* had a long history of mooring and eventual abandonment in this Bay which has not been addressed as a potential site in the DA application report. These sites are likely to be of State heritage significance if remains still exist in the area.'	6.4
'What is the exact age of the jetties and wharf structures which are to be demolished and what is their heritage significance.'	6.3 & Figure 6
'What is the method of removal of the pier/wharf piles – hence the potential damage to heritage sites/relics?"	2, 6.8, 9.1, 9.2
'What is the impact of new mooring piles on seabed deposits?'	2
'OEH requires either an underwater remote sensing survey or maritime archaeological survey of the seabed in the proposed works area conducted by a suitably qualified and experienced maritime archaeologist.'	3.2, 3.4, 6.5, 6.8

1.3. Location

The study area, accessed via 6 John Street, McMahons Point, is within Berrys Bay and on the western side of McMahons Point (Figure 1).

Figure 1: Berrys Bay - approximate overlay of study area (Six Maps)

1.4. Aims of this assessment

In assessing cultural heritage in the study area, the aims of this assessment are to:

- minimise loss of and to develop recommendations that will avoid or mitigate adverse impacts on important aspects of the cultural heritage of the bay
- ensure that, where the UCH cannot be preserved, appropriate investigation, recording and communication is undertaken

2 PROJECT DESCRIPTION

The development proposal is for installation of a floating dry dock (FDD) at the Noakes Group wharves on the western side of Berrys Bay. The FDD will be capable of servicing vessels up to 1,000 tonnes in weight. As a floating vessel, the FDD can be moved into the bay to enable the entry of larger vessels. The FDD would then be brought back to the wharves alongside the shipyard works area.

To facilitate the berthing of the FDD, two existing jetty wharves would be demolished and a third would be shortened (Figures 2-3). The removal of these structures would enable the FDD to be berthed close to shore and minimise its profile within the bay.

The removal of the existing piles would be through full extraction by pulling the piles out of the seabed

No additional mooring piles would be installed for berthing of the FDD.

No dredging would be required to accommodate the FDD. No land-based excavations or ground-engaging works are proposed as part of the proposal.

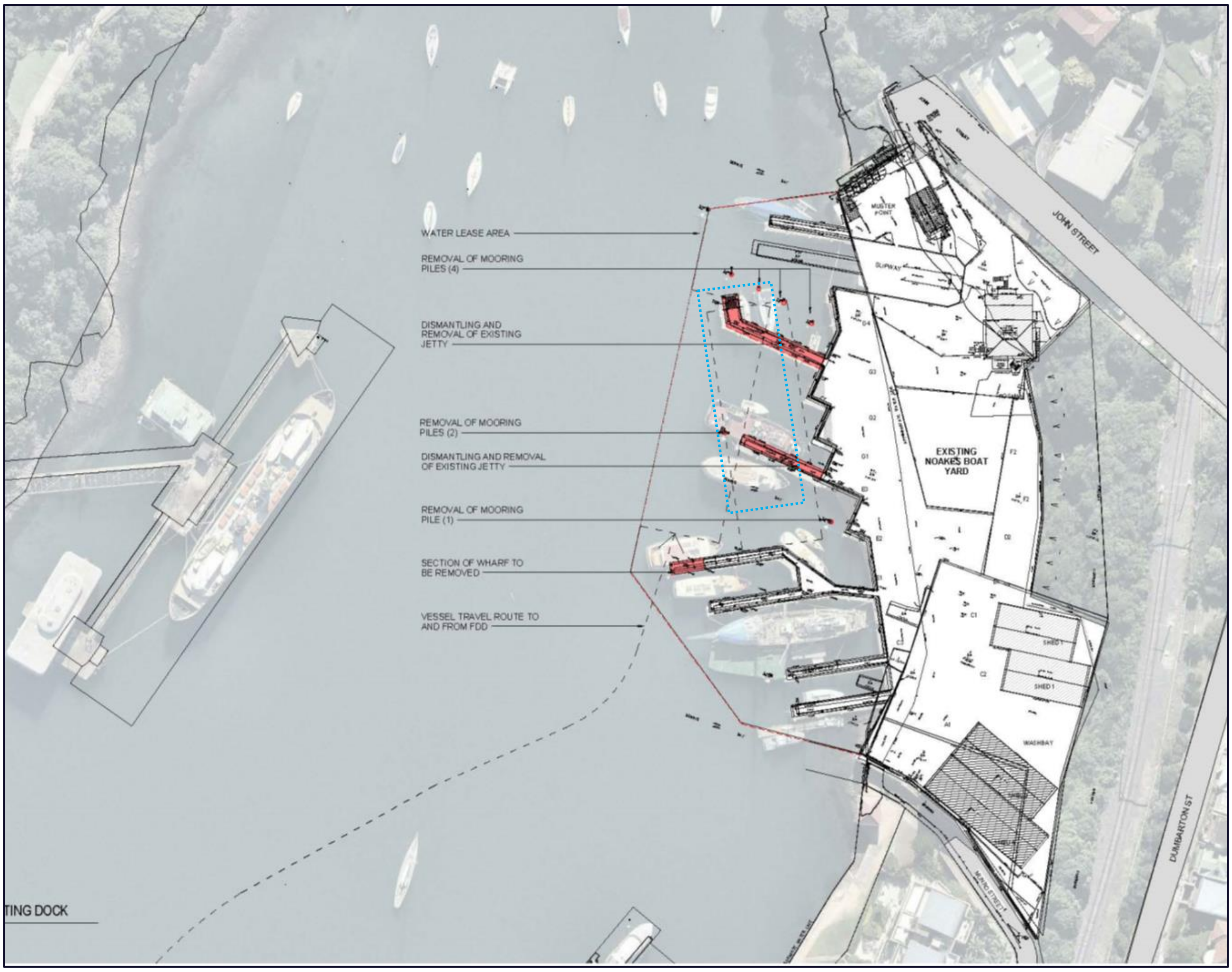


Figure 2: Proposed Site Plan with wharves and mooring piles to be removed in red and the location of the FDD outlined in blue (extract from plan by Altis Architecture 2017)

Figure 3: Aerial view of maritime archaeological study area (red). Jetties to be removed (blue), mooring piles to be removed (green) (Base map from SixMaps)

Figure 4: FDD berthed at the 1962 era BP Dolphin Wharf on the bank opposite to the current study area in 2015

3 METHODOLOGY

3.1. History

A comprehensive history of the study area is included in the recent Statement of Heritage Impact of Noakes Boat and Shipyard, Berrys Bay (NBRS Heritage July 2018). A maritime archaeological assessment of the proposed Berrys Bay on the western side of the bay (Nutley, 2014) and an underwater archaeological inspection of that area (Nutley 2017) also provided background history and comparative data on the seabed within the bay. Those documents have relevance to the potential cultural heritage that lies submerged within the bay or under reclaimed land along the shoreline. They also assisted in planning for the underwater archaeological site inspection and the assessment of archaeological potential.

A 1943 aerial imagery of Berrys Bay was overlayed on the study area to make a comparison with the current configuration of the wharves that would be demolished. This overlay assisted in determining the age and significance of those structures.

The NSW Maritime Heritage Database was accessed on 29 October 2018 to identify any known shipwrecks or other underwater maritime heritage in Berrys Bay.

Nigel Stannard also provided information on the age of the wharves that are to be removed (pers. comm. 22/11/2018).

3.2. Remote sensing

A 2016 Multibeam Echo Sounder (MBES) survey by NSW Port Authority was accessed as well as a 1999 side scan survey of Berrys Bay. The MBES survey covered a portion of the study area but did not extend into the areas between and under the wharves. The 1999 survey however does cover the whole of the study area.

Consideration was given to undertaking an additional remote sensing survey of the study area. However, given the limited size of the survey area and information available from the existing remote sensing data, it was determined that a comprehensive coverage would be achieved through visual inspection by an archaeological diver.

3.3. Dive survey

The dive survey was conducted using Surface supplied Breathing Apparatus (SSBA) operating from The Dive Company work boat *Undaunted*. The dive included inspections around and beneath each of the wharf structures that would be demolished as well as the open areas between those wharves and the Noakes Group lease area boundary to the west. Still photography was taken with a Sony RX100M3 in an underwater housing with wide angle lens. Video footage was also obtained using a GoPro, also in an underwater housing. For the open areas of the inspection area, the diver swam in arcs, extending 1m on each arc to achieve full coverage. The area covered by this survey was over 3,000m2 and extended out to the 10m depth line along the lease area boundary.

3.4. Significance assessment

The significance of the potential submerged or buried maritime archaeological evidence was assessed based on:

- the history of the study area in the NBRS Heritage Statement of Heritage Impact
- analysis of existing remote sensing data undertaken in 1999
- an underwater archaeological inspection conducted by the project maritime archaeologist on 1 November 2018
- the standard criteria for significance assessment as endorsed by the NSW Heritage Council

4 LEGISLATION

4.1. NSW *Heritage Act 1977*

Historic Shipwrecks in State waters (out to the 3 nautical mile limit) are protected under the provisions of Part 3C of the NSW *Heritage Act 1977* (the Act). Section 47 (1a) of the Act defines an historic shipwreck as the remains of any ship, and any articles associated with the ship, that has been 'situated in State waters, or otherwise within the limits of the State, for 75 years or more'. The shipwreck is then included in the State's section 49 Register of Shipwrecks. The Act does not specify that the ship has had to have been wrecked or abandoned for that period of time. A hopper barge at Saw Millers Reserve, Berrys Bay, has been in NSW State waters for more than 75 years and is therefore a protected historic shipwreck. Under section 51(a) of the Act 'A person must not move, damage or destroy any historic shipwreck otherwise than in accordance with a historic shipwrecks permit' (ie, a permit referred to in section 139 of the Act).

Other archaeological relics that are not shipwrecks or associated with shipwrecks, are protected under section 139 of the Act if they are deposits, artefacts, objects or material evidence that:

(a) relate to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
(b) is of State or local heritage significance.

The built heritage below the MHWM in the study area is not listed on the State Heritage Register. The following provisions therefore relate to relics that are of local or State significance. Relics of local or State significance within the study area have statutory protection under the Relics Provisions of the Act (as amended in 1999). Section 139 [1] of the Act states that:

A person must not disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed unless the disturbance or excavation is carried out in accordance with an excavation permit.

All relics protected under Section 139 require a Section 140 Excavation Permit prior to any works that may disturb or destroy them unless the works are of a minor nature and will have a minimum impact of the relics. Where impacts are minor or minimal an Exception under the provisions of Section 139 (4). Section 140 Excavation Permits must be supported by an Archaeological Research Design. The Research Design identifies how the potential archaeological values of the relics will be investigated, recorded, and how any recovered relics will be conserved.

Under Section 146 the discovery of any relic, (whether through a permit, 'Exception' or other means), must be reported to the Heritage Division/Heritage Council of New South Wales along with details of its location.

No relics of local or State significance have currently been identified within the study area.

4.2. Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

The Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005, (Harbour REP), covers all waterways of Sydney Harbour. The Harbour REP for consideration includes provisions for heritage conservation. The REP includes planning controls for strategic foreshore sites. The only heritage item in Schedule 4 of the REP that is attached to the seabed in Berrys Bay is the wreck of a Maritime Services Board Hopper Barge (item 74) on the foreshore to the south of, and outside of, the study area.

4.3. North Sydney Local Environmental Plan 2013 (NSLEP)

Stannard Brothers Shipyard and associated buildings (Noakes Group property) are listed as items of general heritage on the NSLEP as item 10484. The listing description includes the Lot numbers of the property. It is not clear if the property boundaries include the jetty structures. These are not 'buildings' and are not specifically included in the description. The Heritage Map (Sheet HER_002A) does suggest that the jetty wharves are included in that listing. The listing boundary does not include the waters of the bay. The Statement of significance accompanying this listing in the NSW State Heritage Inventory is:

One of the most historically important ship building sites in Sydney Harbour due to associations with the Dunn family and Ford family, and the boats and ships built here. Has technical and scientific interest for the technologies employed and is an important feature in the development of the waterfront of Berrys Bay and the urban fabric of surrounding areas.

5 PREVIOUS STUDIES

5.1. Statement of Heritage Impact of Noakes Boat and Shipyard, Berrys Bay (NBRS Heritage 2018)

This report provides a comprehensive history of the study area and its evolution since the early eighteenth century. That history provides the basis for this assessment and is therefore not repeated in this report.

That report concluded that:

> *The proposal will have no impacts on the visual appreciation or understanding of the cultural significance of the heritage items in the vicinity, on either the eastern or western sides of Berrys Bay, due to the distance between the elements as well as the location of the FDD in the Bay with the items all being land based and generally removed from the site.*

The absence of an assessment of impacts on underwater cultural heritage in that report is addressed is this current report.

5.2. Berrys Bay Marina - Maritime Archaeological Assessment (Comber Consultants 2014)

The Berrys Bay Marina assessment identified three shipwrecks in Berrys Bay and several other anomalies that were examined from remote sensing imagery of the Bay conducted in 1999. Archaeological ground-truthing of one of those shipwrecks and three other anomalies within that study area were recommended. This was undertaken in 2015 as detailed below.

5.3. Berrys Bay Marina - Underwater Historical Archaeological Assessment (Comber Consultants 2015)

As a result of the 2014 assessment detailed above, an underwater archaeological inspection was undertaken in October 2015. This confirmed that the shipwreck visible in the 1999 remote sensing data near the former BP wharves on the western shore of the bay was a hopper barge (Figure 6). This was a relatively intact and rare, surviving example of a class of vessels that served in the development and maintenance of New South Wales harbours and waterways in the eighteenth and nineteenth centuries. It had local significance as an historic wreck under s51 of the NSW Heritage Act 1977. As a result of the recommendations of in this report design plans were subsequently altered to avoid impacts.

Potential remains of a World War Two boom defence gate across Berrys Bay were also identified but would not be impacted by the proposed marina development (Figure 6).

Two other targets that were inspected were items of no heritage significance (Figure 6).

5.4. Geotechnical data

Information regarding the results of geotechnical investigations conducted as part of a Preliminary Contamination Assessment included the following observation from a report by Jacobs Australia (2018):

> *Previous geotechnical investigations[1] undertaken at on shore locations across the site indicate the following general stratigraphy, consisting of fill material (black gravelly sand, sandstone fragments, ash, timber, fragments of bricks, glass, wire and steel, coarse clayey gravel and silt. Fill depths ranged from existing ground surface to approximately 5 meters below ground surface (m bgs). Below the fill material are marine sediments (gravelly sand and silty sand) and residual soils (clayey sand) underlain by sandstone bedrock.* (EIS Page 79)

While inclusions such as bricks, glass, wire and steel are not necessarily significant relics, the presence of such cultural items within sediments is an indicator for the potential presence of significant relics. The layers of residual soils below the fill layers is also an indicator of the potential presence of Aboriginal objects dating to the period prior to sea level rises that inundated Sydney Harbour.

5.5. Queens Wharf, Parramatta – Maritime archaeological investigations (Wolfe 1990 & 1992)

In 1992, underwater archaeological investigations in the upper reaches of the Parramatta River included excavations at Queens Wharf, Parramatta. These excavations established that the concentration of artefacts reduced rapidly as distance increased from the edge of the shoreline wharf. The highest concentration was within the first couple of metres and beyond 8m from the wharf, no artefacts were located (Wolfe 1992:16-19,23).

5.6. Clarence River, Grafton – Maritime archaeological investigation (Comber Consultants 2019)

An investigation of the Clarence River at Grafton in 2014 included remote sensing of the width of the river within the study area and dive inspections of anomalies with potential to be items of underwater cultural heritage. The items of potential cultural heritage value that were identified in this survey were all located within 10m of the southern shoreline (Comber Consultants 2019:29).

5.7. Queens Wharf, Brisbane– Maritime archaeological investigation (Comber Consultants 2019)

Underwater archaeological excavations in the Brisbane River adjacent to Queens Wharf in 2019 included remote sensing of the full width of the river and a series of trenches that extended southwards from the northern riverbank. The northern riverbank had been used for a wide range of industries and sequences of wharves dating from the nineteenth century onwards. The remote sensing indicated a reduced presence of cultural material away from the shoreline and this was also evidences in the concentrations of artefacts recovered from the trenches. The trenches were each 10m in length and placed between 5-10m from the frontages of the former wharves (Comber Consultants 2019:43). While the concentrations partially reflected the dominant direction of the river flow from north-west to south-east, the majority of artefacts were located towards the northern end of each of the trenches and within 10-15m of the frontages of the former wharves.

5.8. Blackwattle Bay – Maritime Archaeological investigation (Comber Consultants 2020)

Underwater archaeological excavations were undertaken within the southern section of Blackwattle Bay in 2020. As with the investigations at Queens Wharf Brisbane, this involved a series of 10m trenches extending from the frontages of earlier wharves as well as beneath the decks of demolished wharves. The pattern of distribution of artefacts in this study had been affected by the prior extraction of pylons and by the influence of discharges from the large stormwater drains at the head of the bay. However, as with the studies referenced above, the general pattern again reflected a rapid fall-off with distance from the wharf frontages. In addition, most items recovered were of materials that had been carried down the stormwater drain or remnants of the bulk materials that had been loaded and unloaded from the wharves, ie, coal and blue metal. Samples of worn of boot soles and heels as well as beer bottles from the second half of the twentieth century were also present. While demolition material from the former wharves was evident, there was a clear was the absence of discarded tools or equipment associated with the functions of the wharves or the ships that they serviced. This perhaps reflects the value placed on such items by the owners & users of that equipment. This finding is also consistent with the materials extracted from the Parramatta River and the Brisbane River.

6 ARCHAEOLOGICAL ANALYSIS OF PREVIOUS STUDIES

6.1. Introduction

The following implications for potential underwater cultural heritage within the study area draws upon several sources. This includes the history of the bay, previous underwater archaeological investigations and sites recorded by recreational divers.

6.2. William Blue (1817 to 1834)

William Blues ferry service was based on the eastern side of Blues Point. Archaeological evidence of his, or his descendants' activities around McMahons Point are unlikely to be presence in the study area.

6.3. Early boatsheds and wharves

There is potential for evidence of the maritime industry that rapidly developed from the 1870s around the foreshores of Berrys Bay - including the study area between John Street and Munro Street. The early maritime infrastructure was located under what is now reclaimed land (Figure 5). Any archaeological evidence in the marine zone will not be in situ structural remains of those wharves. In addition, the current study area is some 40-55m west of the original shoreline and outside of the area where concentrations of equipment or debris associated with those earlier activities is likely to be higher.

Figure 5: Orange line showing shoreline in 1875 (Near Map with 1875 GIS overlay by Comber Consultants)

The present marina was rebuilt in 1993, (NBRS & Partners 2018, Section 2.2:20). Nigel Stannard confirmed that the two wharves were built in 1993-94 (Nigel Stannard, pers. comm 22/11/2018). He advised that the 'Y' shaped wharf to the south of the study area was built in the early 1980s but that the working surface was replaced in 1993-94.

An overlay on 1943 aerial imagery of Berrys Bay confirms that the jetties that would be demolished for the FDD were not present at that time. Jetties and wharves were to the east of the current jetties and within the area now occupied by the main shoreline hard-stand works area (Figure 6).

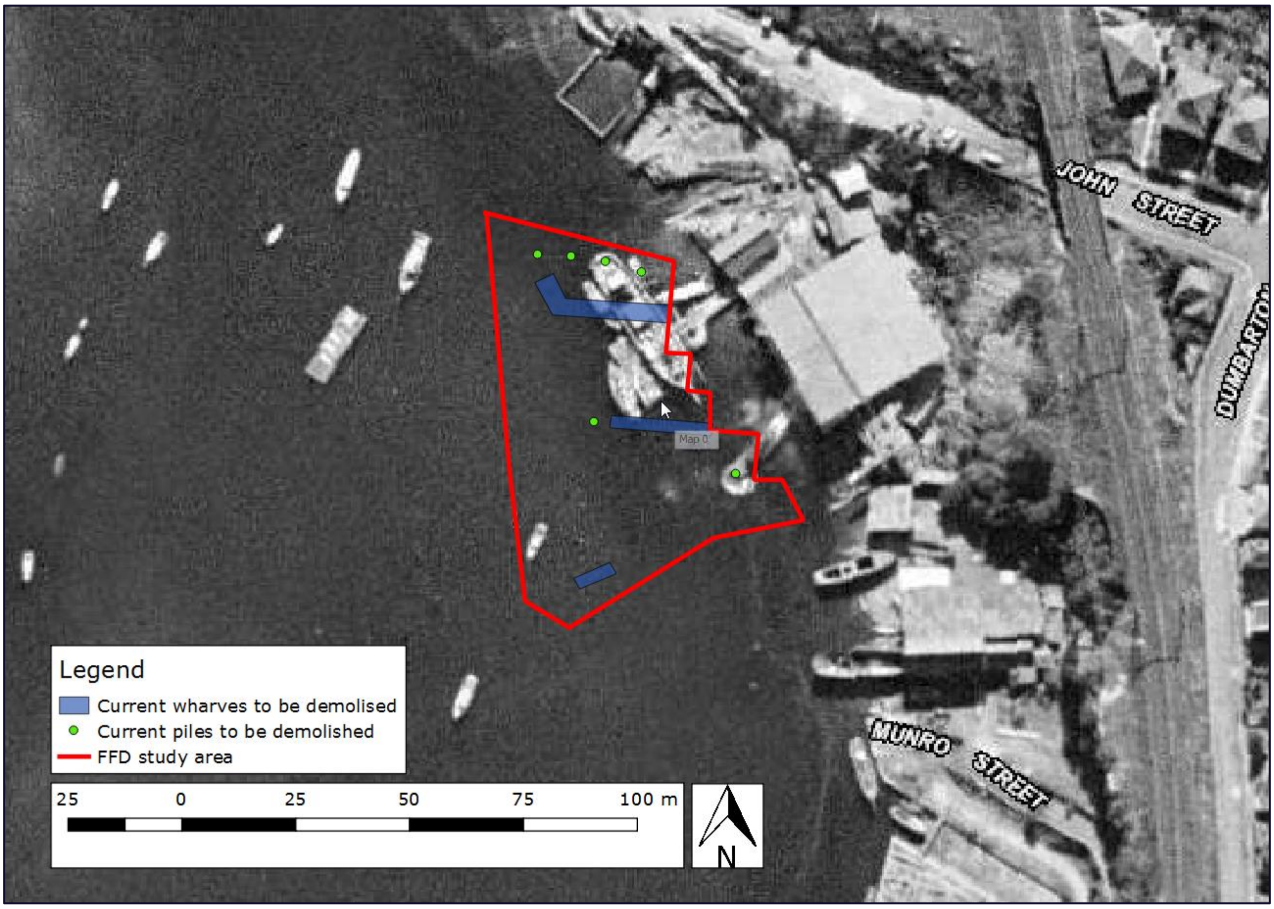


Figure 6: 1943 aerial imagery of Berrys Bay

The 1943 aerial imagery, (Figure 6), shows location of present jetties to be demolished (blue), free-standing piles to be removed (green). None of the structures to be removed were present in 1943. They are contemporary with the 1993 restructure of the marina and shoreline wharf development.

Potential archaeological remains within the study area include ships parts discarded during maintenance, tools, fastenings, ship-board equipment and equipment from the on-shore works area. Apart from the known shipwrecks (see below) within Berrys Bay, the current study found no evidence of wreckage from small, craft or the remains of large vessels that have been broken up.

6.4. NSW Maritime Heritage database entries

There is some suggestion that the ex-naval training ship HMS *Tingira*, renamed *Sobraon*, was broken up at the head of the day. The 1943 aerial shows the remains of a large ship that was in this location at that time (Figure 7). By 1942 the *Sobraon* was described as 'an eye saw' and North Sydney Council requested the then Maritime Services Board to have the hulk removed (NBRA Heritage 2017:17). It is believed to have been at least partly broken up in Berrys Bay and may be the shipwreck shown in the 1943 aerial photograph. These remains are no longer visible and have either been fully removed or partially buried beneath Waverton Park.

Other shipwrecks in Berrys Bay that are on the NSW Maritime Heritage Database are:

Site title	Description	Comment
Unidentified Berrys Bay - east side - Yacht 2	A survey conducted by Port Authority NSW in 2016 found a submerged wreck on the eastern side of Berry's Bay. A multibeam survey also recorded this site on 1 December 2017.	This site is not an historic shipwreck, is outside of the study area and will not be impacted by the FDD.
Unidentified Berrys Bay (Hopper Barge 1)	This shipwreck lies against the bank of Sawmiller's Reserve, Berry's Bay.	This is an historic shipwreck protected under the provisions of

Sydney Harbour		the NSW *Heritage Act 1977.* It is located outside of the study area and will not be impacted by the FDD.
Unidentified Berrys Bay (Hopper Barge 2) Sydney Harbour	This shipwreck lies on the seabed and to the north of Hopper Barge 1	This site is a hopper barge that was identified in the 1999 SSS survey of Berrys Bay. It had previously been inspected by the author of this report. The site is outside of the study area and will not be impacted by the FDD.
Unidentified Berrys Bay - eastern side	A survey conducted by Port Authority NSW in 2016 found a submerged wreck on the eastern side of Berry's Bay.	No details are available on this shipwreck. It is located close to 'Hopper Barge 2' below. Its identity is not known but it is outside of the study area and will not be impacted by the FDD.
Unidentified Berrys Bay - West Side - Cabin Cruiser	A survey conducted by Port Authority NSW in 2016 found a submerged wreck towards the western side of Berry's Bay.	Details of this vessel are unknown but it is outside of the study area and will not be impacted by the FDD.

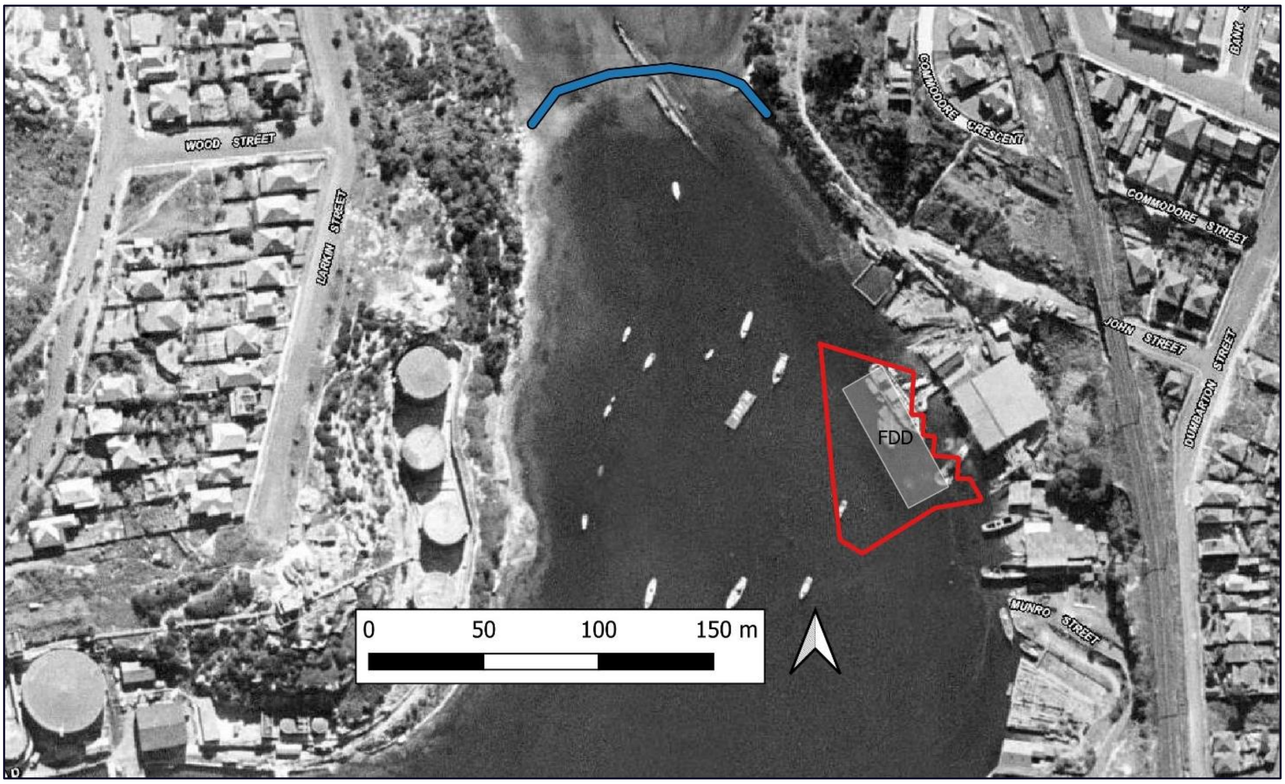


Figure 7: 1943 aerial showing the remains of a large shipwreck about 100m NNW of the study area. About 1/3 of this wreck would now lie beneath Waverton Park. Blue line shows current northern shoreline.

There is a third hopper barge in Berrys Bay that is not yet on the NSW Maritime Heritage database (Figure 8). This site appears in the 1999 side scan sonar and was inspected and identified in 2015 (Nutley, 2015).

6.5. Remote sensing evidence of cultural material on the seabed

Current information on maritime heritage on the seabed within Berrys Bay is mainly limited to shipwrecks which have been located through diver searches or side scan sonar (SSS). A 1999 SSS survey indicates that no significant anomalies are evident in the deeper waters to the west of the study area (Figure 8). The wrecks of three hopper barges within the bay were identified in a 1999 SSS (Nutley 2015).

Within the study area the 1999 SSS imagery showed evidence of numerous anomalies among the piles of the wharf structures. None of these anomalies had the form of a shipwreck. Additional remote sensing would not significantly contribute to the identification of these items. Due to the limited area to be investigated, the inspection of these anomalies was more efficiently achieved through a diver-based archaeological survey.

The wrecks of three hopper barges in Figure 8 are circled in blue. A large, unidentified object is visible south of the study area. This object has not been inspected and is marked on Figure 7 as a 'Large Fragment'. Other anomalies previously inspected within the bay by the author are circled in yellow: 1 - Unidentified but possibly the remains of a spill boom or WWII Boom defence across Berrys Bay; 2 - a collapsed wharf pile; 3 – mooring blocks.

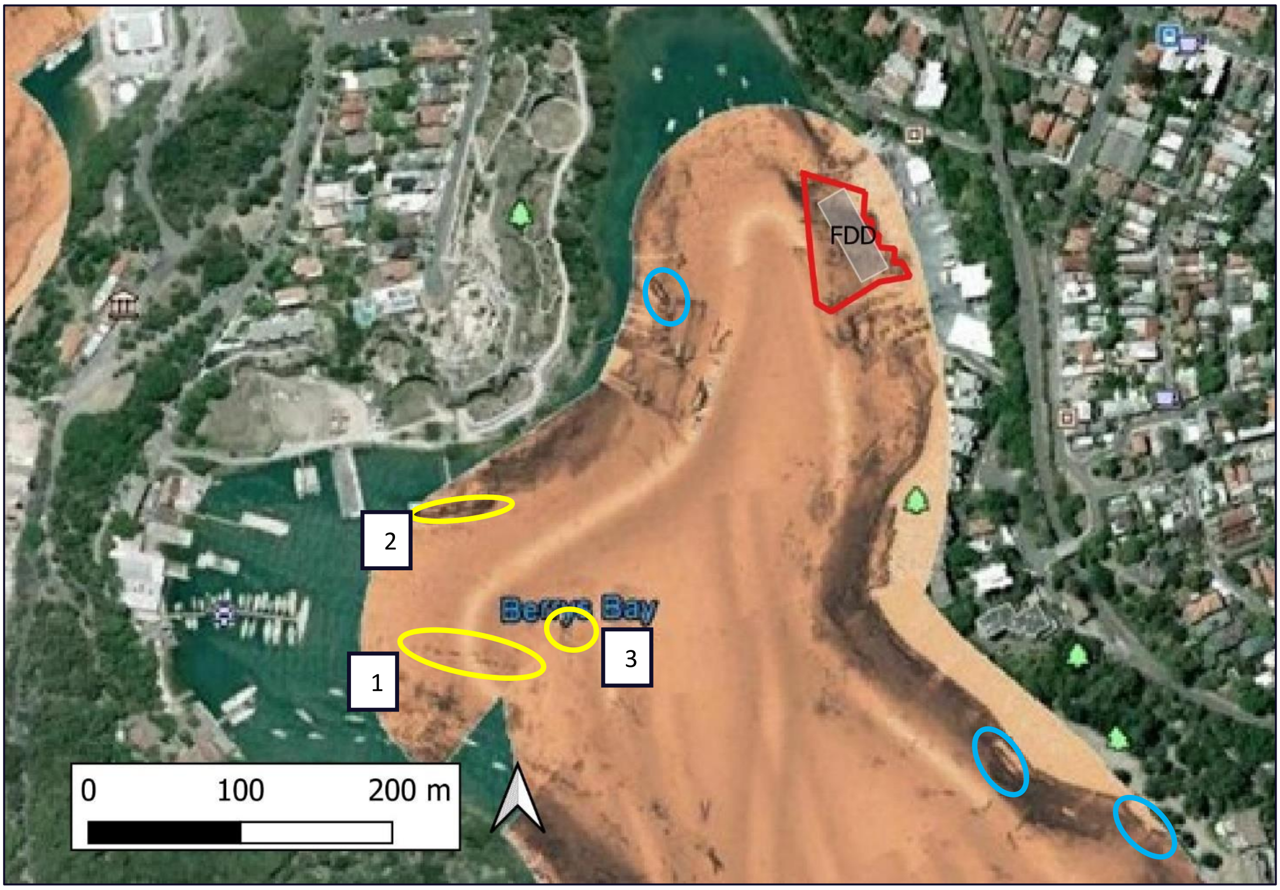


Figure 8: Side scan survey image of Berrys Bay in 1999 (SKM Mertz SSS overlay on Google Earth)

A 2016 Multibeam Echo Sounder (MBES) survey by Port Authority of NSW also shows a relatively barren area between the Noakes lease area boundary and the wharves and piles that would be removed to accommodate the FDD (Figure 9). No shipwrecks or significant structures are shown within the study area component of that survey. The three anomalies that appear along the 7m contour in Figure 9 are, from north to south, a rubber tyre (circled in yellow), and two depressions in the silt (circled in orange).

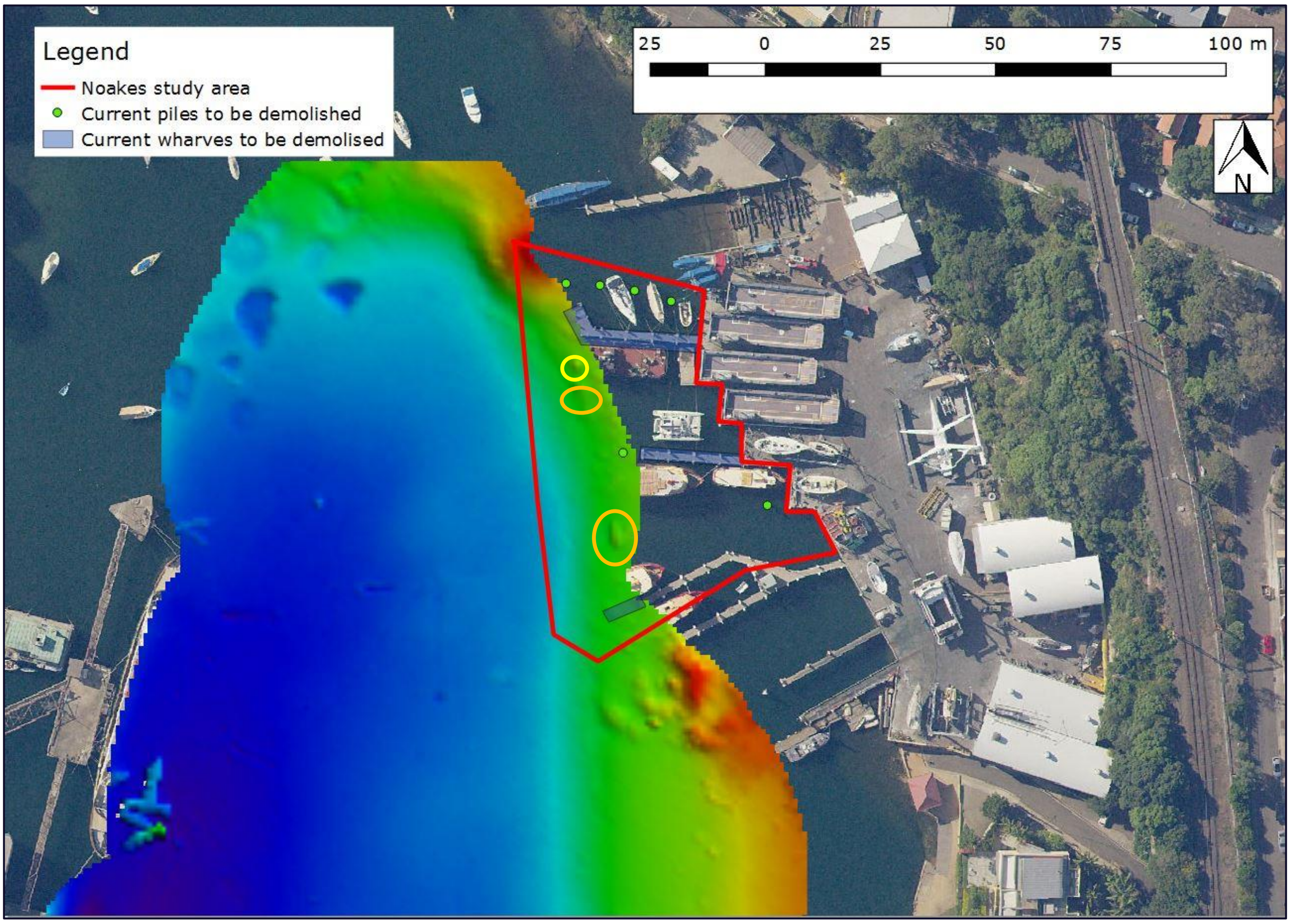


Figure 9: Multibeam Echo Sounder (MBES) survey of Berrys Bay
(Information provided courtesy of the Port Authority of New South Wales. Copyright is owned by Port Authority of NSW

6.6. Items recorded by recreational divers within Berrys Bay

Most recreational diving activity in the bay has been limited mainly to the south-east of the study area as illustrated on NSWWrecks.info on Google Maps (Figure 10). These items are not within the study area.

6.7. Geotechnical data

As noted in section 5.4, the EIS includes data from the Preliminary Contamination Assessment by Jacobs in 2018. This identified the presence of some 5m of fill across the site which included items such as bricks, glass, wire and steel.

While inclusions such as bricks, glass, wire and steel are not necessarily significant relics, their presence within sediments is an indicator for the potential presence of relics protected by the *Heritage Act 1977*.

The data in the EIS does not provide evidence of the spread or frequency of cultural objects within the fill layer – nor the source or dating for the presence of that fill. It may be at least partially related to the period of reclamation along the original foreshore. Additional materials may have originated from items that have fallen from boats or wharves. While this could potentially date from the earliest European activity within the bay, the data acquired from archaeological investigations in other estuarine settings suggests that concentrations are closest to wharves and foreshores and decline rapidly within a few metres of those foreshores and foreshore structures. Asa the earlier foreshore and early jetties are under reclaimed land some distance east of the study area, it is also expected that objects related to earlier phases of European occupation will also be predominantly in those earlier near-shore zones.

The layer of residual soils below the fill layers is also an indicator for the potential presence of Aboriginal objects dating from the period prior to sea level rises that inundated Sydney Harbour.

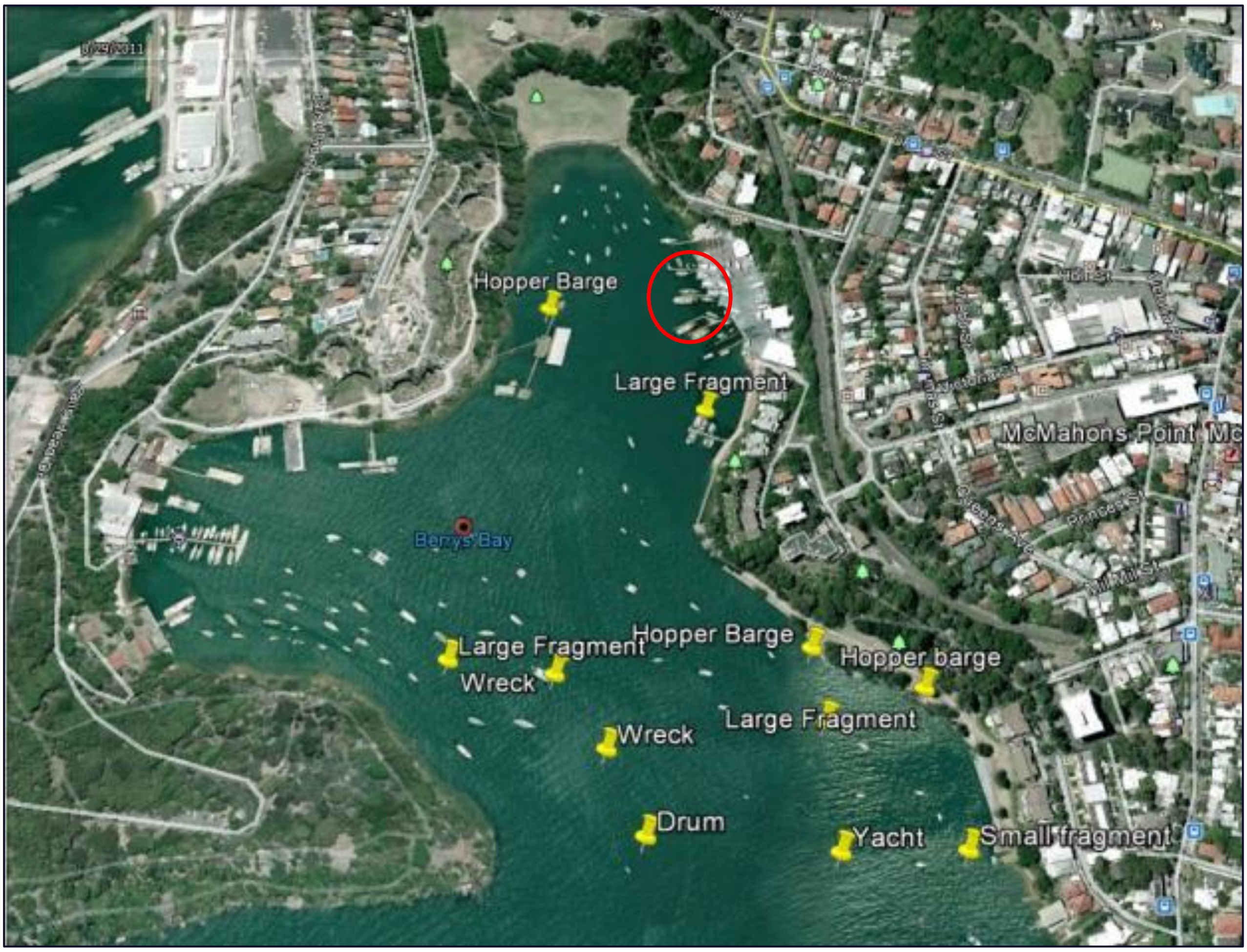


Figure 10: Sites of known shipwrecks and other cultural items within Berrys Bay. Both the hopper barge to the west and the 'Large fragment' to the south are approximately 100m outside of the study area (NSWWrecks.info 2015)

6.8. Conclusions

The history of the bay in the Statement of Heritage Impact (NBRS Heritage 2018) underlines the potential of the study area to have accumulated early colonial cultural remains associated with the use of the bay for port and maritime industry activities. There is potential for such remains to include tools, equipment and abandoned obsolete watercraft. Ship repair and servicing has the potential to be associated with the discard of ship's components (eg, engines, engine parts, boilers, propeller.)

Deposits may arise from other sources. These include ship building, ship repairs, the servicing of vessels. Seabed contamination could have implications for any archaeological investigations. Potential sources of contamination include the application of anti-foul, leaks during the transfer of oil to and from the former bulk storage tanks in the bay and from vessels at the Noakes Group site.

From available historic sources, remote sensing records, prior maritime archaeological studies in the Bay and information from recreational divers, there is no indication that an historic shipwreck is likely to be within the study area. Any early structures will be along the original foreshore and will not extend into the current study area.

No evidence of a history of dredging in the study area has been located and the absence of this is supported by the remote sensing imagery. In addition, the geotechnical studies have identified around 5m fill over the site containing items such as bricks, glass, wire and steel. Therefore, the study area does possess the potential to contain deposits of small items of cultural heritage relating to the long history of maritime industry.

The underwater archaeological inspection for this project was undertaken to assist in identifying any visible items of heritage significance that may be impacted by (a) the removal of piles, and (b) the FDD if it was to settle on the seabed at low tide or misadventure.

7 SITE INSPECTION

The site inspection identified a wide variety of items. These included:

- Various tyres – often used as fenders
- Bottles – all of recent origin
- Isolated girder of 3-4m in length
- A role of carpet
- Several pieces of netting
- 5 isolated piles lying across the site. These were unattached to any structure and showed evidence of decay where they had been broken or been cut off.
- Ladders – 1 'A' frame and 3 sections of straight ladders
- 1 trestle
- 2 shopping trolleys
- A length of steel sheet pile
- Sections of scaffolding
- Sections of PVC pipe of approximately 100mm diameter
- Small sections of ferrous pipe up to 2m in length
- A timber beam ~7m in length and 100mmx100mm in cross section
- A 1.5m timber beam
- A large concrete block ~2m x 1.5m x 0.5m. This block had no visible attachment points.
- Several coils of steel and rope cable
- Miscellaneous scraps of ferrous metal

The majority of the debris was lying close to and under the existing wharves. There was very little debris in the open water towards the western boundary of the lease area. There was no evidence of a shipwreck or items of local or State significance. The observed material in the study area was consistent with post-1993 activities associated with the maintenance of vessels at the marina.

8 ASSESSING SIGNIFICANCE

8.1. Preamble

Significance assessment is the process whereby buildings, items, landscapes and archaeological remains are assessed to determine their value or importance to the community. The significance of an archaeological site can be diminished by disturbance and removal of elements within the site/deposit that creates a loss of integrity and the ability of the site to yield archaeological information.

The following criteria have been developed by the NSW Heritage Division and embody the values contained in the Burra Charter. The Burra Charter provides principles and guidelines for the conservation and management of cultural heritage places within Australia. It defines 'cultural significance' as meaning 'aesthetic, historic, scientific and social value for past, present and future generations.' Significance is therefore an expression of the cultural value afforded a place, site or item.

8.2. Assessment of significance

Criterion (a): Historic Significance - (evolution)
An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (b): Associative Significance – (association)
An item has strong or special association with the life or works of a person, or group of persons, or importance in NSW's cultural or natural history (or the cultural or natural history of the local area)
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (c): Aesthetic Significance - (scenic qualities / creative accomplishments)
An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the cultural or natural history of the local area)
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (d): Social Significance - (contemporary community esteem)
An item has a strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons (or the cultural or natural history of the local area)
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (e): Technical/Research Significance - (archaeological, educational, research potential and scientific values)
An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area)
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (f): Rarity
An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area)
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (g): Representativeness
An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area)
In respect of the maritime heritage, the study area does not meet this criterion.

Criterion (h): Intactness
In respect of the maritime heritage, the study area does not meet this criterion.

9 IMPACTS AND MITIGATION

9.1. Introduction

The wharf piles and free-standing piles that have been targeted for removal are post-1993 do not have significant heritage value and can be removed.

No relics within the meaning of the *NSW Heritage Act 1977* were identified on the seabed. However, due to the long history of boat building and boat maintenance within the vicinity of the study area, there is potential for relics to be present in sub-bottom contexts.

9.2. Impacts and mitigation

Impacts associated with wharves and piles identified for removal

The piles would be extracted from the seabed by means of a barge mounted lifting rig.

The potential impacts are as follows:

Impacts	Mitigation
Extraction of each pile would be accompanied by upheaval of the surrounding sediment. This creates a potential for relics, currently protected in an anerobic environment to be disturbed and to be moved into an oxygenated environment, subject to abrasion and prone to increased rates of deterioration. The level of potential impact is assessed as moderate.	An inspection of the seabed by an archaeologist following the extraction of the piles.

Impacts associated with the berthing of the FDD in the study area

The FDD is a floating platform that would be berthed at the shoreline wharves. No dredging would be required to provide that access and no relics have been identified on the seabed that may be impacted.

If the FDD were to settle onto the seabed, the extent of disturbance would be limited to the surface layers. The FDD is in an area that is a 40-55m distant from any early structures originally along the shoreline and no other significant structures have been installed within the study area. While it is possible that isolated cultural items may be present within the 5m of fill, there is a very low potential for surface disturbance to impact on such items due either settling or dragging of the hull of the FDD along the seabed.

Apart from the archaeological inspection following extraction of piles, no additional mitigation measures are required to protect underwater cultural heritage from berthing of the FDD.

9.3. Conclusions

The following conclusions are the result of:

- the analysis of the history of the site contained in this report
- the results of the visual inspection of the seabed in the study area detailed in this report
- the nature of the proposed works to reconfigure wharfage to accommodate the FDD.

This maritime archaeological assessment of the proposed works concludes that:

1. The potential impacts on any relics in the study area is limited to the extraction of existing piles by lifting them from the seabed. The mitigation measure is a dive inspection of the seabed by an archaeologist immediately following extraction of the piles.
2. The ongoing presence of the FDD in the study area, or during movements within the bay would have no impacts on underwater cultural heritage in Berrys Bay.
3. Except for the mitigation measures identified for extraction of existing piles during reconfiguration of the existing wharfage, no further mitigation measures are required to protect underwater cultural heritage during reconfiguration of berthing facilities for the FDD.

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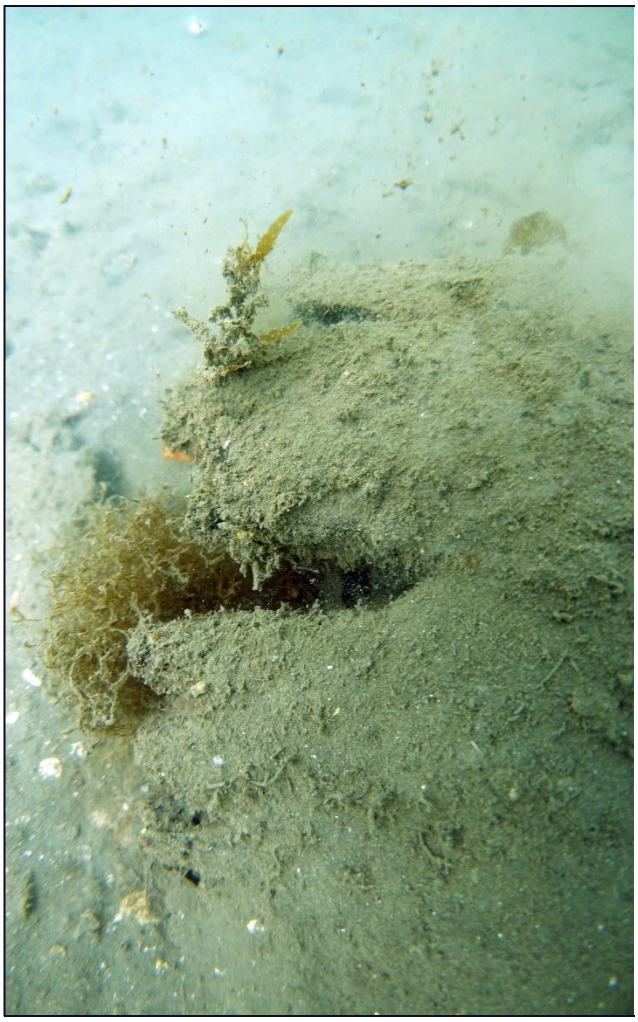
APPENDIX A: PHOTOGRAPHS

Photograph 1: Fallen timber pile 1

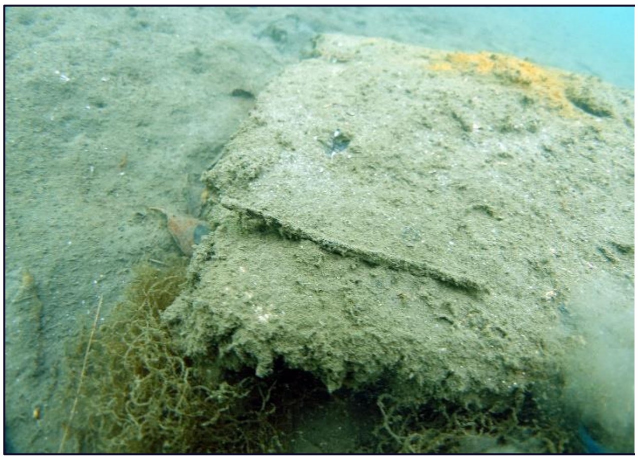


Photograph 2: Fallen timber pile 2 in middle of search area

Photograph 3: Fallen timber pile 3 near south end of search area

Photograph 4: Mixed debris below northern jetty wharf – coil of steel rope, miscellaneous metal

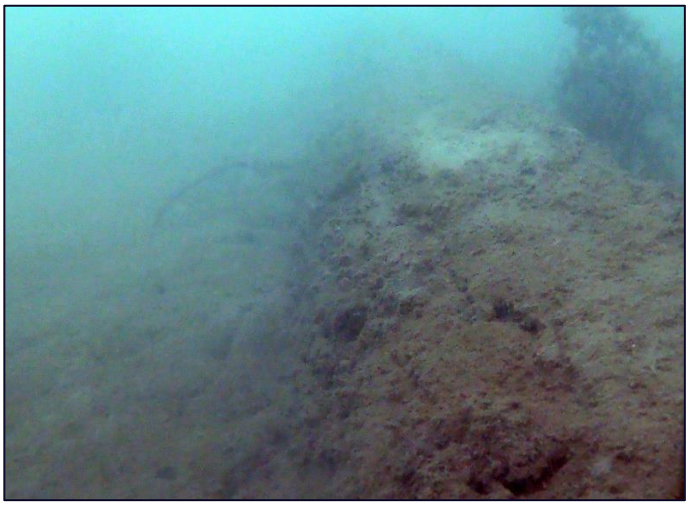
Photograph 5: Typical seabed near northern wharf



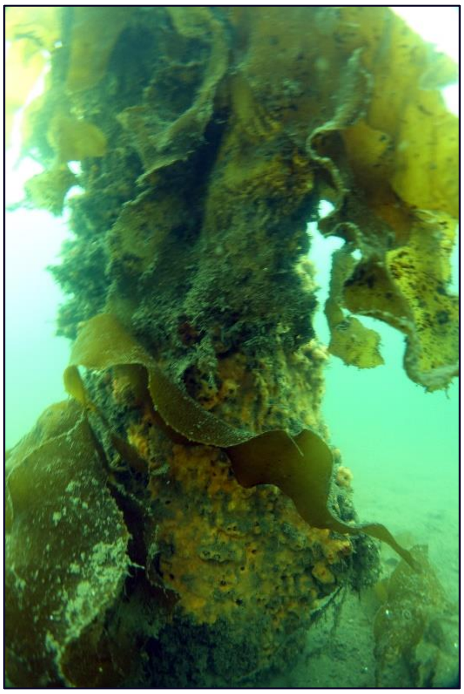
Photograph 6: sheet of metal and fishing net

Photograph 7: Section of rope and miscellaneous metal fragments

Photograph 8: Bank stabilisation inshore near northern line of piles



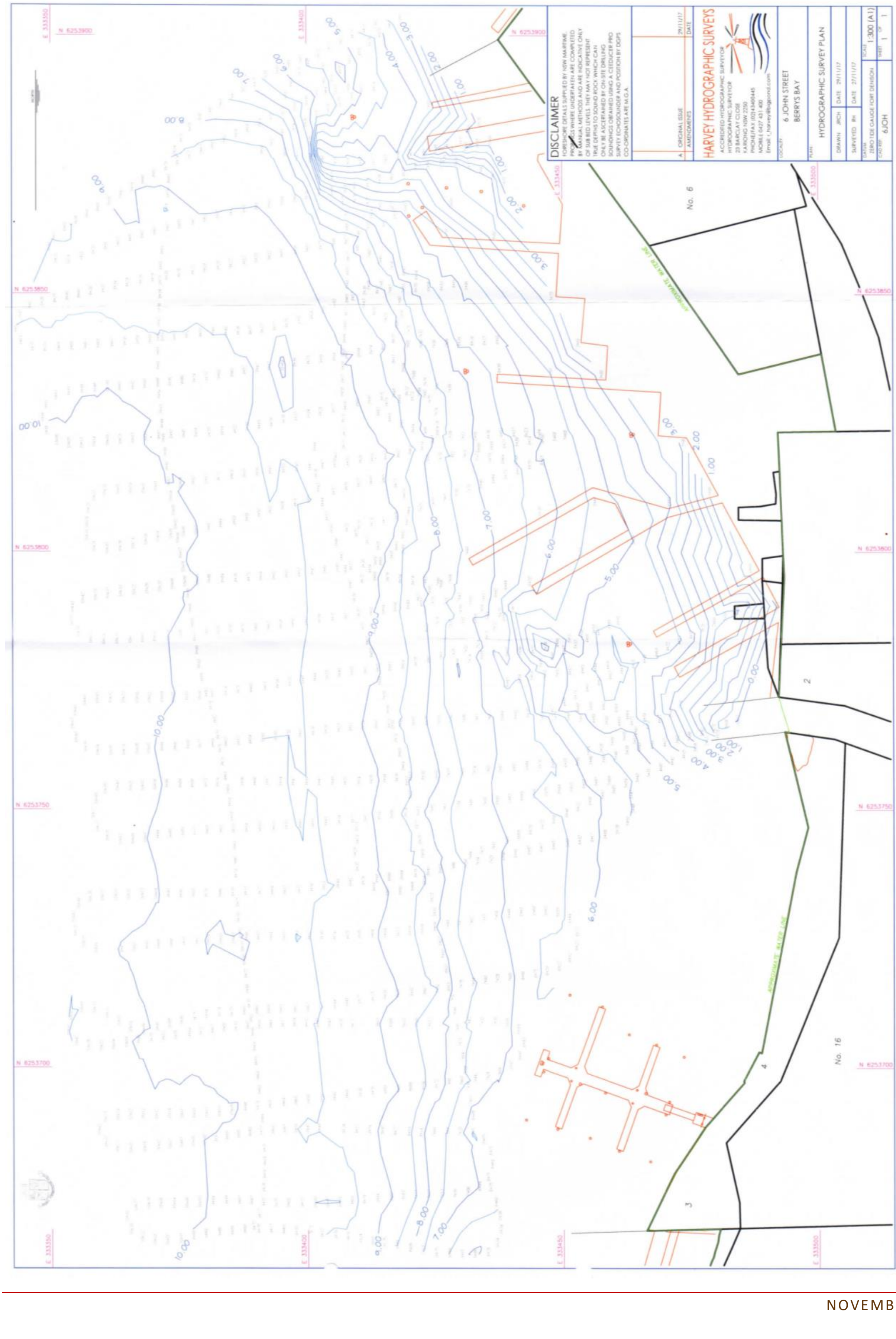
Photograph 9: Fallen timber pile 4



Photograph 10: Timber pile at north, west extremity of search area with heavy growth of kelp

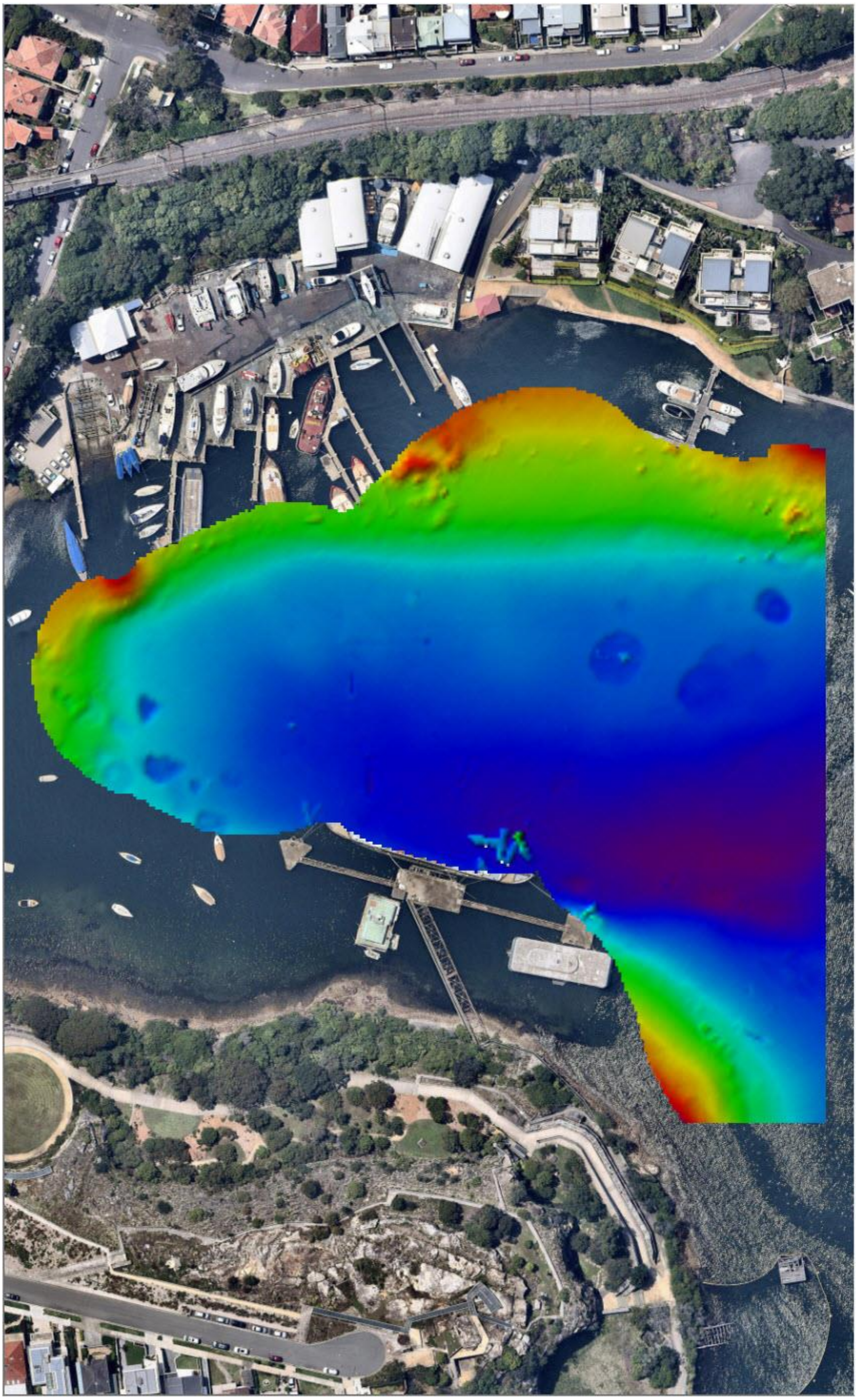
APPENDIX B: HYDROGRAPHIC SURVEYS

a. Hydrographic survey plan – depths – Harvey Hydrographic Surveys 29/11/2017



b. Hydrographic Survey – Altis 06/12/2017

c. Hydrographic survey plan – NSW Port Authority 2016



REPORT

Stannards Marine Pty Ltd v North Sydney Council

Navigation Issues Response

Client: Noakes Pty Ltd

Reference: PA2987WMRP211203

Status: Final/02

Date: 03 December 2021

HASKONING AUSTRALIA PTY LTD.

Level 15
99 Mount Street
North Sydney NSW 2060
Water & Maritime
Trade register number: ACN153656252

+61 2 8854 5000 **T**
project.admin.australia@rhdhv.com **E**
royalhaskoningdhv.com **W**

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Author(s):	Rick Plain
Drafted by:	Rick Plain
Checked by:	Gary Blumberg
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Classification
Open

Royal HaskoningDHV

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Appendices

1 Background

The report herein outlines Royal HaskoningDHV's (RHDHV's) response to North Sydney Council's experts and Colville Marine Pty Ltd. The response herein is specifically in regard to matters relating to navigation and stability to the extent that it influences navigation. This report should be read in conjunction with the Noakes Boat and Shipyard Floating Dry Dock Navigation Impact Assessment (RHDHV, 2019). Matters relating to navigation from Council's experts and Colville Marine include the following:

- Applicant to provide additional cross-sectional detail of the maximum-sized vessels that can be loaded onto the FDD based on hydrographic survey.
- Applicant to prepare agreed list of operational procedures for the FDD dealing with matters of timing of operation and stability assessment.
- Applicant to provide details of berthing, lifting and unloading sequences including timing of each stage and FDD draft at each stage.
- Applicant to provide analysis of annual tidal data identifying monthly loading and unloading dates to assess operational requirements to delivery monthly cycle.

These matters are addressed in **Section 2** to **Section 5** herein.

In addition to the above, the report herein also provides at **Section 6** a response to the Review of the Noakes Proposal to use the Floating Dry Dock in Berrys Bay (Colville Marine Pty Ltd, 2021).

2 Maximum vessel size and cross section detail

Additional hydrographic survey information was collected by Port Authority of NSW on the 20th October 2021. The hydrographic survey is provided in **Appendix A**. The survey complies with Ports Australia Class A standards.

An overlay of the FDD in the berthing pocket and loading pocket is provided in **Appendix B** along with cross-sections at the critical location/s. The minimum water depth is as follows:

- Berthing pocket: -4.5m CD; and,
- Loading pocket: -3.0m CD.

An assessment of water depths and UKC, based on the revised survey, is provided herein.

2.1 Berth Pocket

The minimum freeboard for a FDD, in accordance with the Department of Defense Standard Practice Safety Certificate Program for Drydocking Facilities and Shipbuilding Ways for U.S. Navy Ships (MIL-STD), is 0.3m. For the proposed FDD, this would result in a draft of 2.443m (pontoon depth 2.743m). The minimum freeboard, with a 1,000t lift, is achievable (Shearforce Maritime Services Pty Ltd, 2016).

The Harbour Master Directions Sydney Harbour and Port Botany (15 February 2021) note that in a berth box, Under Keel Clearance (UKC) must be a minimum of 0.5m unless otherwise directed. It should be noted that the Harbour Master Directions were updated following the Navigation Impact Assessment (RHDHV, 2019). As such, UKC of 0.5m would be adopted herein.

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Based on the maximum bed level of -3.0m CD, the UKC would be 0.56m at Lowest Astronomical Tide, which complies with the Harbour Master Directions.

John Butler Design has been engaged to provide an assessment of dynamic movement of the FDD under wave action.

2.2 Lifting Pocket and Updated Assessment of Vessel Draft

In line with the Harbour Masters Directions, an UKC of 0.5m between the FDD and seabed would be adopted herein. The waterplane of the FDD, when submerged, is relatively small (wingwalls only). As such, minimal movement of the FDD due to wave action is expected. John Butler Design has been engaged to provide an assessment of dynamic movement of the FDD under wave action.

Noakes intends to use concrete keel blocks (keel line to deck) varying in thickness from 300mm to 1200mm.

The water level adopted for submergence of the FDD is 1.3m CD, which is the water level 2 hours either side of MHWS (1.57m CD) in accordance with the Navigation Impact Assessment (RHDHV, 2019). The maximum water depth available for submergence of the FDD is 5.8m (water depth at CD [-4.5m CD] plus tide [1.3m CD]). Since 5.8m is less than the maximum draft of the FDD (8.68m, refer **Table 1**), the FDD could not be fully submerged and the vessel draught for loading onto the FDD would be limited by the available water depth.

Assuming the following dimensions, the maximum vessel draught that could be loaded onto the FDD is approximately 1.96m:

- Water depth of 5.8m;
- FDD UKC (from seabed to the bottom of the FDD) of 500mm;
- FDD pontoon height of 2.743m;
- Keel block height of 300mm (above the deck of the FDD pontoon. Note that this is the minimum keel block thickness and maximum vessel draught would decrease if keel block thickness increases); and,
- Vessel under keel clearance (from vessel to keel blocks) of 300mm. Note that this assumes calm conditions for loading the vessel.

(Equation: Maximum vessel draft = 5.8m – 0.5m – 2.743m – 0.3m – 0.3m = 1.96m

While this draught would preclude a number of sailing yachts, which typically have a deeper draft, recreational cruisers and shallow draft commercial vessels could be docked on the FDD.

The FDD does not need to be submerged to the maximum draught when loading and unloading shallower draught vessels. Loading of shallow draft vessels does not require full submergence of the FDD and could be undertaken at lower water levels.

3 List of operational procedures for the FDD dealing with matters of timing of operation and stability assessment.

The MIL-STD and Design of Marine Facilities Engineering for Port and Harbor Structures (Gaythwaite, 2016) both specify 5 phases of operation of an FDD as follows:

- Phase 1 — Dock at full submergence without vessel. The vessel is floating independently and the dry dock is in the submerged condition before the vessel bears on the blocks.
- Phase 2 — Partial liftoff. Vessel starts bearing on the blocks and one-half of the vessel's weight is supported by the floating dock.
- Phase 3 — External waterline at the top of the keel blocks (i.e. vessel keel at water level).
- Phase 4 — Top of pontoon at water level. The water level between the wingwalls is just above the top of the pontoon.
- Phase 5 — Dock at normal operating draft. Top of pontoon is at or above the minimum freeboard.

A stability assessment has been undertaken by Shearforce Maritime Services Pty Ltd (November, 2016). The stability assessment was undertaken in accordance with the MIL-STD requirements. The stability assessment is provided in **Appendix C** and includes the following:

1. Buoyancy requirements
    (a) The minimum rated freeboard at the lowest point of the pontoon deck of the dock with the vessel lifted shall be 12 inches (0.305m). The floating dock lifting capacity variation with docked vessel longitudinal locations is provided in **Figure 1**. The FDD complies the requirement of MIL-STD.

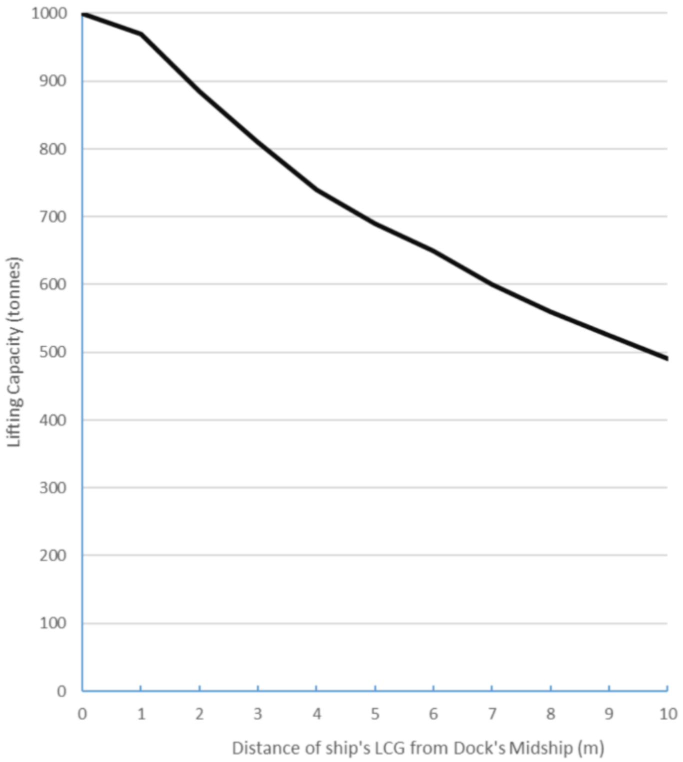

Figure 1: Floating dock lifting capacity variation with docked vessel longitudinal locations (LCG – longitudinal centre of gravity), Shearforce, 2016.

2. Intact Stability Requirements
   (a) Metacentric Height (GM) in the phase of minimum stability shall not be less than 5 feet (1.524 m). The limiting curve of docked vessel adjusted vertical centre of gravity (VCG) vs. dock lifting capacity is provided in **Figure 2.** The GM for Phase 1, 2, 4 and 5 for a 1000t vessel is provided in **Table 1**. The FDD complies with the requirement of MIL-STD.

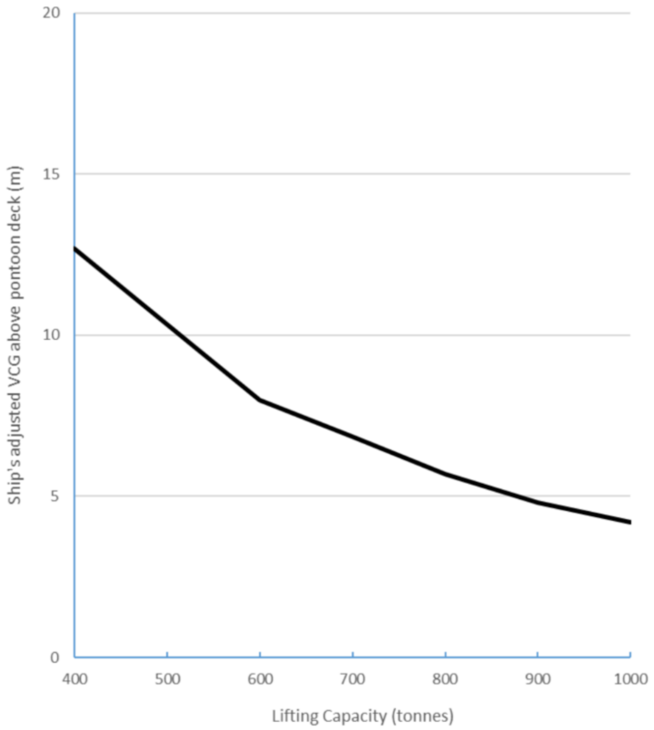

Figure 2: Limiting curve of docked vessel adjusted VCG vs.dock lifting capacity (Shearforce, 2016).

Table 1: GM in Phase 1, 2, 4 and 5 for 1000t vessel (Shearforce, 2016).

	Ship	Ballast	Total	VCG	Draught	GM	Status
	tonne	tonne	tonne	m	m	m	
Phase 1	-	3314	4763	3.61	8.68	2.56	Comply
Phase 2	500	2222	4179	4.47	6.10	1.98	Comply
Phase 4	1000	839	3304	6.26	2.90	3.73	Comply
Phase 5	1000	308	2773	7.34	2.30	7.90	Comply

Note: the adjusted VCG of the docked ship is 5.2m from the pontoon deck

(b) The dock shall withstand the effects of beam winds stated below without heeling more than 15 degrees.

i. a 100-knot beam wind, when the vessel is fully docked, vessel and dock system in Phase 5.
ii. a 20-knot beam wind, when the vessel and dock system is in its minimum-stability phase.
iii. determine the wind that would cause 15-degree heel when the vessel and dock system is in its minimum-stability phase.

The heeling effect from beam wind is provided in **Table 2**. The FDD complies the requirement of MIL-STD.

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Table 2: Heeling from beam winds effect (Shearforce, 2016).

Criteria	Requirement	Actual	Status
Heel angle under 100 knot beam wind with ship docked in Phase 5	Maximum 15 degree	1.68	Comply
Heel angle under 20 knot beam wind with ship dock minimum stability	Maximum 15 degree	0.24	Comply
Determine windspeed that would cause 15-degree heel in minimum stability Phase	-	155 knots	N/A

3. Damaged stability and reserve buoyancy requirements.
   (a) Side shell and bottom shell damage in fully ballasted and deballasted conditions.

   The damaged stability calculations indicate that in both the fully ballasted and deballasted conditions, the angle of heel due to the shell damage does not comply with the MIL-STD. It should be noted that the stability assessment assumed damage at the location of a bulkhead with flooding of 2 tanks (note that the pontoon comprises 12 tanks). To comply with the damage stability requirements, additional watertight bulkheads could be added to reduce the size of individual tanks.

The FDD has been modified following completion of the stability assessment. The vertical centre of gravity of the FDD is expected to be lower due to removal of generators, walkway and redundant upper deck machinery, including a crane. An inclining experiment is required and the stability assessment is subject to change once the actual stability data is obtained through the inclining experiment. However, stability is expected to improve.

4 Details of berthing, lifting and unloading sequences including timing of each stage and FDD draft at each stage.

An assessment of the timing of operation was included in the Navigation Impact Assessment (RHDHV, 2019). The time required to complete slewing and loading operations is discussed as follows:

- Slewing of the FDD out into the loading pocket would be completed in approximately 30 minutes.
- Submerging the FDD would be completed in approximately 45 minutes.
- Loading a vessel onto the FDD would be completed in approximately 90 minutes. It is noted that the time required to unload a vessel would be less than the time required to load a vessel.
- Floating the FDD would be completed in approximately 120 minutes.
- Slewing the FDD back into the berthing pocket would be completed in approximately 30 minutes.
- Total 5.25 hours.

In the above assessment, the FDD would be submerged on a flooding tide and floated on an ebbing tide (i.e. operations timed around high tide). The total ballast in Phase 1 is 3,314 tonnes (refer **Table 1**), which equates to ~3,236m^3 (3,236,000L) of salt water. Note that this assumes a draft of 8.68m, which is more than the available water depth at the site. The FDD would be submerged to approximately 5.3m (0.5m UKC and water depth of 5.8m measured 2 hours either side of MHWS, refer **Section 2.2**). The volume of water when submerged would therefore be somewhat less. Noakes has advised that the time required to float the FDD from a 5m draft to a 1.8m draft is approximately 1.5 hours. However, this would be dependent on the displacement of the vessel to be docked.

The FDD draft in each Phase of operation is outlined below:

- Phase 1 – limited by water depth and requirement for UKC of 500mm. In accordance with the assessment in **Section 2.2**, draft would be 5.3m.
- Phase 2 – draft is approximately equal to Phase 1 less half of the vessel draft (approximately 4.3m).
- Phase 3 – draft equal to the depth of the pontoon (2.743m) plus thickness of keel blocks (300mm), which is approximately 3.04m.
- Phase 4 – draft is equal to depth of the pontoon (2.743m).
- Phase 5 – draft to maintain at least 300mm freeboard is 2.44m. Note that in accordance with **Table 1**, at maximum lift of 1000t, the FDD would be ballasted with 308 tonnes of water to achieve 300mm freeboard. Depending on the weight of the vessel and ballast, and stability of the FDD, draft could be reduced and freeboard could be increased. Further assessment by a naval architect would be required.

5 Analysis of annual tidal data identifying monthly loading and unloading

An analysis of tidal data has been undertaken based on the forecast high and low tides from 1st January 2021 to 31st December 2024 (4 years of data). The forecast high and low tides have been obtained from NSW Department of Planning Industry and Environment. The forecast high tides have been filtered to include forecasted water levels above 1.57m CD (Mean High Water Springs [MHWS]) occurring Monday to Friday and between 9:30am and 3:30pm. This restricts operation of the FDD to standard working hours (7am to 6pm) and caters for 2.5 hours either side of MHWS to slew/warp and ballast (of float and slew/warp) the FDD. It should be noted that:

- the water level adopted in the analysis of maximum vessel draft in **Section 2** is based on the water level two hours either side of MHWS and is therefore consistent with the analysis herein and includes time to slew; and,
- loading of shallow draft vessels does not require full submergence of the FDD and could be undertaken at lower water levels.

An analysis of the data presenting high tides exceeding 1.57m CD and occurring on a weekday between 9:30am and 3:30pm is provided in **Figure 3**. In total, there are 158 days where this criteria is satisfied (average of 39.5 days per year). However, water levels exceeding MHWS are skewed with higher tides occurring between November and April. There is a period of 3-5 month each year, typically between May/June and August/September, when a water level exceeding MHWS is not forecast at a suitable time of day.

Reducing the target water level for loading vessels to 1.37m CD, as shown in **Figure 4**, greatly increases the number of days with suitable water level. In total, there are 342 days where this criteria is satisfied (average of 85.5 days per year). The maximum vessel draft that could be docked would decrease by 200mm from 1.96m to 1.76m.

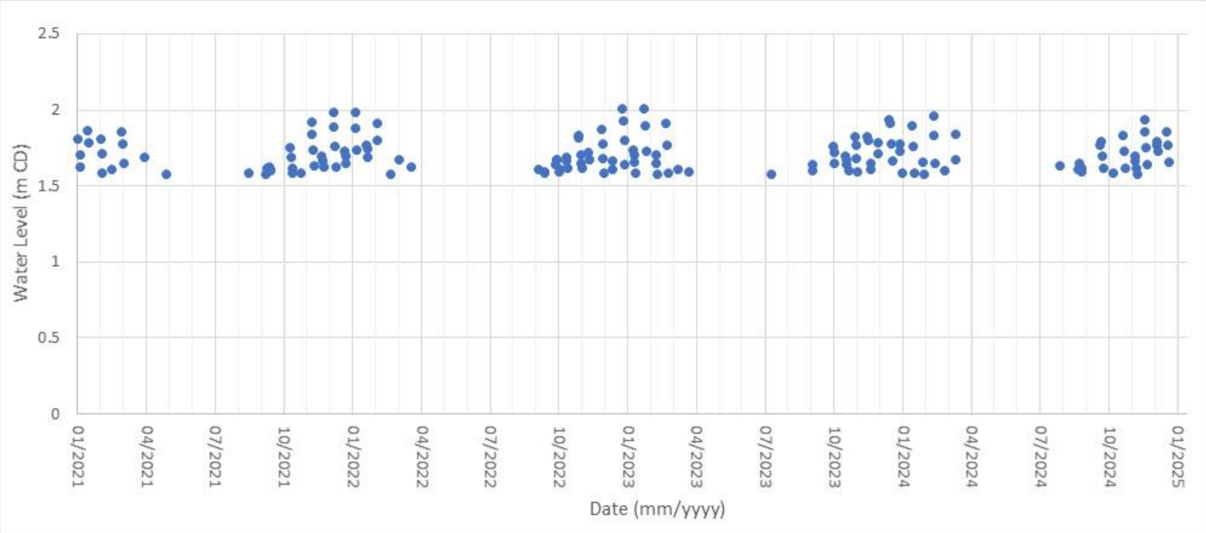

Figure 3: High tides exceeding 1.57m CD and occurring on a weekday between 9:30am and 3:30pm.

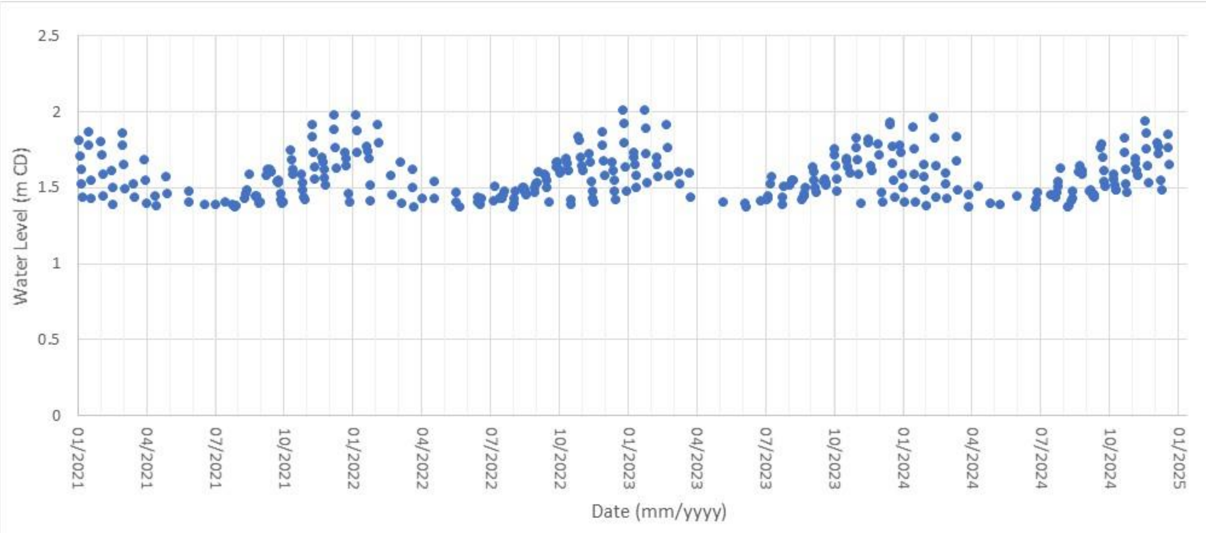

Figure 4: High tides exceeding 1.37m CD and occurring on a weekday between 9:30am and 3:30pm.

6 Response to the Review of the Noakes Proposal to use the Floating Dry Dock in Berrys Bay (Colville Marine Pty Ltd, 2021).

Colville Marine Pty Ltd, 2021 undertook a review of the Noakes proposal to use the FDD in Berrys Bay. The review by Colville Marina includes the following main headings:

1. Executive Summary
2. Market forces and the typical docking
3. Seamanship and navigational issues
    - (a) COLREGS
    - (b) Slewing, warping and berthing lines
    - (c) Safe Distances
    - (d) Wash, waves and wave action

(e) Lines of approach
(f) Restrictions imposed by the swing basin and lines of approach
(g) Entering the dock

4. Dock Stability
    (a) Ballast and deballast operations
    (b) The Docking Plan
    (c) Analysis of the ballast and deballast operation
5. Under Keel Clearance
    (a) Identifying the correct UKC standard
    (b) Wave action and the UKC
    (c) Identifying the UKC through risk assessment
    (d) A Cross Section of the FDD operations
6. Maritime Lease and Consent to Lodge
7. Other Environmental issues
    (a) Jacobs Waste Management EIS
    (b) Jacobs Water Quality EIS
    (c) Jacobs Noise and Vibration Assessment
    (d) Jacobs Contamination Reports
    (e) Historical Woodleys Contamination Reports
8. Documents Reviewed and References
9. Conclusions

Commentary on each of the headings is provided where applicable. One of the main critiques from Colville Marine is the guidelines adopted for the navigation assessment. The navigation assessment in the Navigation Impact Assessment (RHDHV, 2019) was based on:

- AS3962-2001 Guideline for design of marinas; and,
- Harbour Approach Channel Design Guidelines (PIANC, 2014).

The Navigation Impact Assessment (2019) notes the limitation of both guidelines. However, in lieu of more suitable guideline documentation, these documents have been used as a reference. Alternate guidelines could be considered including:

1. PIANC Design and Operational Guidelines for Superyacht Facilities (2013);
2. PIANC Guidelines for Marina Design (2016); and,
3. PIANC Design Guidelines for Inland Waterway Dimensions (2019).

These guidelines would not substantially change the navigation impact assessment as the various guidelines include similar requirements. Indeed, more recent PIANC guidelines specify reduced navigation widths, which reflects on the improved manoeuvrability of modern vessels.

6.1 Market forces and the typical docking

The response by Colville Marine speculates on market forces and makes a number of assumptions. The Navigation Impact Assessment (RHDHV, 2019) notes constraints around water depths for operation of the FDD, which limits the maximum vessel draft that could be docked on the FDD. This limits the economic benefit of the FDD. However, it does not preclude use of the FDD.

6.2 Seamanship and navigational issues

6.2.1 COLREGS

The assessment and critique of the interpretation of COLREGS is somewhat irrelevant. The Navigation Impact Assessment (RHDHV, 2019) correctly identifies that:

> *The NSW Marine Safety (General) Regulation 2016 and Marine Safety Act 1998 adopts the COLREGS and includes minor modifications and additional special rules applicable to NSW waterways.*
>
> *The RMS produced the NSW Boating Handbook (RMS, 2016), which is an interpretation of the law and legislation.*

Two key rules in the COLREGS were highlighted in the Navigation Impact Assessment (RHDHV, 2019). As correctly identified by Colville Marine, all of the COLREGs Part B – Steering and Sailing Rules (Rules 4 to 19) are key to preventing collisions between vessels in sight of one another. However, the NSW Boating Handbook (RMS, 2016) provide an interpretation of the law and legislation, including the COLREGs, in layman terms. For the purpose of a document prepared for public exhibition, it is deemed preferable to provide a simple explanation of laws and legislation where practical, which the NSW Boating Handbook (RMS, 2016) and the Navigation Impact Assessment (RHDHV, 2019) provides.

6.2.2 Slewing, warping and berthing lines

Cold move slew is defined in the Navigation Impact Assessment. It means that the FDD is relocated by moorings lines with the assistance of hand operated capstans (winches). Warping means to move a vessel by hauling on a rope fixed so a stationary object. Either terminology is acceptable, provided that the terminology in the Environmental Impact Statement is consistent.

As noted in the Navigation Impact Assessment (RHDHV, 2019), the provided mooring line arrangement is indicative only and may be altered to suit floating dock winch locations and hardstand bollard locations. It is understood that additional bollards, leads and capstans may be required. The use of 'bow' and 'stern' when referring to the FDD has been avoided as the bow and stern of the FDD is not clearly defined. The term 'athwartship' meaning across a vessel was used as a suitable description. Colville Marine does correctly identify that the Navigation Impact Assessment (RHDHV, 2019) should refer to 'spring' line rather than 'springer' line.

The cold move slew and mooring line arrangement has been developed in consultation with Noakes. It is our opinion that the FDD could be readily modified to achieve the cold move slew as proposed. It is noted that high mooring line loads would be encountered during slewing of the FDD to the lifting location, particularly at the southern end of the FDD. Infrastructure would need to be designed accordingly.

6.2.3 Safe Distances

Colville Marine highlights Marine Safety Regulation (NSW) 2016 Clause 40, which outlines the safe distance for 'towing equipment' and 'person being towed'. It is our understanding that the intent of this clause relates to tow sports such as waterskiing and wakeboarding and 'towing equipment' relates to ski tubes and inflatables. However, 'towing equipment' is not clearly defined in the *Marine Safety Act 1998* or Regulation. Regardless, the assertion by Colville Marine that the proposed tow operation/s contravenes the Regulation because the 60m is not complied with is incorrect as the Regulation states:

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1. *The operator of any vessel must ensure that the vessel and any towing equipment and any person being towed by the vessel maintains—*
    a. *a distance of not less than 60 metres from any persons in the water or, **if that is not practicable, a safe distance and speed.***

It is noted that recreational swimming facilities are not provided in the vicinity of Noakes Shipyard and any person in the water would likely be a diver assisting with the docking operations, who would be trained and aware of the vessel movement.

Colville Marine notes that the, 'COLREGS Rule 6 also acts to limit safe distances and speed limits close to persons in the water or on small craft such as kayaks. There is no discussion in the Navigation Assessment about how Noakes intend to manage this restriction on the activities of the FDD if or when the public wharf is constructed?'

The above statement is partially correct in that the COLREGS Rule 6 – Safe Speed specifies that, '*a vessel must operate at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.*' The Navigation Impact Assessment was developed under the assumption that construction vessels and vessels navigating to and from the FDD would meet all navigation safety requirements, and:

- operate under the control of licensed and experienced Masters;
- operate under the supervision of experienced Noakes Group personnel or representatives from Noakes Group;
- comply with the requirements of the COLREGS and NSW Marine Safety (General) Regulation 2016 including PANSW Harbour Master directions; and,
- operate in accordance with the Safety Management System prepared for the FDD.

The Navigation Impact Assessment (RHDHV, 2019) notes that there are no passive recreation craft launching facilities or public jetties at the head of the Bay. Numerous dinghies and kayaks are stored along the foreshore of Berrys Bay and it is assumed that these craft are primarily used for accessing moorings. While dinghy or kayak movements in the vicinity of the FDD operations would not be expected, if it so happened that a boater was too close, the operation/s could be suspended until the boater had moved away a safe distance.

In regard to the impact on DA Condition 51 – Jetty, Section 5.3 of the Navigation Impact Assessment (RHDHV, 2019) addresses this. However, in the absence of a design, location or intent, an impact statement cannot be completed on this structure. However, the FDD would be operated within the Lease Boundary at all times and there are not expected to be any impacts on the operation of the proposed jetty at the end of John Street.

6.2.4 Wash, waves and wave action

Colville Marine notes that, 'the most likely damaging wave action that will affect the FDD is the case of a 15m vessel entering the bay at high speed and passing down through the point of plane where the wave propagated will be greatest and where the bow waves directly approach the shoaling ground under the proposed FDD berthing box.'

The edge of the mooring field is some 400-450m from the proposed location of the FDD.

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As noted in the Navigation Impact Assessment (RHDHV, 2019), the clear width between the defined mooring areas in Berrys Bay is measured to be 45 to 65m. Further and as noted, the NSW Marine Safety Regulation 2016 states the operator of a power-driven vessel that is travelling at a speed of **6 knots** or more must ensure that the vessel, and any towing equipment and any person being towed by the vessel, maintain a distance of not less than **30 metres** from any vessel, land, structures and other things or, if that is not practicable, a safe distance and speed. From a distance of 450m from the site, all vessels are legally required to be travelling at a speed of 6 knots or less. The wave height assessment in the Navigation Impact Assessment (RHDHV, 2019) considers the wave height from a cruiser transiting past the site at a speed of less than 6 knots.

Further to the above, Clause 11 of the NSW Marine Safety Regulation 2016 notes:

> *(2) The operator of a vessel must not cause wash that damages or impacts unreasonably on—*
> > *(a) any dredge or floating plant, or*
> > *(b) any construction or other works in progress, or*
> > *(c) any bank, shore or waterside structure, or*
> > *(d) any other vessel, including a vessel that is moored.*

Operating a vessel in a manner that produces excessive wash near Noakes would violate the regulation. However, the definition of ‘wash that damages or impacts unreasonably’ is ambiguous. The adopted wave height and period reflects a boat generated wave height that could be readily achieved by all operators.

The adopted wave height of 0.4m with a period of 4 seconds is considered conservative. Due to the complexities of wave attenuation, reflection, refraction, diffraction and shoaling, further assessment through desktop methods is not considered appropriate. If required to refine the design wave height, data collection in the field would be required. However, a visual observation of the site indicates that it is protected and additional data collection is deemed surplus to requirements.

John Butler Design have been engaged to undertake a dynamic vessel analysis based on the nominated wave height.

6.2.5 Lines of approach

Colville Marine contests the assessment of the lines of approach and highlights limitations of the adopted guidelines, which is noted in the Navigation Impact Assessment (2019) and discussed in **Section 6**. It should be noted that AS3962-2001 Guideline for design of marinas has been superseded by AS3962-2020 Marina Design. There are some subtle differences. However, in general, the guidelines are largely the same.

Section 4.3.1 and Section 5.1.2 of the Navigation Impact Assessment (2019) note that power assisted move (assistance form a workboat or similar) would be required for navigation of some vessels, which is not considered by Colville Marine.

Further, adopting an ‘entrance channel’ width on the approach to the swing basin in accordance with AS3962, rather than an ‘interior channel’, is deemed acceptable. The ‘interior channel’ caters for manoeuvring into fairways and berths, which is not required on the approach to the swing basin at Noakes.

The response by Colville Marine does not provide substantiated guidelines or evidence to support the conclusions.

6.2.6 Restrictions imposed by the swing basin and lines of approach

Colville Marine notes that size of the proposed swing basin shown in Map 2 of the Navigation Impact Assessment (RHDHV, 2019) should not include any waters in the berthing box alongside the oil terminal. The swing basin is clear of the marine lease boundary, adjacent to the former oil terminal wharf, which ensured the swing basin does not encroach on the berth box.

Colville Marine notes that the commercial mooring operated by Noakes would need to be relocated; this is recognised in Section 5.1.2 of the Navigation Impact Assessment (RHDHV, 2019).

6.2.7 Entering the dock

There are a number of incorrect statements from Colville Marine. These are outlined below:

- Colville Marine notes that an interior channel of 75m provides 37.5m abeam of a vessel on either side. This is incorrect as it does not consider the vessel beam. Further, the intent of the navigation channel is to provide space to manoeuvre. Therefore, the space abeam of a vessel navigating within an interior channel in a marina could reasonably be expected to be less than 5m during manoeuvring or touching a fender for alongside berthing. The assessment to maintain 37.5m abeam of a vessel is excessive.
- Colville Marine notes that the wharf used to cold move slew the FDD presents a danger. This is consistent with Section 4.3.1 and Section 5.1.3 of the Navigation Impact Assessment (RHDHV, 2019), which notes that fenders would be installed at this location. Notwithstanding, the risk of navigating past the wharf is similar to manoeuvring into a marina berth.
- Conclusion 3 notes that the lines of approach and the swing basin impose restrictions on free movement in Berrys Bay. If anything, the swing basin and navigation channel provide space for the movement of vessels and improves navigability of other vessels. It is recognised that the swing basin and navigation channel impacts on mooring grounds. However, the only mooring impacted is a commercial mooring operated by Noakes.

6.3 Dock Stability

The issue of dock stability is indirectly related to the navigation impact. A separate stability assessment has been completed by Shearforce Maritime Services Pty Ltd (2016) and a dynamic analysis is being undertaken by John Butler Design.

Provided the FDD is maintained and operated within the limiting conditions identified in the stability assessments, the risk of a 'stability incident' is extremely low. An analogy to this would be the risk of building collapse or bridge failure provided the structure is not overloaded. Notwithstanding, the risk of a 'stability incident' should be included in the Safety Management System. Other risks that could impact instability and the ability to operate the FDD as planned, such as generator or pump failure, should also be included in the Safety Management System.

The analysis of ballast and deballast operations does not reflect the water depth assessment in Section 5.1.5 of the Navigation Impact Assessment (RHDHV, 2020).

6.4 Under Keel Clearance

Colville Marine contends that the adopted guidelines for the Navigation Impact Assessment (RHDHV, 2019) are not applicable. However, alternate guidelines are not suggested or recommended. The Harbour Master Directions (2021) noted by Colville Marina supersede the Harbour Master Directions in the Navigation Impact Assessment (RHDHV, 2019). The assessment should consider the guidelines currently on force and the requirements for UKC in the Harbour Master Directions (2021) are adopted herein.

Colville Marine makes an incomplete reference to Section 2.1.2.7 of the Harbour Approach Channel Design Guidelines (PIANC, 2014), noting that an UKC of 1000mm is recommended where the consequences of touching the bottom is large. This is clarified later in Section 2.1.2.7 where it states, “UKC should be at least 0.5 m, but could be increased to 1.0 m where the consequences of touching the bottom is large (e.g. for channels with rocky bottoms)”.

Colville Marine notes that if the FDD touched the bottom during a ballasting or deballasting operation or as a result of wave action, ‘the consequences of disturbing the contaminated sediment should be categorised as large’. Compared to say a fuel tanker running aground on a rocky reef, the consequence of the FDD locally disturbing seabed sediment would be considered low. Nevertheless, as demonstrated in **Sections 2.2** and **5**, this is not expected to be an operational outcome.

Colville Marine notes that there is insufficient water depth to operate the FDD to the maximum capacity. This is not disputed and it is spelt out in Section 5.1.5 of the Navigation Impact Assessment (RHDHV, 2019).

Colville Marine incorrectly assumes that keel blocks have not been included in the Navigation Impact Assessment (RHDHV, 2019). Section 5.1.5 and Section 5.4 of the Navigation Impact Assessment (RHDHV, 2019) calculates the maximum vessel draft that could be docked at the proposed location and includes an allowance for keel blocks of 300mm as advised by the Naval Architect.

Colville Marine quotes Section 2.16 of the Harbour Masters Directions, which note that, ‘a person disturbing the seabed, pursuant to section 67ZN of the Ports and Maritime Administration Regulation 2012 (NSW), must seek permission from the Harbour Master via the application form on the Port Authority website.’ It should be noted that the Ports and Maritime Administration Regulation 2012 has been superseded by the Ports and Maritime Administration Regulation 2021. Clause 110 - Disturbance of bed of port states that:

> *A person must not use drags, grapplings or other apparatus for lifting an object or material from the bed, or otherwise disturb the bed, of a port specified in Schedule 4 except—*
>
> *(a) with the written permission of the relevant harbour master, and*
>
> *(b) in accordance with the conditions of the permission.*

Approval for disturbance of the seabed would be required from PANSW for removal of piles and the like. No other bed disturbance of any significance is expected with the FDD proposal.

6.5 Maritime Lease and Consent to Lodge

There are a number of items highlighted by Colville Marine that would appear to be misleading. However, a planner would be in a better position to respond. In regard to the Navigation Impact Assessment (2019), it should be noted that:

Royal HaskoningDHV

- The FDD is not intended to operate beyond the lease boundary;
- The FDD is designed to safely operate with passing traffic; and,
- No dredging is proposed as part of the development.

6.6 Other Environmental Issues

A number of issues raised by Colville Marine relate to other environmental considerations, which should be addressed accordingly.

6.7 Conclusions

Response to the conclusions from Colville Marine are provided in red below.

1. The proposed market for the FDD is to dock ASD tugs and vessels between 35m and 50m in length. The proposed market identified by Colville Marine is speculative commentary relating to economics rather than operation. The Navigation Impact Assessment (2019) correctly identifies a maximum vessel draft for operation.

2. The proposed warping operation of the FDD from the alongside position to the docking and submergence position will not work. A fair view, given the location and configuration of the equipment and the difficulties presented, would be that operator intends to move the FDD using the assistance of a tug and that the primary use of the capstans will be to handle the vessels being docked. An indicative mooring line plan is provided in the Navigation Impact Assessment (2019) demonstrating that the FDD can be slewed. The proponent is aware that additional bollards, leads and capstans may be required to undertake the cold move slew operation.

3. The safe channel widths, lines of approach and swing basin are not correct. The lines of approach and the swing basin impose restrictions on free movement in the bay and the ability to add moorings in the future. The commercial mooring operated by Noakes will need to be permanently removed. The swing basins and approach channels required for operation of the FDD are as per existing with the exception of the commercial mooring operated by Noakes. Free movement would not be restricted in Berrys Bay. Potentially the proposed navigation arrangements including the swing basin would improve free movement.

4. Any vessel over 30m entering the dock in a moderate breeze (15kts) from the south or west would require one or two tugs to complete the manoeuvre safely. The requirement for power assisted move (assistance form a workboat or similar) is highly dependent on the type and propulsion of the vessel to be docked. A vessel fitted with suitable bow and stern thrusters would not require assistance. Section 5.1.2 of the Navigation Impact Assessment (2019) correctly identifies that certain vessels would require assistance.

5. The Navigation Assessment does not assess the risk of a stability incident occurring on the boundary of the maritime lease that would block the channel or endanger the public. If operated in accordance with the design conditions, the risk of a stability incident is low. An analogy is the risk of building collapse or bridge failure if the design load is not exceeded.

6. Phase 3 of the FDD 4 phases of operation (Table 4) was omitted as it shows the unfavourable condition of the FDD at the submergence required for a 1000 tonne vessel with a deep draught where the draught of the FDD at this loading should be around 8.0m. Phase 3 relates to the

external waterline at the top of the keel blocks (i.e. vessel keel at water level). The draft would be approximately 3m. John Butler Design have been engaged to undertake a stability assessment and dynamic movement analysis.

7. The theoretical UKC clearance of 300mm is insufficient to prevent the disturbance of the contaminated sediment on the seabed. A safe UKC should be determined by assessment of the actual risk of wave action or a miscalculation in the Docking Plan and using 500mm UKC as the starting point. The agreed assessed UKC should be referred to the Harbourmaster for consent according to Harbourmasters Directions 2.16 and 3.2. The Harbour Masters Directions (2021) supersede the Navigation Impact Assessment (2019). The revised assessment herein adopts 500mm UKC in accordance with the Harbour Masters Directions (2021).

8. There is insufficient depth to operate the FDD safely without disturbing the contaminated sediments in the seabed in either the alongside position or in the submerged position. The operator intends to operate the FDD in the deeper water beyond the boundary of the maritime lease using a tug for assistance to position and hold the FFD in place during the docking. The FDD is proposed to remain within the lease boundary. There is sufficient water depth to operate the FDD. However, the maximum vessel draft for docking is limited. This is highlighted in Section 5.1.5 of the Navigation Impact Assessment (RHDHV, 2019).

Overall, the review by Colville Marine has misunderstood the proposed development. This is reflected in their assessment and review of the Navigation Impact Assessment (RHDHV, 2019). In particular, the following is noted:

- The FDD is not intended to operate beyond the lease boundary;
- The FDD is designed to safely operate with passing traffic; and,
- No dredging is proposed as part of the development.

7 Expert Witness Qualifications

This report has been prepared by Rick Plain of Royal HaskoningDHV. His qualifications and experience which justifies his ability to provide expert witness is set out in his curriculum vitae in **Appendix D**.

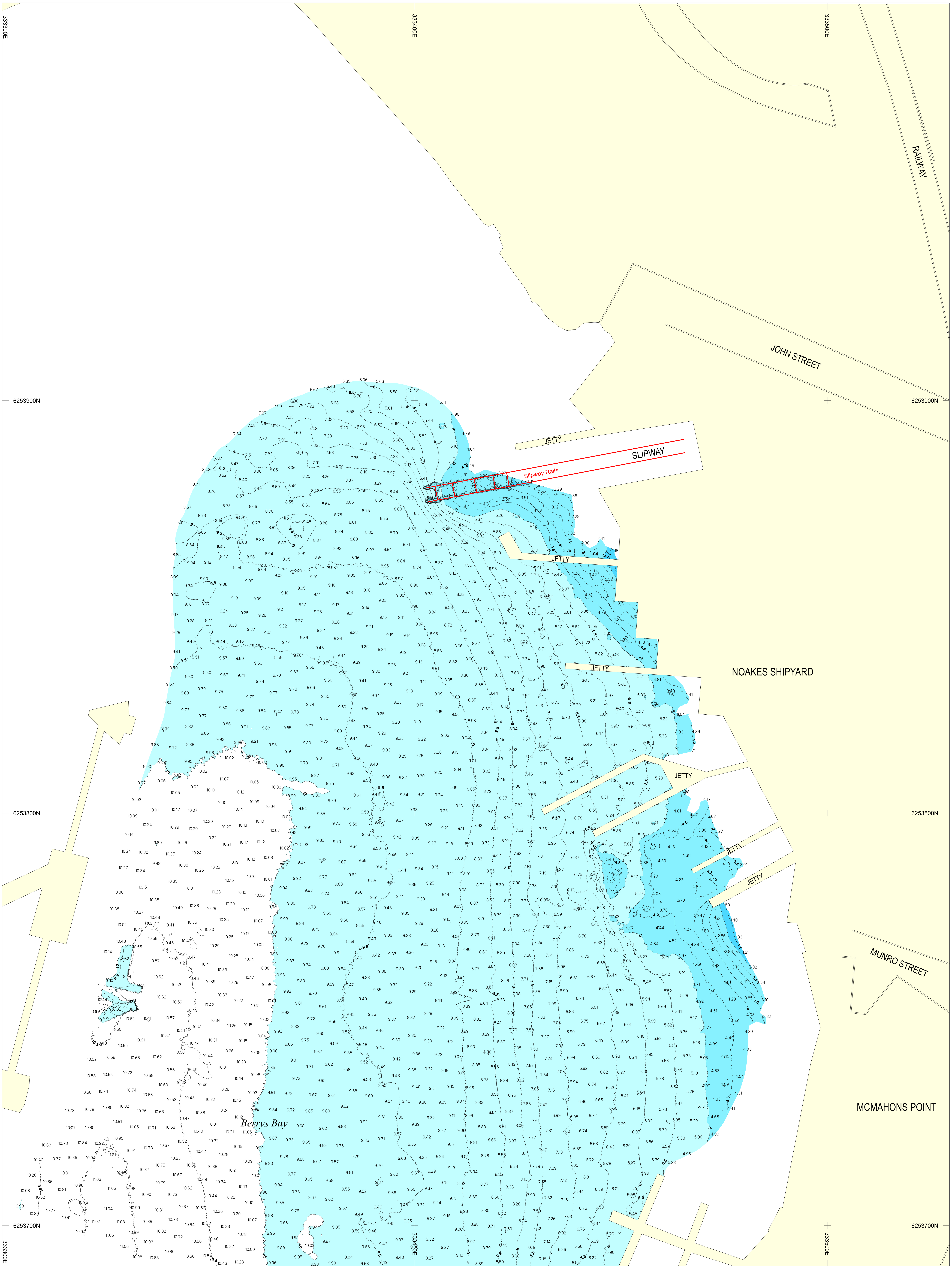
I have read Division 2, Part 31 of the Uniform Civil Procedure Rules 2005 and the Expert witness code of conduct in Schedule 7. This report is prepared in accordance with the Uniform Civil Procedure Rules 2005 and I agree to be bound by their terms. My evidence in this report is within my area of expertise, except where I stated that I have relied upon the evidence of another person.

8 References

- Colville Marine Pty Ltd (2021), Review of the Noakes Proposal to use the Floating Dry Dock in Berrys Bay.
- Department of Defense Standard Practice Safety Certificate Program for Drydocking Facilities and Shipbuilding Ways for U.S. Navy Ships (MIL-STD).
- Gaythwaite (2016), *Design of Marine Facilities Engineering for Port and Harbor Structures.*
- Port Authority of NSW (PANSW, 2021), *The Harbour Master Directions Sydney Harbour and Port Botany (15 February 2021).*
- Royal HaskoningDHV (RHDHV, 2019), *Noakes Boat and Shipyard Floating Dry Dock Navigation Impact Assessment.*
- Shearforce Maritime Services Pty Ltd (2016), *Structural and Stability Assessment – Final Report Floating Dock AFD 1002.*
- World Association for Waterborne Transport Infrastructure (PIANC, 2014), *Harbour Approach Channel Design Guidelines.*
- World Association for Waterborne Transport Infrastructure (PIANC, 2013), *Design and Operational Guidelines for Superyacht Facilities.*
- World Association for Waterborne Transport Infrastructure (PIANC, 2016), *Guidelines for Marina Design.*
- World Association for Waterborne Transport Infrastructure (PIANC, 2019), *Design Guidelines for Inland Waterway Dimensions.*

Royal HaskoningDHV

Appendix A – Hydrographic Survey (PANSW, 2021)



1. PLAN LIMITATION STATEMENT
This plan has been prepared in accordance with accepted practice for the use only of Port Authority of New South Wales and Noakes Group Pty Ltd for a specific purpose. No warranty or representation, expressed or implied, is made to any other party regarding this survey and plan. This plan should not be relied upon for any other purpose or use by any party including Port Authority of New South Wales.

2. GRIDDED DATASET
Raw soundings have been processed and validated on a shoal bias and gridded at 0.25m x 0.25m resolution.

3. FILTERED SOUNDINGS STATEMENT
In producing this plan some soundings have been intentionally filtered to improve ease of interpretation. Filtering of the "gridded dataset" has been carried out to preserve soundings on a shoal bias. The filtering interval is 10mm at plan scale. Soundings shown are in true horizontal location. Contours have been produced from a TIN model based on a dataset at four times the plotted sounding density.

4. TIDE DATUM INFORMATION
Soundings are in metres reduced to Zero Fort Denison Tide Gauge.
This zero is 0.925 metres below Australian Height Datum. Soundings above zero are shown thus 0.2.

REV	DESCRIPTION	DATE

Grid North

SURVEY CLASS
This survey and the estimates for horizontal and depth TPU comply with the requirements set out by Ports Australia Class A standards

Average Depth TPU(m) = 0.08m
Average Position TPU(m) = 0.1m

0 5 10 15 20 25
Metres

SCALE: 1:400 @ A1
CONTOUR INTERVAL: 0.5m
DECLARED DEPTH: N/A

EQUIPMENT
SURVEY VESSEL: Port Explorer
ACQUISITION SOFTWARE: Teledyne PDS
PROCESSING SOFTWARE: CARIS HIPS & SIPS
MULTIBEAM SONAR: Teledyne RESON T50P
SONAR FREQUENCY: 400kHz
GNSS BASE STATION: CORS Network FTDN
POSITION/ORIENTATION: POSMV OceanMaster

NOTES
-SOUNDINGS IN METRES ROUNDED TO 2 DECIMAL PLACES
-POSITION OF LAND FEATURES & MARINE STRUCTURES ARE APPROXIMATE ONLY

SURVEY INFORMATION
REDUCED DATA: J:\SurveyDbase\bkupoutports External Work\2021\2021_Noakes Berrys Bay
FIELD DATA: MicrosoftAzure\Hydrographic Survey Data\2021\ Sydney\202110_Noakes Berrys Bay
FILE NO: Content Manager M17/18
HORIZONTAL DATUM: GDA2020
PROJECTION: MGA zone 56
VERTICAL DATUM: Zero Fort Denison Tide Gauge
RUNLINES: N/A CROSSLINES: N/A
DATE STARTED: 20-October-2021 Date Completed: 20-October-2021

CHARGE SURVEYOR: Tim Connor
Certified Professional (CPHS1)
CHECKING SURVEYOR: Venessa O'Connell
Certified Professional (CPHS1)

PORT AUTHORITY OF NEW SOUTH WALES

Noakes GROUP

Group Survey Manager

HYDROGRAPHIC SURVEY
BERRYS BAY
NOAKES SHIPYARD

Charge Surveyor

This Plan replaces: N/A

DWG No: BB-RHDHV 001

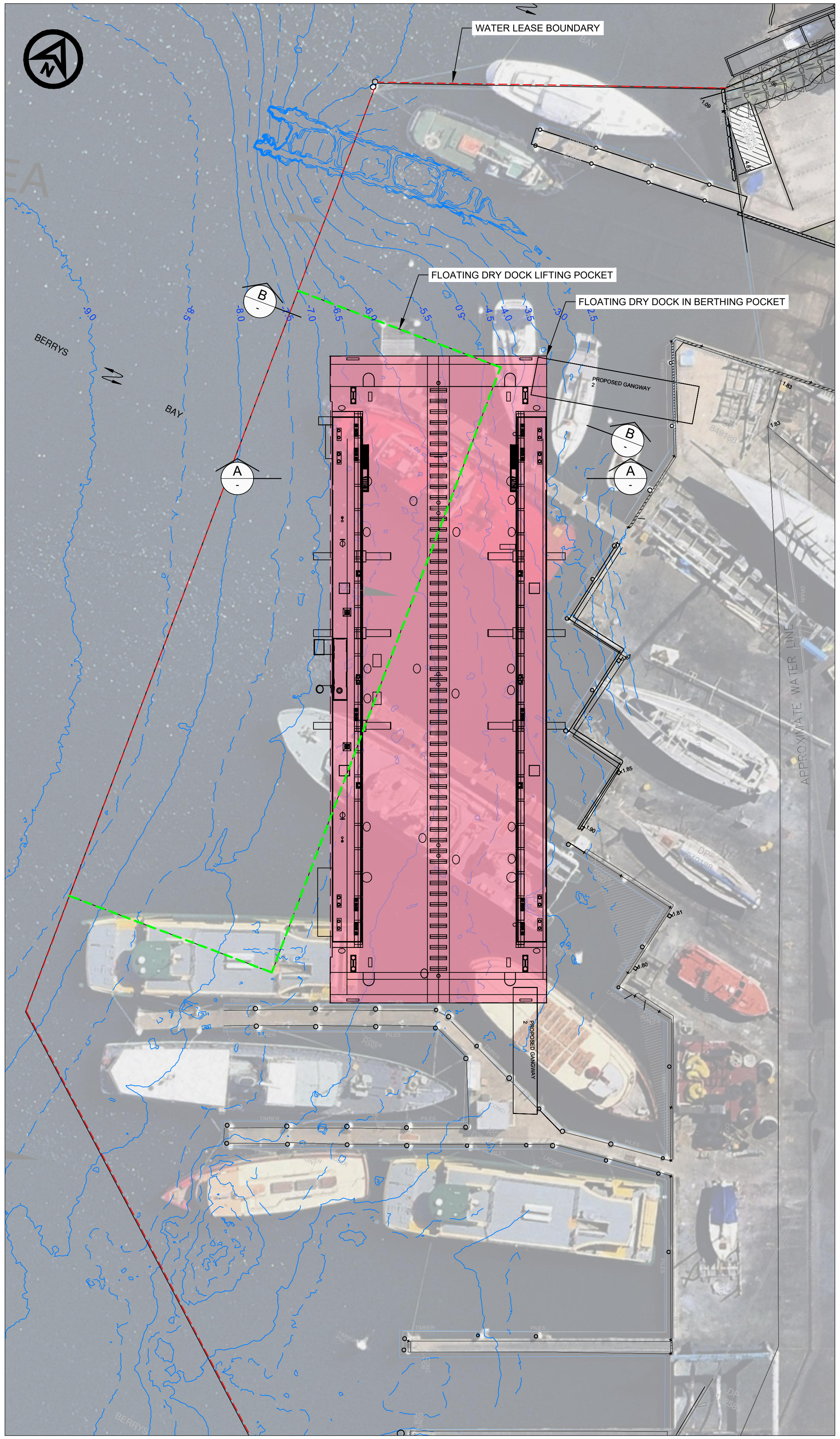
Appendix B – FDD Section

NOAKES SHIPYARD FLOATING DRY DOCK

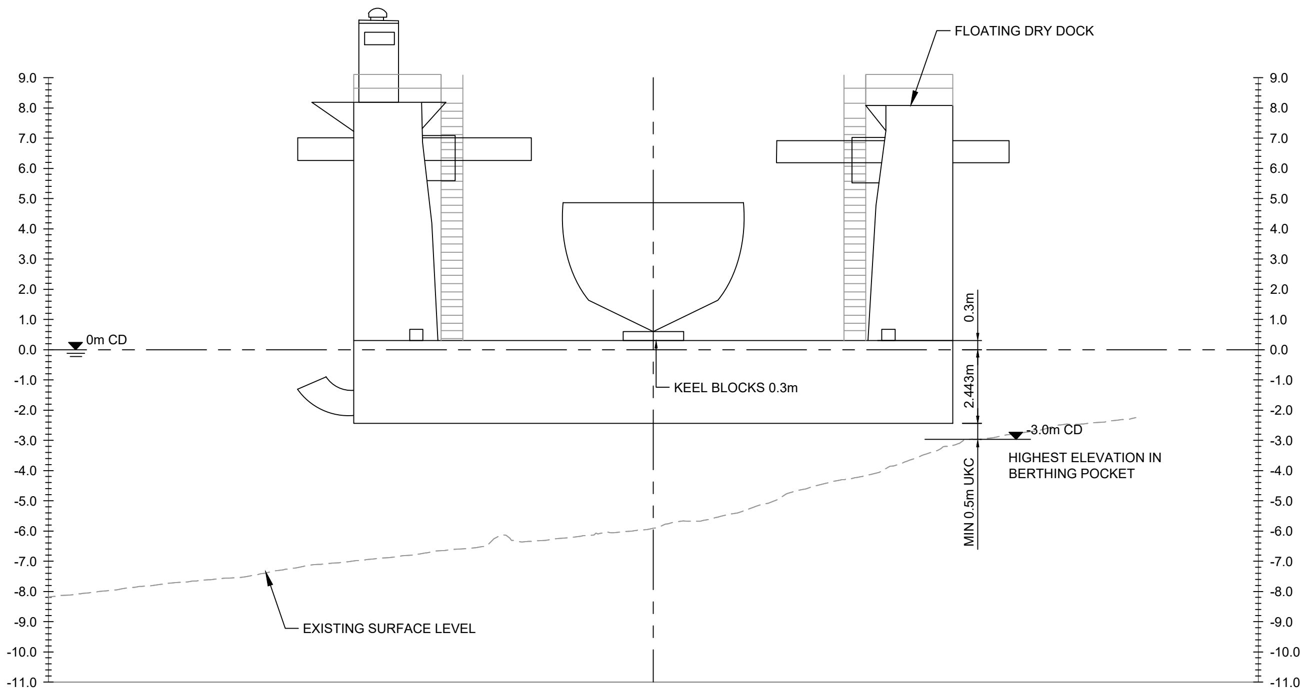
SK001

NOTES

1. AERIAL PHOTOGRAPH SOURCED FROM NEARMAP, DATED 10/2021.
2. HYDROGRAPHIC SURVEY BY PORT AUTHORITY OF NSW, DATED 20/10/2021

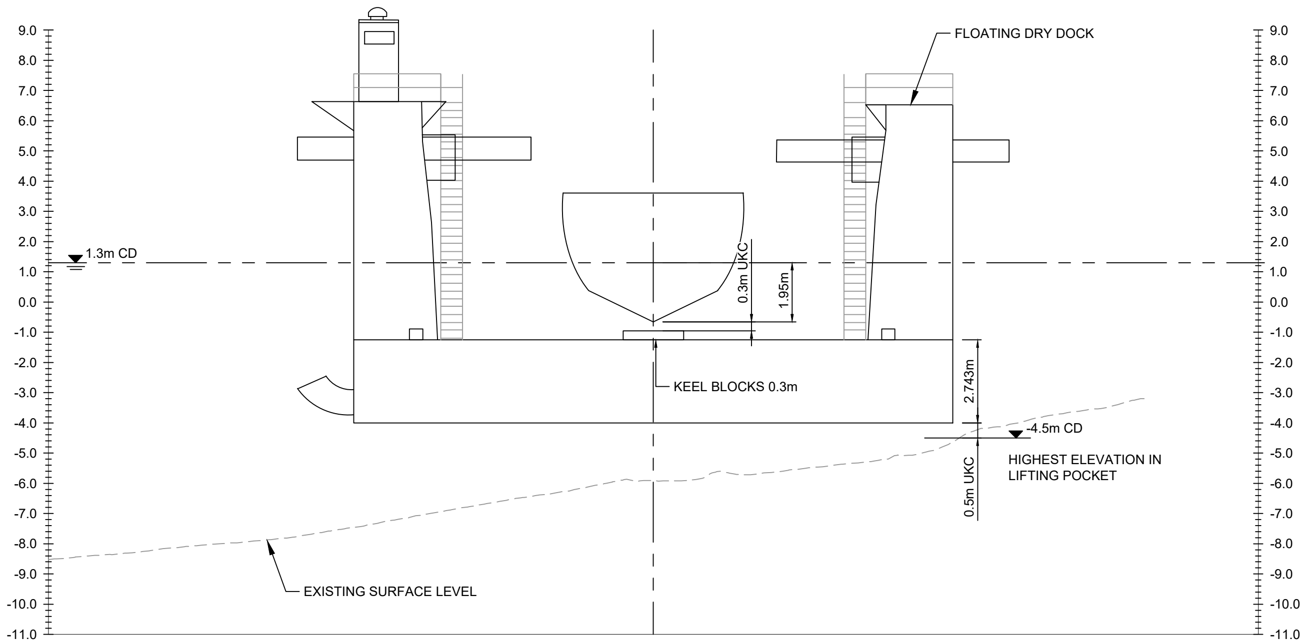


PLAN 01
1:250



SECTION A
1:125

PHASE 5 - NORMAL OPERATING CONDITION IN BERTHING POCKET



SECTION B
1:125

PHASE 1 - BALLASTED DOWN CONDITION IN LIFTING POCKET

Appendix C – Structural and Stability Assessment (Shearforce, 2016)

Report No: SYD/2015/19

Date: 16/11/2016

Structural and Stability Assessment – Final Report
Floating Dock AFD 1002

Shearforce Maritime Services Pty Ltd
ABN 63 108 496 751

P.O. Box 722
Gordon NSW 2072
Australia
Tel: +61 (0)2 94408472
e-mail: info@shearforce.com.au

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001

CONTENTS

Appendix I – UGL Strength Analysis of the Docking Cradle

Appendix II – Longitudinal Bending Moment & Deflection Calculation

1 Executive Summary

At the request of Noakes Group Pty Ltd, Shearforce Maritime Services Pty Ltd, has conducted a structural and stability assessment for the floating dock designated FLOATING DOCK AFD 1002.

The assessments have been carried to demonstrate that the floating dock is fit for purpose for use by Royal Australian Navy (RAN) vessels. This particular usage of the floating dock requires that the submission of the documents confirm that the floating dock is in a satisfactory condition and is adequate for its intended purpose.

To demonstrate the suitability of the floating dock for the use of RAN vessels, the United State Department of Defense Standard Practice Safety Certification Program for Dry-docking Facilities and Shipbuilding Ways for U.S. Navy Ships (MIL-STD) was selected for this assessment.

The structural strength of the floating dock has been assessed in several operating conditions, as per the MIL-STD, to identify the limiting loading at different stages of the operation and in different loading configurations.

To assess the longitudinal strength, three different types of docked vessels were used for the assessment. These cases were selected as they are considered to provide the worst loading case scenarios. The calculations were carried out to determine if the floating dock bending moment is within its limit when each of these vessels is in dock. The maximum allowable bending moment and its corresponding deflection at amidships were also calculated.

The loading limits of local structural components comprising of transverse structure, watertight bulkheads, mooring bollard and the keel block stand were calculated. Details of these loading conditions and their results are discussed in ***Section 4*** of this report.

The preliminary stability assessment of the existing floating dock has been carried out to determine the intact and damage stability characteristics and their compliance with the MIL-SPEC requirements.

The intact stability characteristics of the dock were calculated and both the GM and the maximum wind heeling were found compliant.

The maximum lifting capacity versus docked vessel adjusted VCG and the maximum lifting capacity of the dock versus the range of docked vessel longitudinal positions were calculated with the result presented in ***Section 5.5*** of this report.

The damaged stability calculations show that in both the fully ballasted and the de-ballasted conditions, the equilibrium-heeling angle from side shell damage does not comply with the MIL-STD. The large angle of heel was due to the significant loss of the reserve buoyancy from the forward wing compartment and from the side tank at the floating dock end.

The extent of damage required to be survived is considered excessive. It is recommended that the watertight sub-division of the floating dock be either increased by adding watertight bulkheads so that compliance with the MLI-STD can be achieved or that alternate damage stability criteria be applied such as the IMO Damage Stability Requirements. The results from this investigation are included in this report.

This preliminary stability assessment is subject to validation once the actual stability data is obtained through the conduct of an inclining experiment.

2 Floating Dry Dock Particulars

Name of Vessel:	Floating Dock AFD 1002
Classification Society:	Not Classed
Length Overall:	64.00 m
Moulded Breadth:	19.81 m
Depth of Pontoon:	2.74 m
Depth of Sides:	7.77 m
Depth Overall:	10.52 m
Designed Lift Capacity:	1000 tons
Builders:	Morts Dock
Place and Date of building:	Sydney, 1942

3 General Information

3.1 Background

The structural and stability assessments have been carried out to demonstrate that the floating dock is fit for purpose for use by the Australian Defence Force for their vessels. This use of the dry dock requires the submission of documents that verify that the floating dock is in a satisfactory condition and is adequate for its intended purpose.

The Australian Shipbuilding Board originally designed the floating dock in the 1940's for the Royal Australian Navy. The original structural and stability calculations and its design certifications are no longer available. As such, the calculations have been carried out following the United States Department of Defense Standard Practice Safety Certification Program for Drydocking Facilitates and Shipbuilding Ways for U.S. Navy Ships, document no. MIL-STD 1625D(SH) (MIL-STD).

3.2 Structural arrangement

The floating dock consists of a barge shaped steel hull and a wing section at both sides of the dock. These are supported by primary structures which consist of shell plating, longitudinal bulkheads, transverse bulkheads and transverse open frames.

3.3 Watertight and Ballasting arrangement

The floating dock is subdivided into twelve compartments by a combination of longitudinal and transverse watertight bulkheads for ballasting purposes. ***Figure 3.3.1*** shows the tanks arrangement.

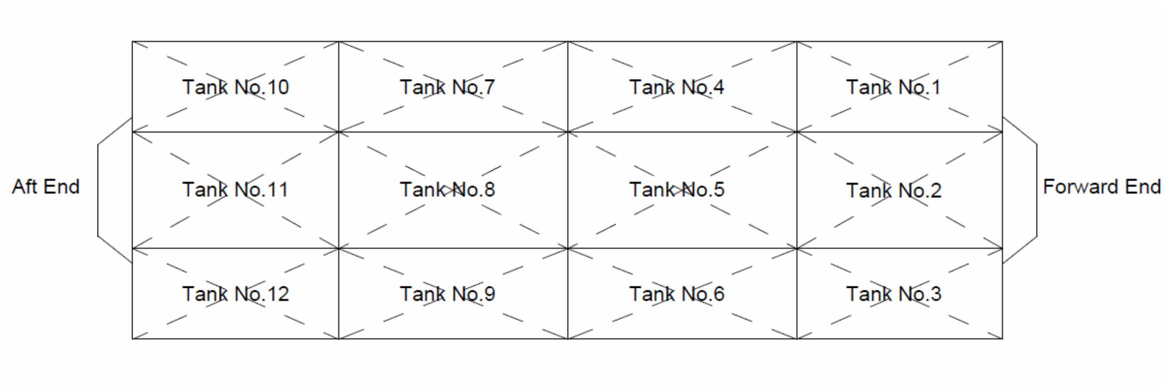


Figure 3.3.1: Ballast tanks arrangement

The pontoon deck bounds all the tank tops, except for tanks No. 1, 3, 10 and 12. Tanks 1, 3, 10 and 12 are bound by the safety deck. These four tanks work by the isothermal compression principle, where the tank's air ventilation pipe is fitted with its intake end below the safety deck and works like a shut off valve. Once the ballast level is above the pipe bottom, the remaining air inside the tank will compress to the point where its pressure will stop any further ballast from entering.

To flood the dock to its deepest allowable draught, tanks No. 1, 3, 10 and 12 are filled up to the bottom of the air vent pipe while the other tanks are filled to the pontoon deck level.

4 Structural Assessments

4.1 Introduction

The structural assessment of the floating dock has been carried out to determine its capacity as defined in the MIL-STD.

The intent of the assessment is to determine the maximum longitudinal strength, transverse strength and the maximum load of local structural components. Detailed requirements from the MIL-STD are listed in ***Section 4.2*** below.

For this assessment, first principle calculations and FEA analysis have been used where it is deemed appropriate.

4.2 Structural Criteria

The section concerning the structural strength assessment of the floating dock is detailed in Section 5.1.3.4 of the MIL-STD and its detail requirements are summarised as follows:

a. Maximum allowable longitudinal bending moment calculation.
b. Transverse strength calculation substantiating the maximum allowable pontoon deck loading in long tons (LT) per linear foot.
c. Longitudinal deflection calculation corresponding to maximum allowable bending moment.
d. Maximum keel block, side block, and hauling block loading calculations including local pontoon deck structure under docking blocks.
e. Maximum pontoon deck loading at other than keel block and side block locations, if different than that of the blocking area.
f. Structural arrangement and scantlings.
g. Longitudinal and transverse watertight bulkhead design calculations.
h. Maximum allowable differential head between adjacent tanks.
i. Maximum allowable differential head between tanks and exterior dry dock draft.
k. Data and calculations substantiating adequacy of mooring attachments on the dock's structure.
l. Maximum allowable differential head between adjacent tanks (or group of adjacent tanks) to produce a bending moment equal to the maximum

allowable value.

The allowable longitudinal and transverse bending stress for steel floating dry docks shall not exceed 0.60 Fy (60% of the structure material yield strength), which is equivalent to a minimum Factor of Safety of 1.66.

4.3 Material Properties

At the time of this assessment, the mechanical properties of the original structural steel used for the floating dock was not known. It has been assumed that mild-steel was used for all of the structural components and ***Table 4.3.1*** lists the mechanical properties.

Table 4.3.1: Mild-Steel Mechanical Properties

Mass Density	7850 kg/m^3
Yield Strength	207 MPa
Ultimate Tensile Strength	345 MPa
Young's Modulus	220 GPa
Poisson's Ratio	0.275

From the above mechanical properties, the allowable bending stress of all the floating dock structure components are limited to 124 MPa in exception of the docking block. The mechanical properties of the docking block are to refer to the separate analysis report from UGL in Appendix I.

4.4 Scantling

Throughout the operational life of the floating dock, its structure is subjected to potential corrosion wastage and this must be considered in this assessment. For this, a net scantling approach has been adopted where the net scantling used for the analysis are calculated from deducting the corrosion thickness allowance from the gross scantling of the structure. Corrosion thickness allowance of 25% was adopted in accordance to the MIL-STD.

Table 4.4.1 summarised both the original and net scantling for the floating dock structure components.

Table 4.4.1: Structural Components Scantling Summary

Items	Original Scantling (mm)	Net Scantling (mm)
Bottom Plate	12	9
Side Plate	12	9
Pontoon Deck Plate	12	9
Outer Wing Wall Plate	12	9
Inner Wing Wall Plate	12	9
Top Deck Plate	10	7.5
Safety Deck Plate	10	7.5
Centreline Girder	10	7.5
Side Longitudinal BHD Plate	10	7.5
Transverse Side Frame	12	9
Plate supporting stiffener	10	7.5

4.5 Design Loads

This section identifies the loads that the floating dock encounters during its operations.

4.5.1 Floating Dock Mass

The mass of the floating dock used for this assessment is 1426 tons using the data from inclining experiment carried out on 11th May 1974.

4.5.2 Docked Vessel load

For determining the loads from the docked vessels, we considered three types of vessel, which the floating dock is capable to lift and each of them represents the worst loading scenarios. These are:

- 35m Harbour Tug

  This represents the heaviest vessel that the floating dock is rated to lift on the shortest blocking length.

- Huon Class Minehunter

  This represents the heaviest vessel that the floating dock is rated to lift on the longest blocking length.

- Paluma Class Surveying Ship

  This vessel type represents the heaviest catamaran type vessel that the floating dock is rated to lift on the longest blocking length.

Table 4.5.2.1 summaries the particulars for these vessels, and ***Figures 4.5.2.1*** to ***4.5.2.3*** shows their photos.

Table 4.5.2.1: Particulars of vessels used for structural assessment

Vessel Type	**35m Harbour Tug**	**Huon Class minehunters**	**Paluma Class Surveying ship**
LOA (m)	34.0	52.5	36.6
Beam (m)	11.0	9.9	12.8
Draft (m)	4.0	3.0	2.7
Displacement (tonnes)	960	732	325
Supporting block length (m)	22	42	24

Figure 4.5.2.1: Harbour tug

Figure 4.5.2.2: Huon Class Minehunter

Figure 4.5.2.3: Paluma Class Surveying Ship

To determine the load distributions of these vessels along the longitudinal length of the floating dock, the two weight distribution curves from the DNV-GL Classification Rule for Floating Docks were chosen. These two curves represent typical load distributions for a ‘sagging’ and a ‘hogging’ vessel. ***Figure 4.5.2.4*** and ***4.5.2.5*** shows their weight distribution profile and their calculation details are described in the Classification rules[1].

1. DNV-GL Rules for Classification Floating Dock Edition October 2015, website https://rules.dnvgl.com/docs/pdf/DNVGL/RU-FD/2015-10/DNVGL-RU-FD.pdf

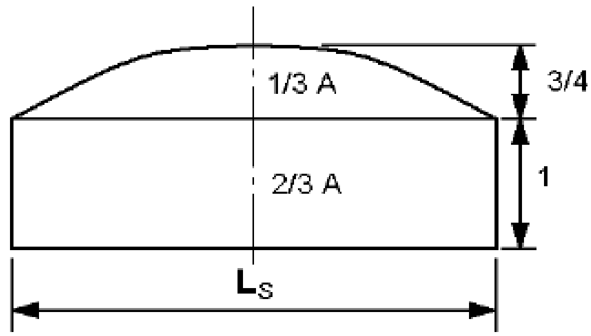


Figure 4.5.2.4: Sagging vessel load distribution profile

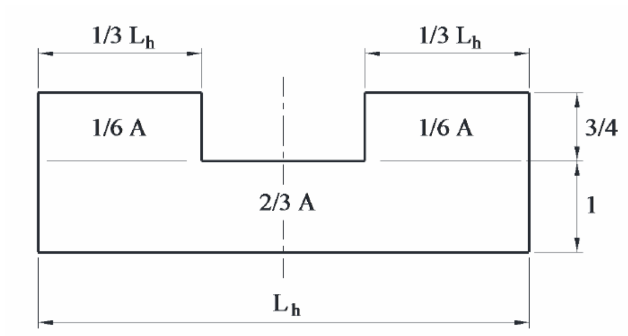


Figure 4.5.2.5: hogging vessel load distribution profile

The sagging vessel load profile was used for the harbour tug and Paluma Class Surveying Ship as this represents the greatest load applied to the midship of the dock. The hogging load profile was used for the Huon Class Minehunter as it represents the greatest load distribution applied the fore and aft ends of the dock.

4.5.3 Hydrostatic & Water ballast load

The typical hydrostatic and corresponding water ballast load for various stages of dock operations have been determined using the condition as described in ***Figure 4.5.3.1***.

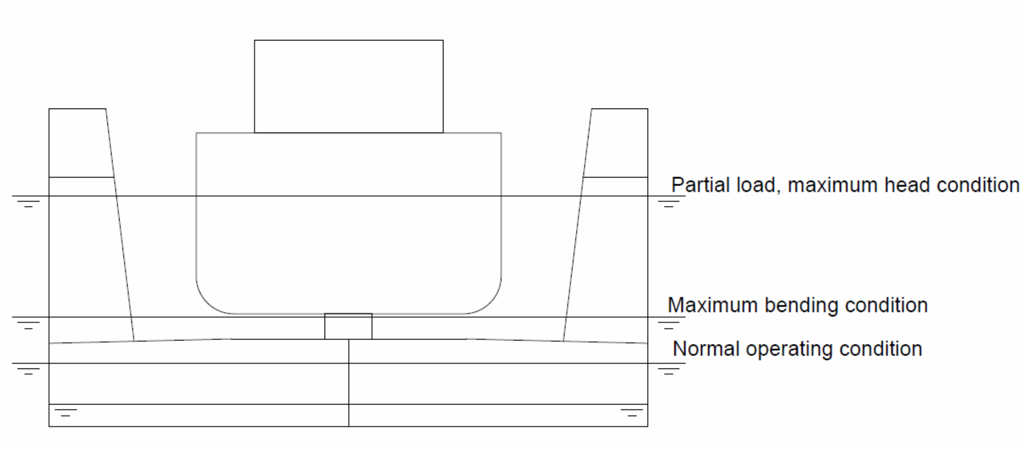


Figure 4.5.3.1: three phase of operation conditions considered for structural assessment

4.6 Assessment Methodology

This section lays out the assessment methodology used for each for the analyses as required by the MIL-STD.

4.6.1 Maximum allowable longitudinal bending moment calculation

The floating docks' longitudinal strength has been assessed by using the quasi-static method, where the bending moments are calculated by first integrating the net load of the dock along its length to obtain the shear force, and then by integrating the shear force to obtain the bending moment.

$$\text{Shearforce}, S = \int (\rho g a - m g) dx$$

Where ρ is seawater density, *m* is the dock weight per unit length, *a* is the immersed cross-section area at point of interested and *g* is gravity.

$$\text{Longitudinal bending moment, M} = \int S\, dx = \iint (\rho g a - m g) dx\ dx$$

The floating docks' maximum allowable bending moment was calculated by applying the load exerted by a docked vessel on the centreline block of the dock amidships, to represent a worst-case scenario. Load cases from docked vessels were also calculated using the vessels listed in ***Section 4.5.2***.

4.6.2 Transverse strength calculation substantiating the maximum allowable pontoon deck loading in long tons (LT) per linear foot.

The transverse strength assessments were focused on the open frame section i.e. frames that were not supported by either a solid frame or a watertight bulkhead.

The operating conditions of the dock that were assessed are as shown in ***Figure 4.5.3.1*** and as described below:

- **Normal operating conditions (Phase 5)**

  This represents a docked vessel on the floating dock with 1 foot of slack ballast

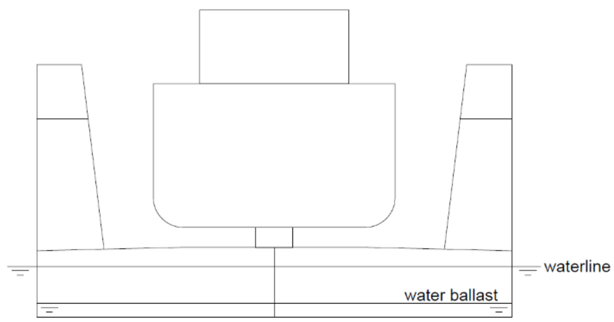


Figure 4.6.2.1: Normal Operating Conditions (Phase 5)

- **Docked vessel keel at water level (Phase 3)**

  This is represented by the maximum load on the pontoon deck from both the docked vessel and seawater.

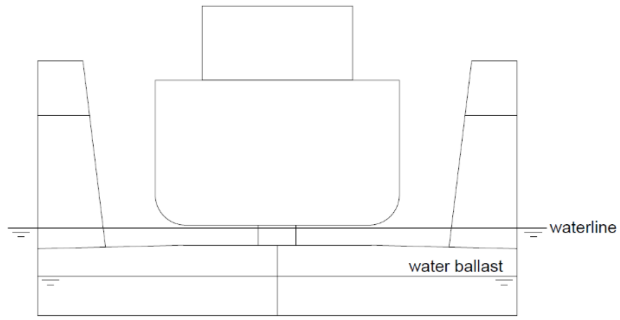


Figure 4.6.2.2: Maximum load (Phase 3)

- **Partial load, Maximum head condition (Phase 2.5)**

  this is when the docked vessel is just about to lift out of the water. At this condition the internal ballast water level is parallel to the pontoon deck and 10% of the vessel weight is supported by the floating docks' block.

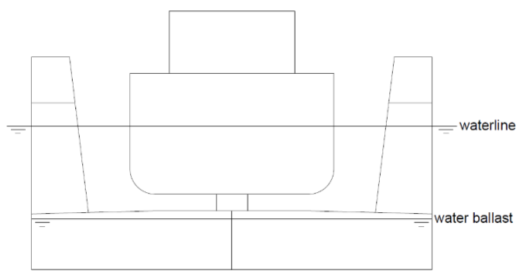


Figure 4.6.2.3: Partial load, maximum head condition (Phase 2.5)

For each of these three conditions, two different block load arrangements were investigated:

- 100% loading on centreline block
- 50% Keel block and 50% load Side Block

This condition represents the docked vessel load on both centreline and side block and are assessed to investigate the load acting on the side of the dock.

A section of the dock model was created with a span of a single centreline block spacing i.e. 0.953 m. ***Figure 4.6.2.4*** shows this model.

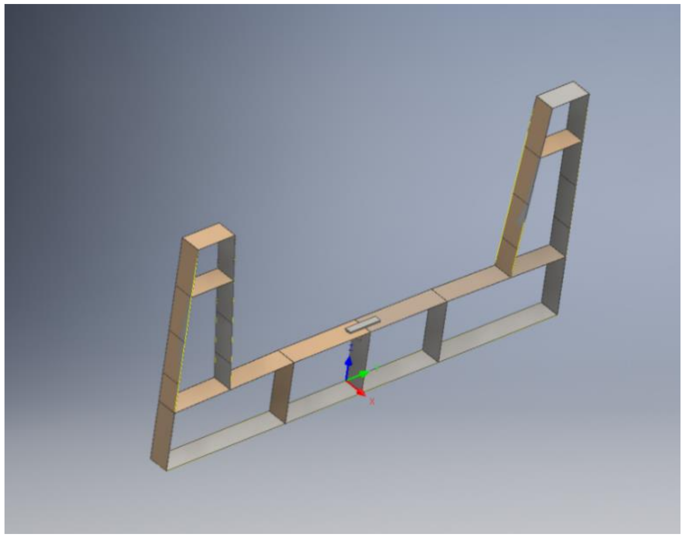


Figure 4.6.2.4 CAD model for transverse strength FEA analysis

4.6.3 Longitudinal deflection calculation corresponding to maximum allowable bending moment.

The deflection is calculated by integrating the bending moment calculated as per ***Section 4.6.1*** along the length of the dock twice.

$$\text{Deflection}, d = \int \frac{M}{EI} dx dx$$

4.6.4 Maximum keel block and side block loading calculations including local pontoon deck structure under docking blocks.

The structural assessment of the Dock keel and side block cradle was independently assessed by UGL in 2015. ***Figure 4.6.4.1*** shows a CAD drawing of the block structural arrangement and the UGL strength analysis was listed in ***Appendix I***.

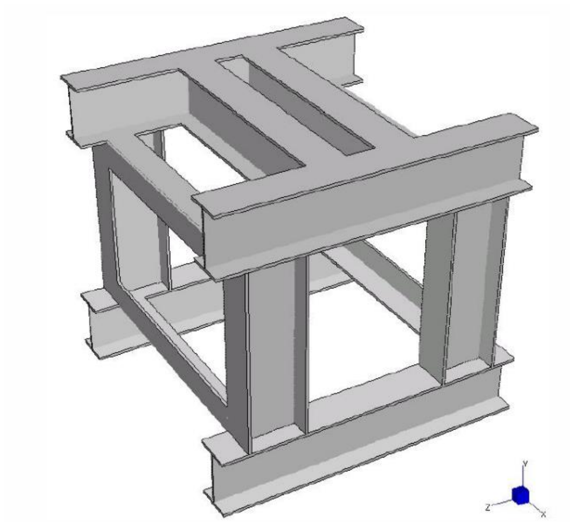


Figure 4.6.4.1: Keel and side block arrangement

4.6.5 Maximum pontoon deck loading at other than keel block and side block locations, if different than that of the blocking area.

The Dock's pontoon deck loading was calculated to access the scenario of the dock is fully submerge with the water level up to its top deck. Partial of deck structure was modelled for FEA assessment and this partial structure are shown in ***Figure 4.6.5.1*** and ***4.6.5.2***.

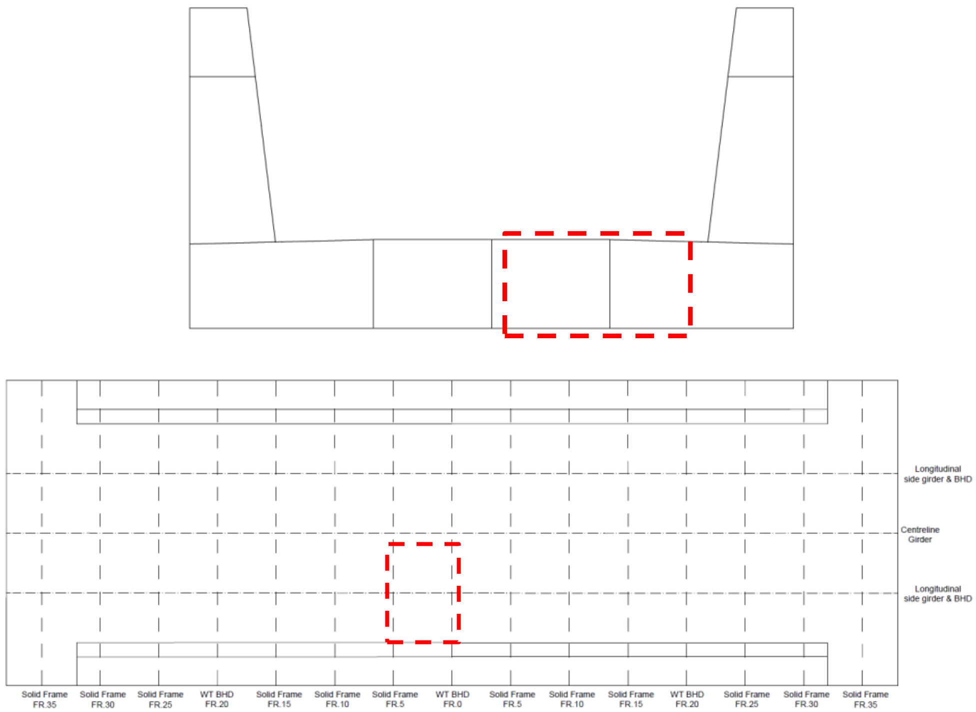


Figure 4.6.5.1: Area of the partial deck structure used for FEA assessment

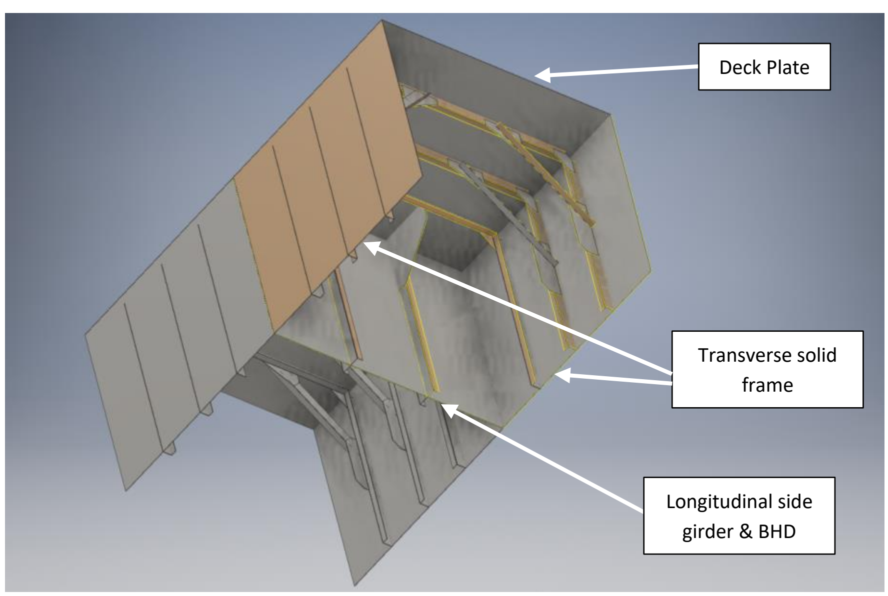


Figure 4.6.5.2: Deck structure CAD Model

4.6.6 Longitudinal and transverse watertight bulkhead design calculations

The strength of longitudinal and transverse watertight bulkheads was calculated whilst subjected to both the hydrostatic and docked vessel load. To assess the combination of these loads acting on the bulkhead FEA was used.

The FEA assessment was carried out using the operating stage as stated in ***Section 4.6.2***, in addition, the worst case scenario was investigated where water ballasts tanks were 100% filled on tank no 1, 2 and 3 while tank no 4, 5 and 6 were emptied. A detail model of the transverse bulkhead at frame No. 20 was created for this assessment and its CAD model is shown in ***Figure 4.5.6.1***.

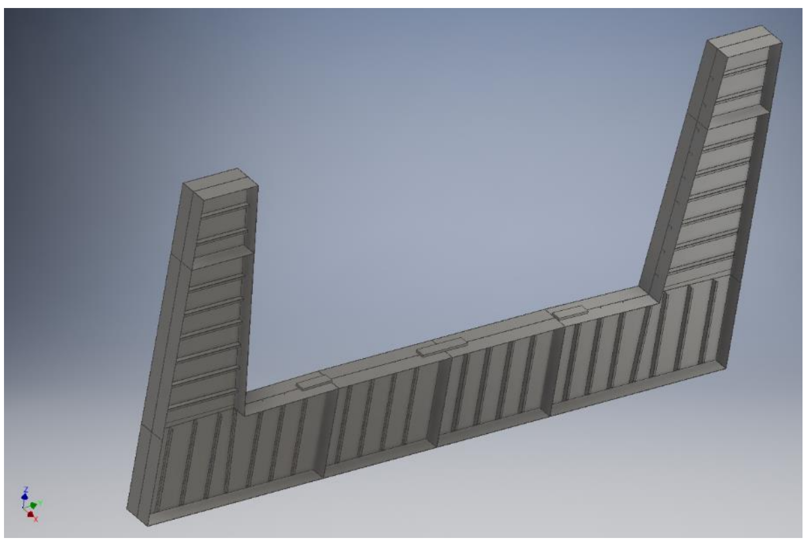


Figure 4.5.6.1: Transverse watertight bulkhead CAD model

4.6.7 Maximum allowable differential head between adjacent tanks

FEA was used to assess the differential head loads between the ballast tanks. A model of the dock forward between midships and end was used to represent the Tank No.1 to No.6. Analysis was carried out with tanks No.1 and No.4 filled separately while the other tanks were empty. The FEA model is shown in ***Figure 4.6.7.2.***

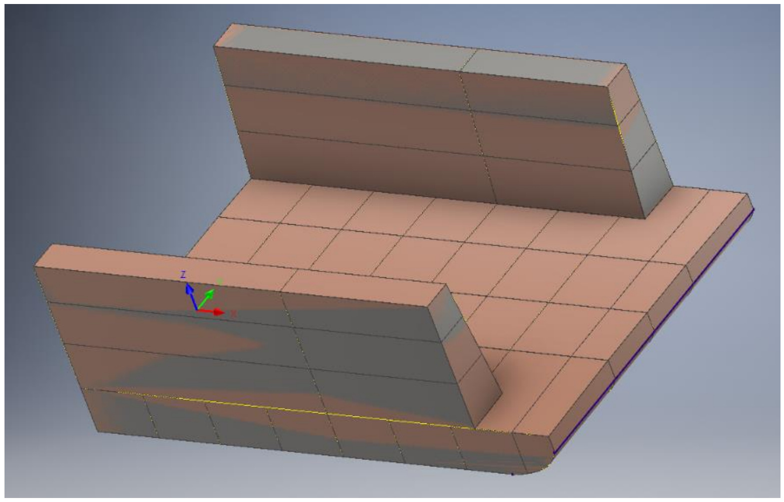


Figure 4.6.7.2: CAD model of the dock tank No. 4, 5 and 6

4.6.8 Maximum allowable differential head between tanks and exterior dry dock draft

FEA assessment was carried out to determine the load on the ballast tanks when the exterior floating dock draft is at the wing deck level whilst the internal water ballast tanks are all empty. The model from ***Figure 4.6.7.2*** above was used for this analysis.

4.6.9 Data and calculations substantiating adequacy of mooring attachments on the floating docks' structure

The floating docks' mooring arrangement consists of four bollards fitted on the pontoon deck. The drawing and scantling of the bollard is shown in ***Figure 4.6.9.1***.

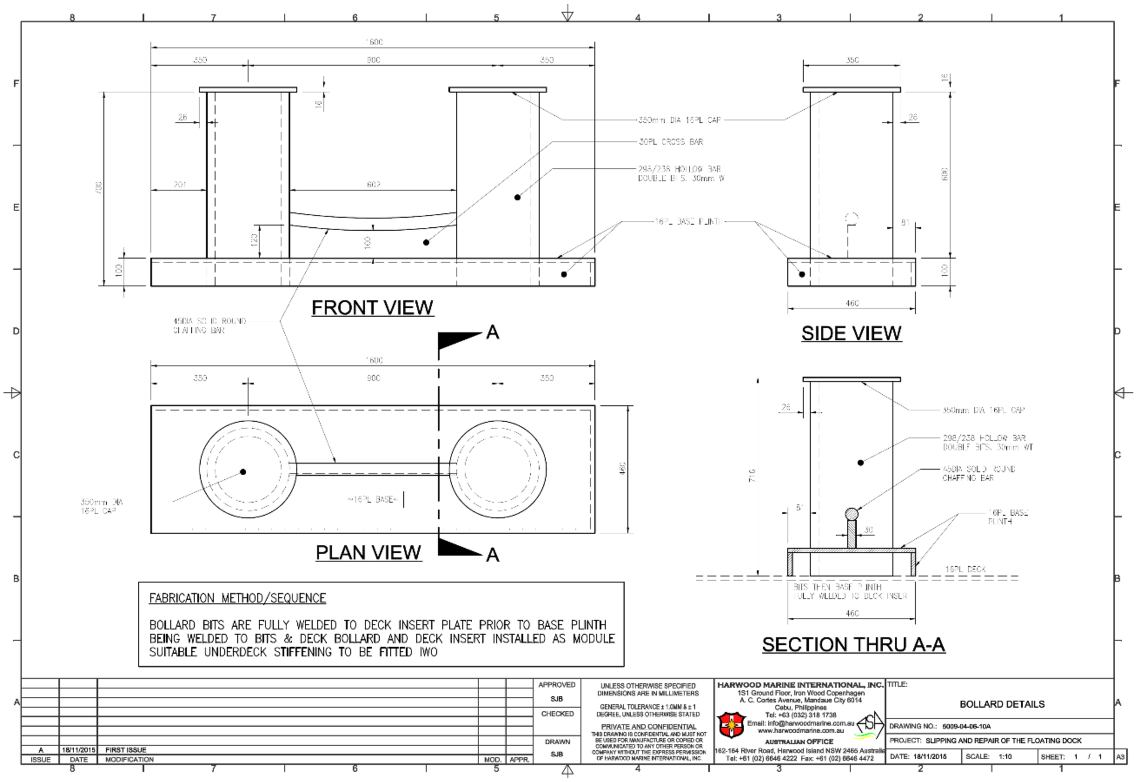


Figure 4.6.9.1: Bollard details

FEA was used to identify the maximum load that the bollard can withstand in accordance with the International Standard "ISO 13795 – Ship's mooring and towing fittings – Welded steel bollards for sea-going vessels"

4.6.10 Maximum allowable differential head between adjacent tanks (or group of adjacent tanks) to produce a bending moment equal to the maximum allowable value

To investigate the maximum bending moment from the ballast tanks' load, the methodology laid out in ***Section 4.6.1*** was used to calculate the load when Tanks No. 4, 5, 6, 7, 8 and 9 fully filled.

4.7 FEA Details

4.7.1 Software Details

The FEA calculations for the floating dock have been carried out using a general-purpose Finite Element Analysis software suite, which is inbuilt into Inventor™. The module uses ANSYS (a simplified version) for the FEA calculations.

4.7.2 Model Meshing

The meshing arrangement of the models and their mesh settings in the FEA software are shown between ***Figure 4.7.2.1*** to ***4.7.2.5*** and ***Table 4.7.2.1*** respectively

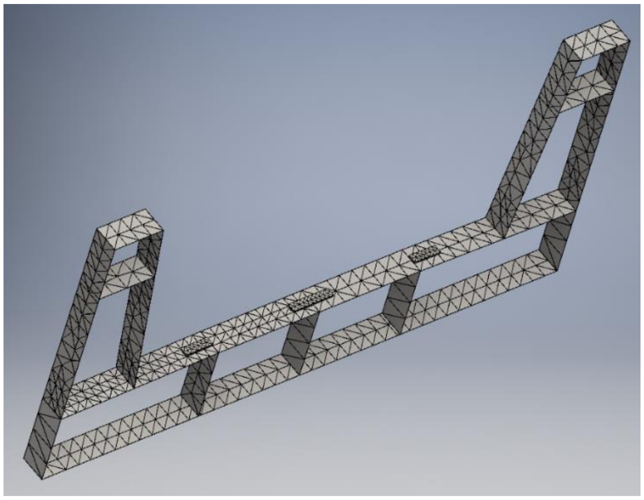


Figure 4.7.2.1: Transverse strength analysis model

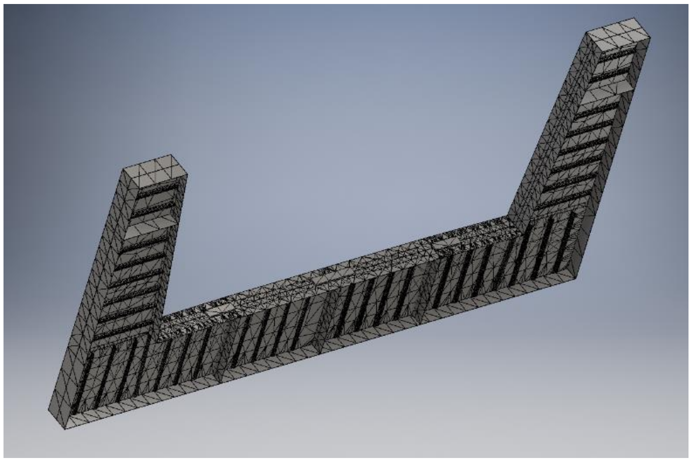


Figure 4.7.2.2: Transverse watertight bulkhead analysis model

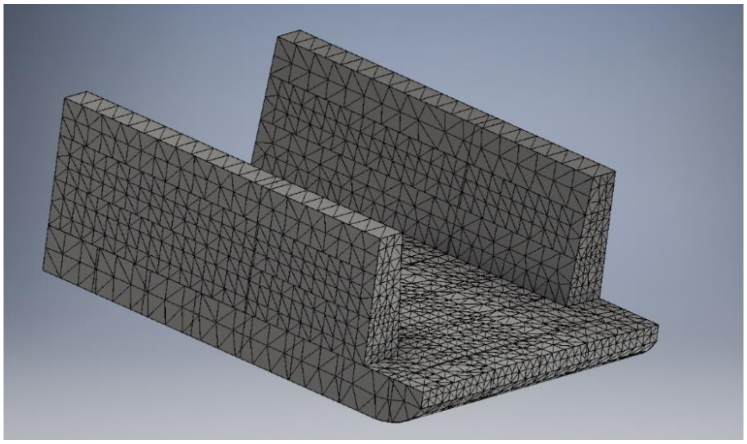


Figure 4.7.2.3: Differential tank heads analysis model

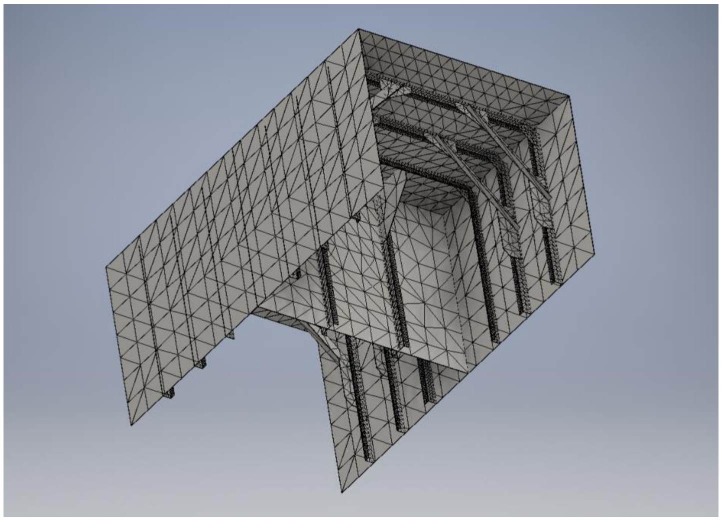


Figure 4.7.2.4: Deck structure analysis model

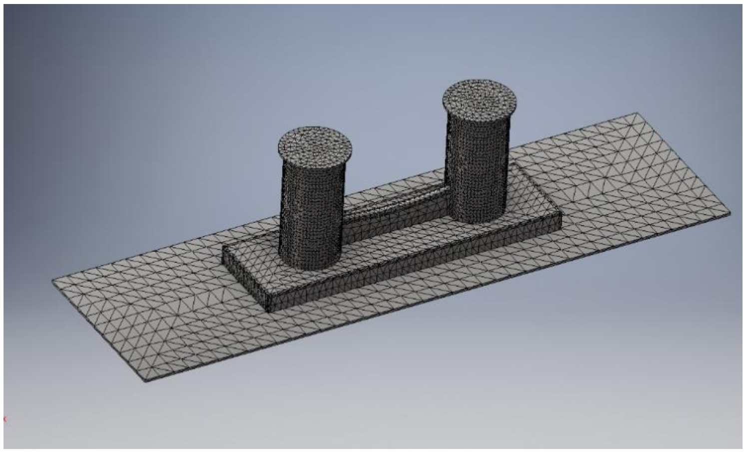


Figure 4.7.2.5: Mooring bollards analysis model

Table 4.7.2.1: Model FEA mesh settings

Model	No. of Nodes	No. of elements	Average element size (as a fraction of bounding bow length)	Minimum element size (as a fraction of average size)
Transverse strength	10287	4333	0.75	0.75
Transverse watertight bulkhead	191849	95434	0.90	0.90
Differential tank heads	128047	64999	0.90	0.90
Deck Structure	156037	80384	0.65	0.50
Mooring bollards	114900	64725	0.10	0.20

4.8 Assessment Result

4.8.1 Maximum Allowable Longitudinal Bending Moment

The calculated maximum allowable longitudinal bending moment with 1,740 tonne of load acting on the floating dock amidships was 169,269 kN.m, which corresponds to the Factor of Safety of 1.67. ***Figure 4.8.1.1*** and ***4.8.1.2*** show the load distribution and calculated bending moment along the length of the floating dock and ***Appendix II*** lists the detailed calculations.

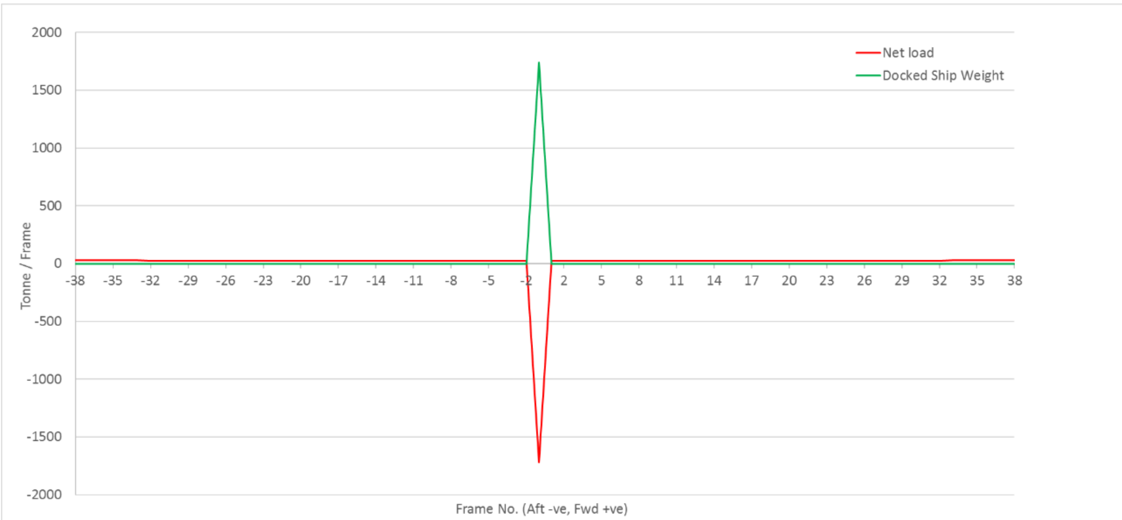


Figure 4.8.1.1 Load Distribution

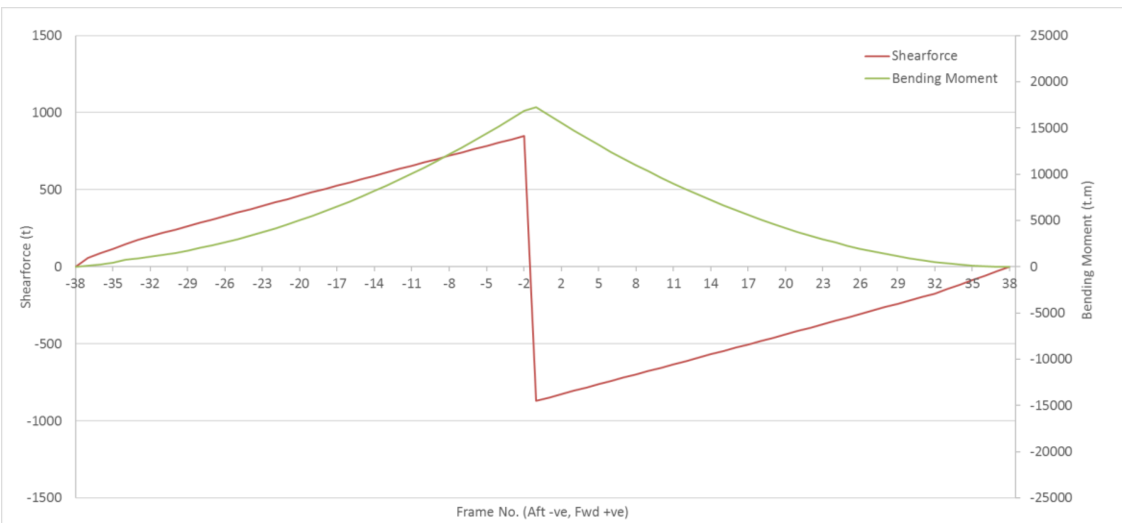


Figure 4.8.1.2 Bending Moment Calculation

The calculated longitudinal bending moment of the floating dock, whilst docked with the harbour tug, Huon class minehunter and Paluma class surveying ship are 73,279kN.m, 20,699kN.m and 28,747kN.m respectively with all their Factor of Safety exceeding 1.6. ***Figures 4.8.1.3*** and ***4.8.1.8*** show their load distribution and calculated bending moment.

Figure 4.8.1.3 Load Distribution – Harbour tug

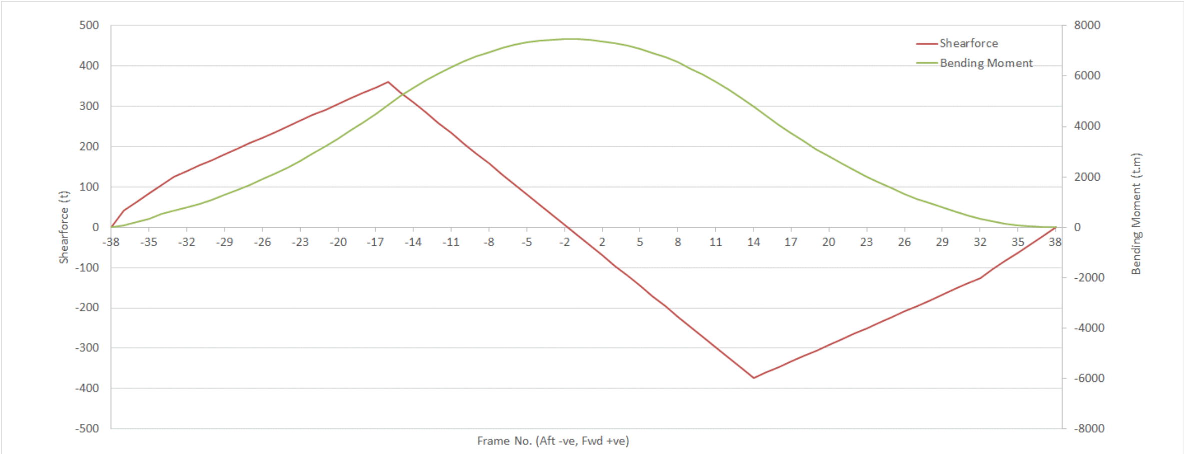


Figure 4.8.1.4 Bending Moment Calculation – Harbour tug

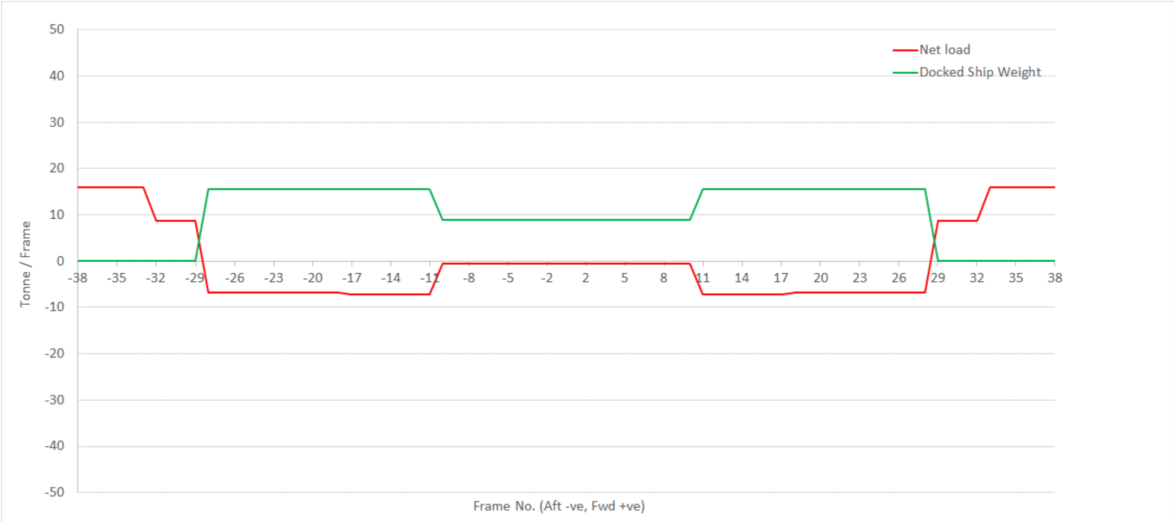


Figure 4.8.1.5 Load Distribution – Huon Class Minehunter

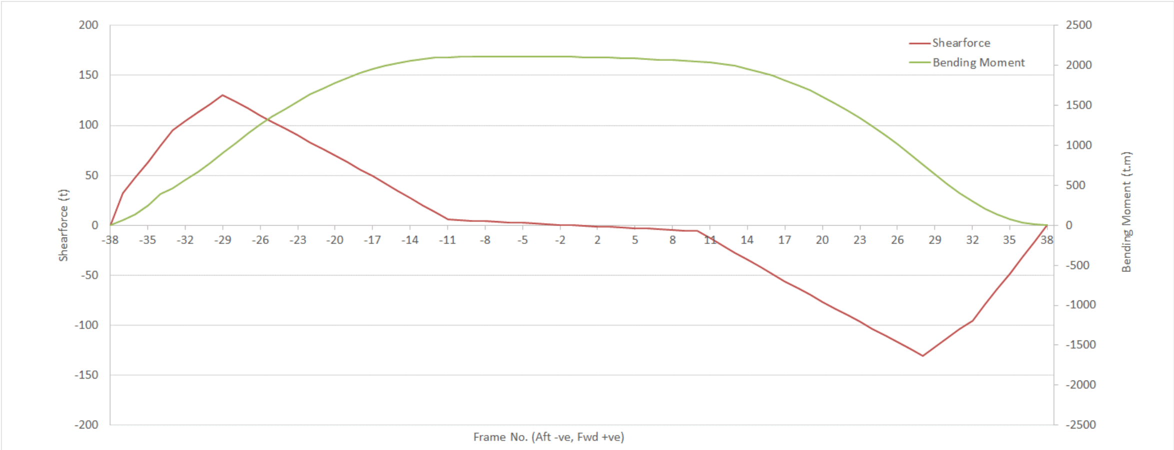


Figure 4.8.1.6 Bending Moment Calculation – Huon Class Minehunter

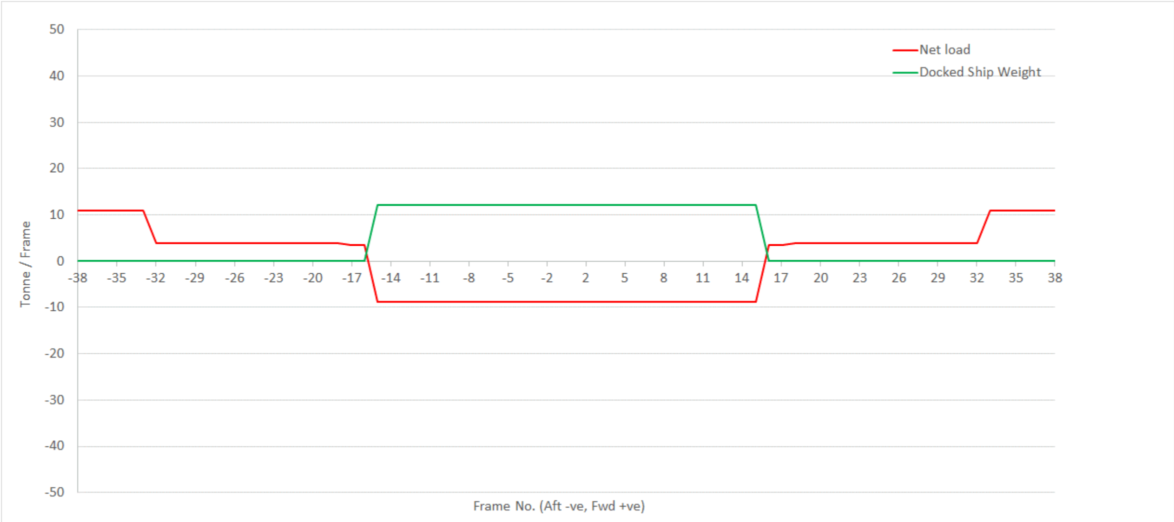


Figure 4.8.1.7 Load Distribution – Paluma Class Surveying Ship

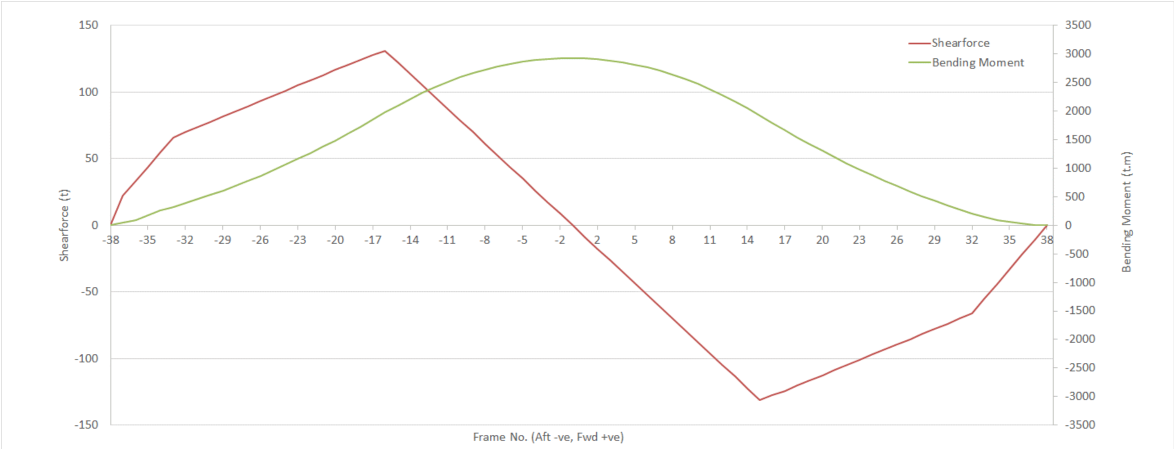


Figure 4.8.1.8 Bending Moment Calculation – Paluma Class Surveying Ship

4.8.2 Transverse strength calculation substantiating the maximum allowable pontoon deck loading in long tons (LT) per linear foot

The FEA result shows that the maximum allowable pontoon deck loads for Phase 1 operating condition are 65 tonnes per block, and the corresponding maximum stress are 92 MPa with its equivalent Factor of Safety of 2.25. This is equivalent to a maximum pontoon deck load of 22.5 tonnes per linear foot. ***Figure 4.8.2.1*** and ***4.8.2.2*** shows the FEA result.

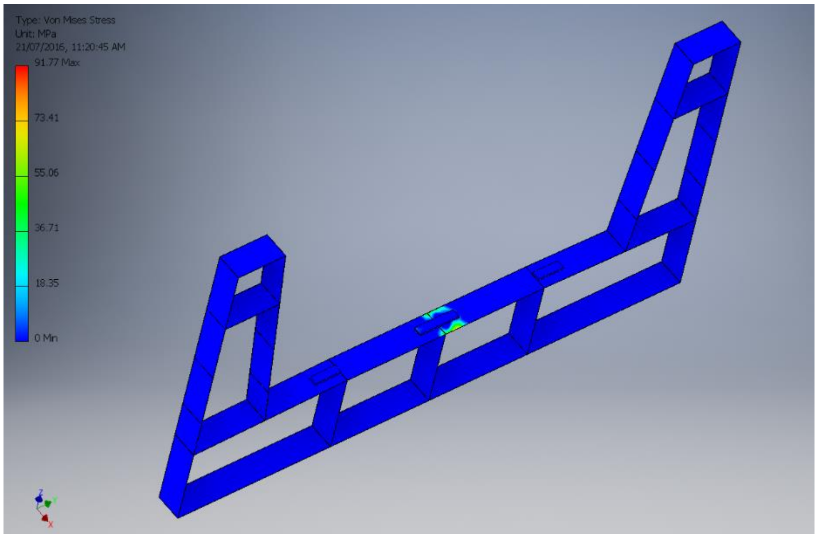


Figure 4.8.2.1 Maximum block load at normal operating condition - Phase 1 (100% load on CL block)

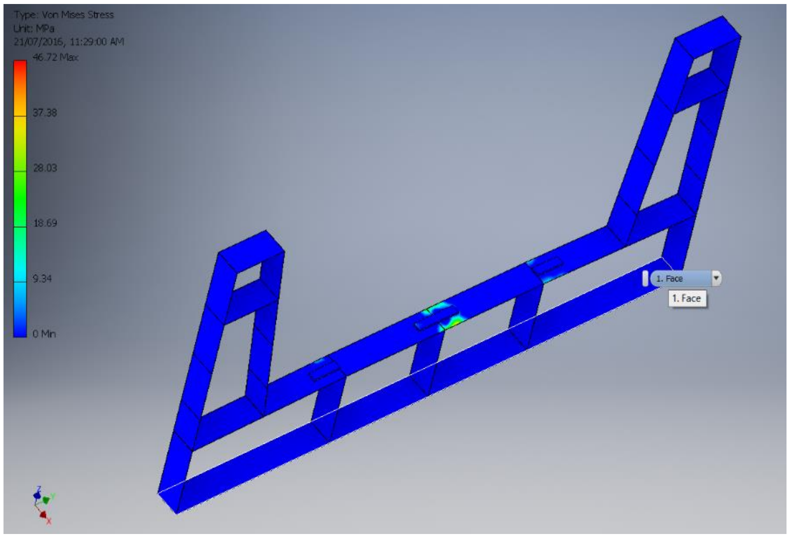


Figure 4.8.2.2 Maximum block load at normal operating condition - Phase 1 (50% load on CL block & 50% load on side blocks)

Applying the same load from above, the result for Phase 3 and Phase 2.5 operating conditions are 87 MPa and 40 MPa with their equivalent Factor of Safety of 2.3 and 5.1 respectively. ***Figures 4.8.2.3*** to ***4.8.2.6*** show these results.

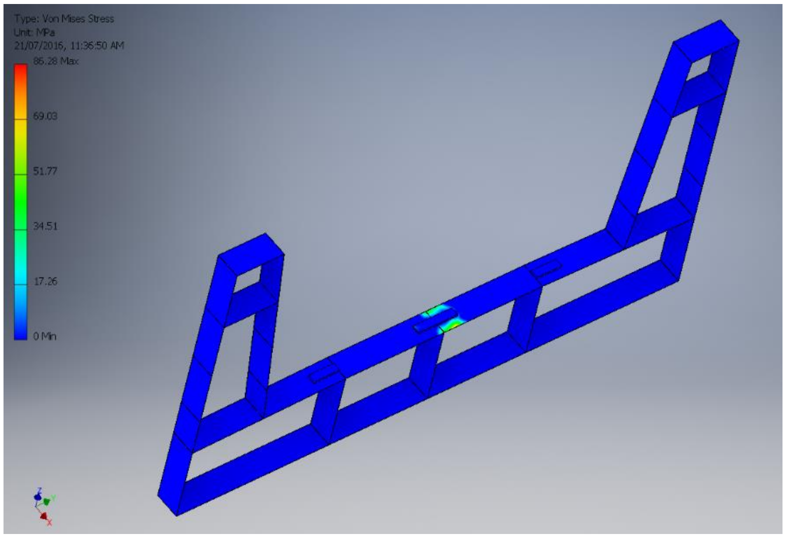


Figure 4.8.2.3 Waterline up to docked vessel keel – Phase 3 (100% load on CL block)

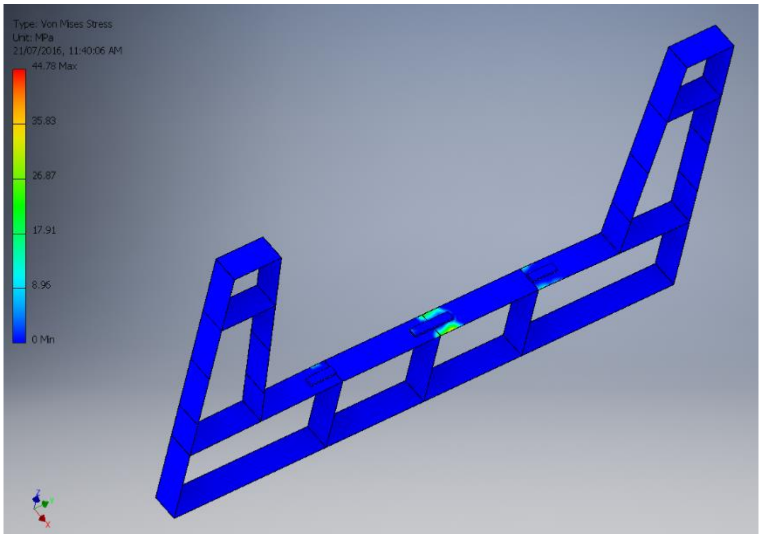


Figure 4.8.2.4 Waterline up to docked vessel keel - Phase 3 (50% load on CL block & 50% load on side blocks)

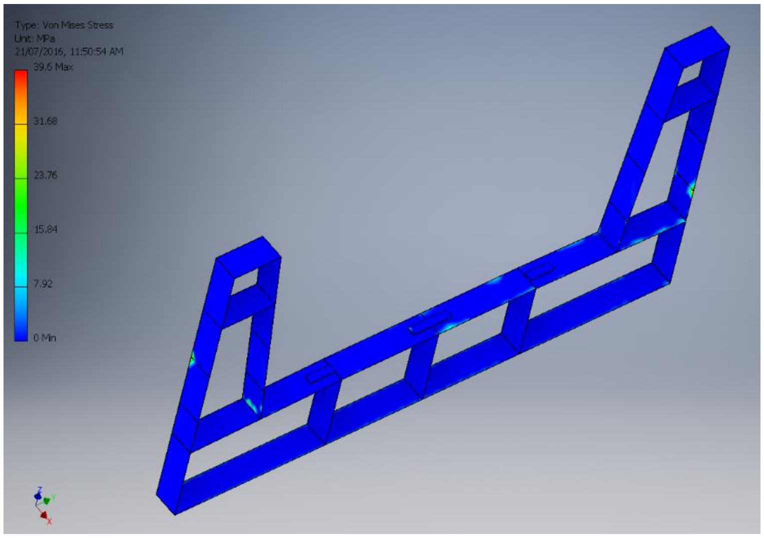


Figure 4.8.2.5 Partial load, maximum head condition – Phase 2.5 (100% load on CL block)

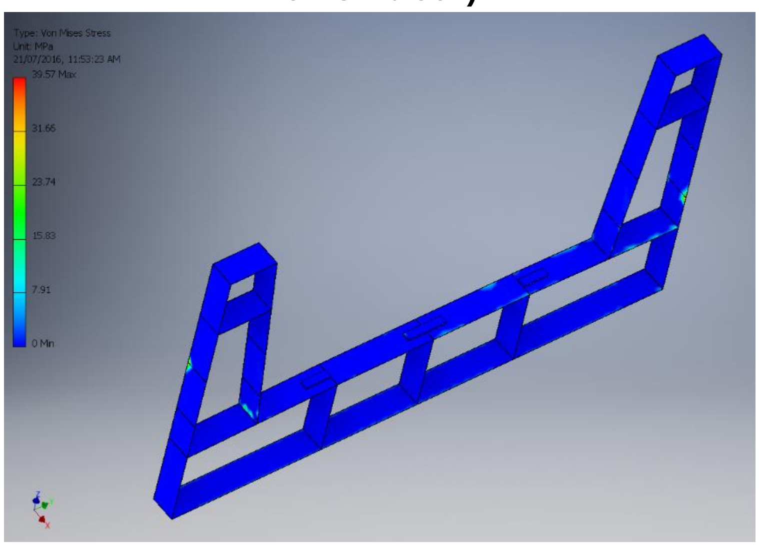


Figure 4.8.2.6 Partial load, maximum head condition – Phase 2.5 (50% load on CL block, 50% side blocks load)

4.8.3 Longitudinal deflection calculation corresponding to maximum allowable bending moment

The longitudinal deflection corresponding to the maximum allowable bending moment calculated in ***Section 4.8.1*** above is 99 mm at the floating dock amidships. The detailed calculations are listed in ***Appendix II***.

4.8.4 Maximum keel block and side block loading calculations including local pontoon deck structure under docking blocks.

From the UGL report the calculated maximum keel and side block is 30 tonnes. The detail calculations are listed in ***Appendix I***.

Maximum load of pontoon deck structure under the docking block are calculated to 65 tonnes per block from ***Section 4.8.2***, this calculated load exceeded the maximum load that the keel and side block can withstand.

4.8.5 Maximum pontoon deck loading at other than keel block and side block locations, if different than that of the blocking area

The FEA result shows that the maximum stress of the pontoon deck from the hydrostatic head of 7.8m (when the dock fully submerge to its waterline is up to the top deck) is 26 MPa with its equivalent Factor of Safety of 8. The above hydrostatic head is corresponding to maximum deck loading of 7.9 t/m^2.

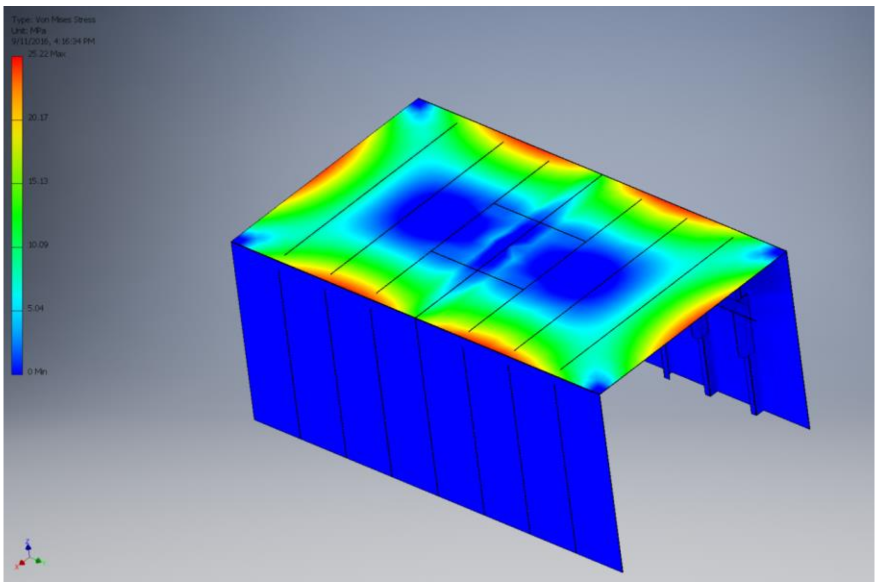


Figure 4.8.5.1: Maximum pontoon deck load

4.8.6 Longitudinal and transverse watertight bulkhead design calculations

The FEA result shows that the maximum stress from the water ballast head of 8.2m is 64 MPa with its equivalent Factor of Safety of 3.2. The result from the FEA is shown in ***Figure 4.8.6.1***.

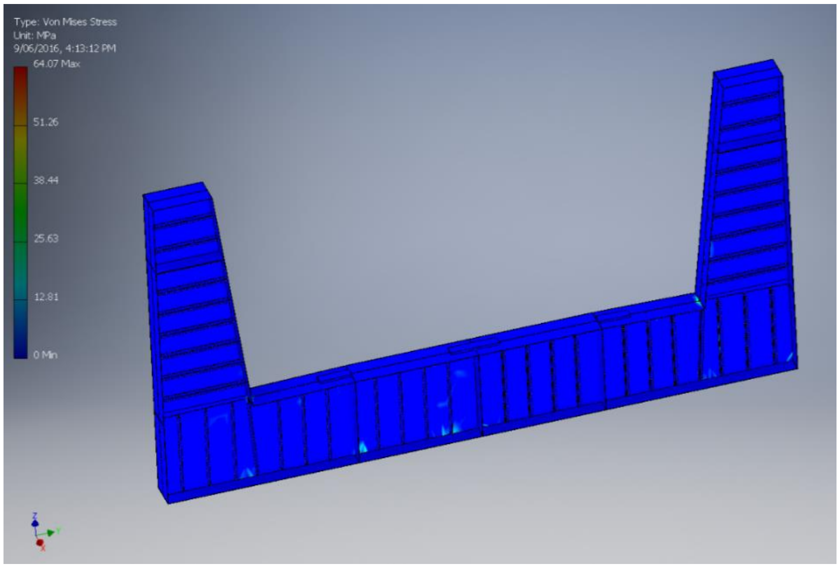


Figure 4.8.6.1: Maximum water ballast head

The stress from a centre line block load of 63 tonnes are 105 MPa with its equivalent Factor of Safety is 1.9. The result of the FEA is shown in ***Figure 4.8.6.2***.

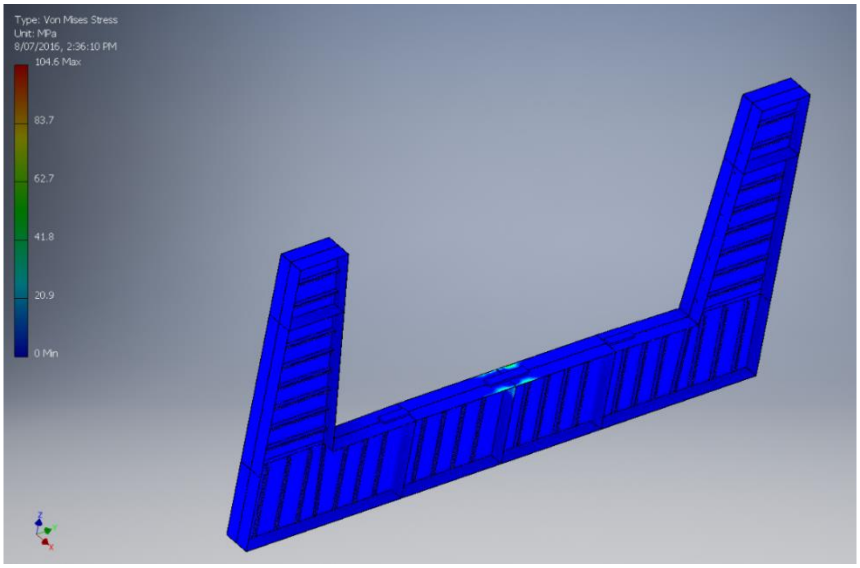


Figure 4.8.6.2: CL block load

4.8.7 Maximum allowable differential head between adjacent tanks.

The calculated maximum stress on the floating docks' tank structure with ballast tank No.1 filled to 5.6 m and other tanks empty is 9 MPa with its equivalent Factor of Safety of 23. ***Figure 4.8.7.1*** shows the result.

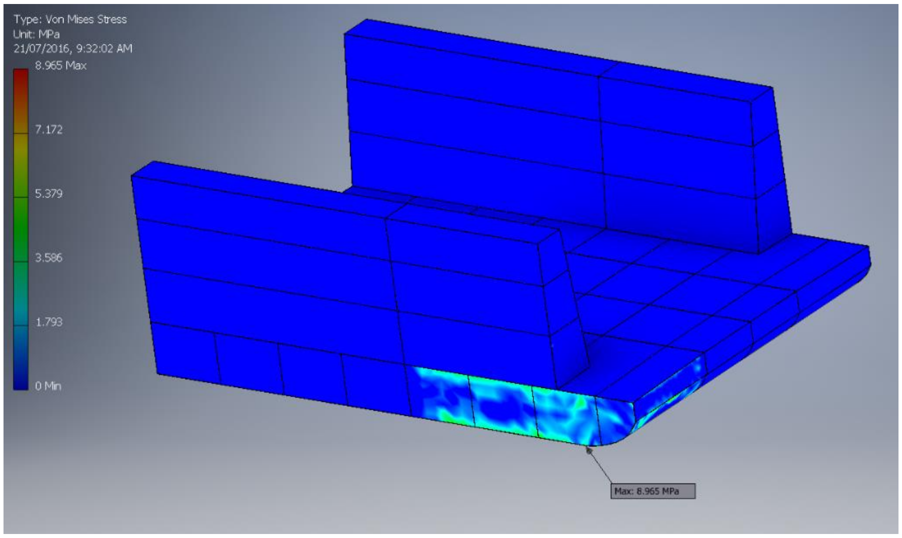


Figure 4.8.7.1: FEA result – No.1 Ballast tank filled to 5.6m

The calculated maximum stress on the floating docks' tank structure with ballast tank No.4 filled to 2.75 m and other tanks empty is 11 MPa with its equivalent Factor of Safety of 18.8. ***Figure 4.8.7.3*** shows the result.

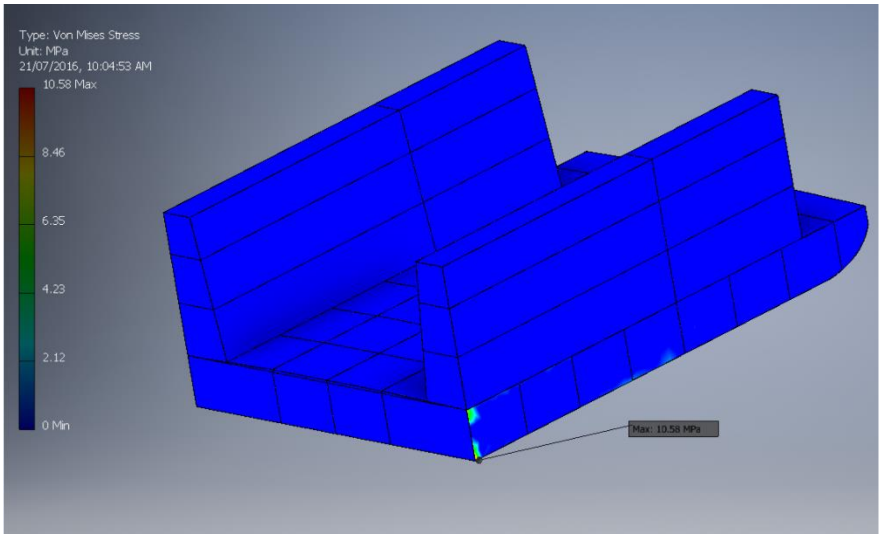


Figure 4.8.7.2: FEA result – No.4 Ballast tank filled to 2.75m

4.8.8 Maximum allowable differential head between tanks and exterior dry dock draft.

The FEA result shows that the maximum stress on the floating docks' tank structure taking the exterior dock draft up to the wing deck level and empty internal tanks is 63 MPa and its equivalent Factor of Safety of 3.2. ***Figure 4.8.8.1*** shows the result.

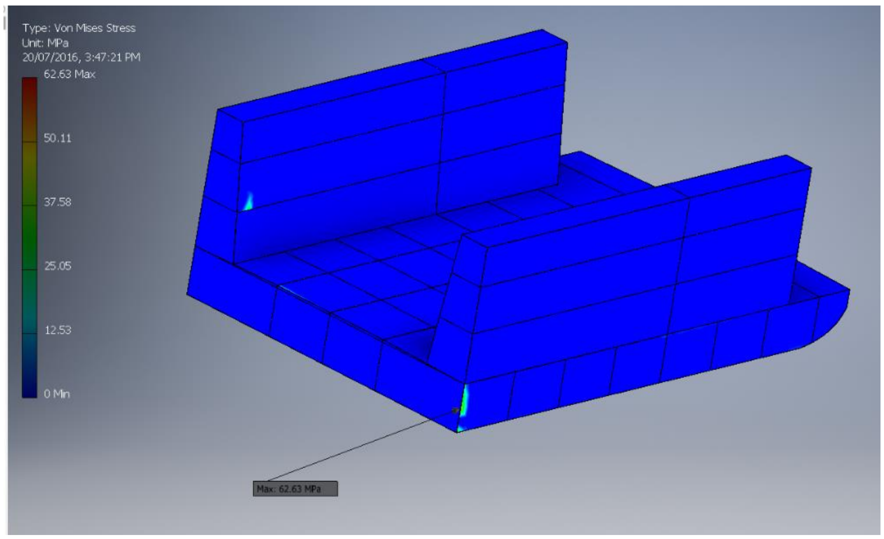


Figure 4.8.8.1: FEA result - empty ballast tanks & draft up to wing deck

4.8.9 Data and calculations substantiating adequacy of mooring attachments on the dock's structure

The maximum load that the bollards can withstand is 23 tonnes and the FEA result is shown in ***Figure 4.8.9.1***.

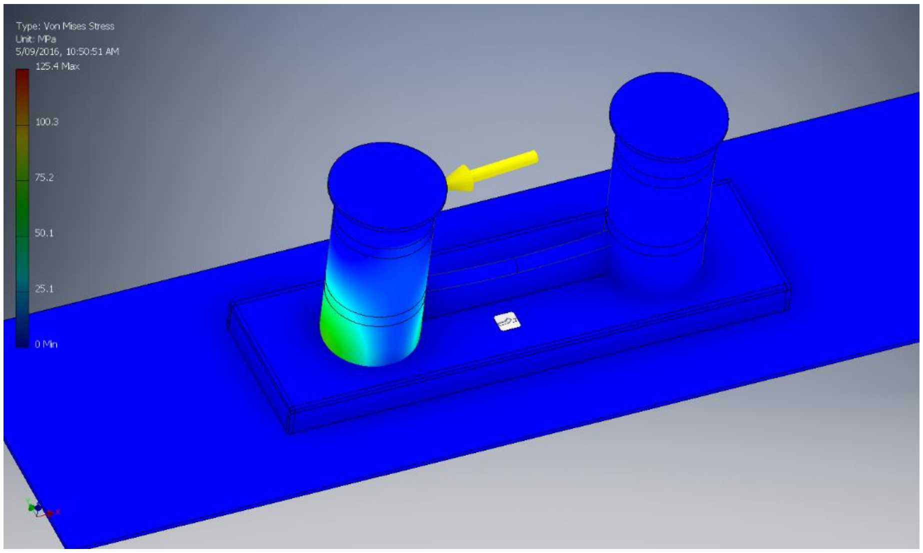


Figure 4.8.9.1: FEA result – maximum load on bollard

4.8.10 Maximum allowable differential head between adjacent tanks to produce a bending moment equal to the maximum allowable value

The calculations show that the maximum bending moment of the floating dock with ballast tanks No. 4, 5, 6, 7, 8 and 9 fully ballasted is 88,093 kN.m with its equivalent Factor of Safety of 3.2. ***Figures 4.8.10.1*** and ***4.8.10.2*** shows the load distribution and the bending moment respectively. The detailed calculations are listed in ***Appendix III***.

Figure 4.8.10.1 Load Distribution

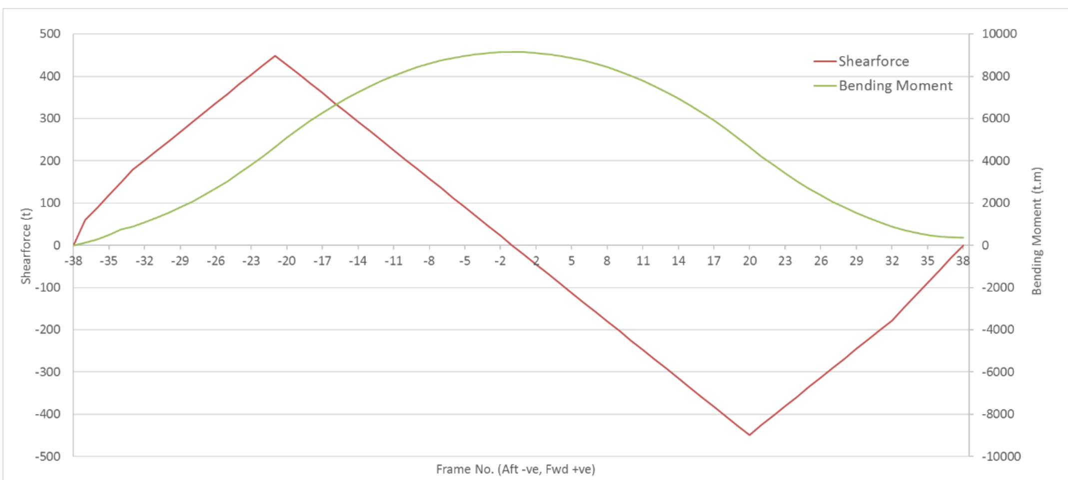


Figure 4.8.10.2 Bending Moment Calculation

4.9 Result Summary

The results of the assessment from ***Section 4.8*** are summaries in the table below. The Factor of Safety of each of the assessment exceed 1.66, which is the minimum requirement from the MIL-STD.

Table 4.9.1 Structural Assessment Result Summary

Section	item	Load category	Load Magnitude	Maximum Stress	Factor of Safety
4.8.1	Maximum allowable longitudinal bending moment	Single point load acting on Dock midships	1740 tonnes	124 MPa	1.67
	Longitudinal bending moment from harbour tug	Harbour tug	1120 tonnes	53.6 MPa	3.9
	Longitudinal bending moment from Huon class minehunter	Huon class minehunter	735 tonnes	15.1 MPa	13.7
	Longitudinal bending moment from Paluma class surveying ship	Paluma class surveying ship	364 tonnes	21.0 MPa	9.8
4.8.2	Transverse strength substantiating maximum allowable pontoon deck loading (Phase 1 Operation)	100% load on centreline block	22.5 tonnes per linear foot	92.0 MPa	2.2
		50% load on centreline block & 50% load on side blocks		46.8 MPa	4.4
	Transverse strength substantiating maximum allowable pontoon deck loading (Phase 3 Operation)	100% load on centreline block		86.3 MPa	2.3
		50% load on centreline block & 50% load on side blocks		44.8 MPa	4.6
	Transverse strength substantiating maximum allowable pontoon deck loading (Phase 2.5 Operation)	100% load on centreline block		40.0 MPa	5.1
		50% load on centreline block & 50% load on side blocks		40.0 MPa	5.1
4.8.3	Longitudinal deflection calculation corresponding to Maximum allowable bending moment	Single point load acting on Dock midships	1740 tonnes	Maximum deflection of 99 mm	1.67
4.8.4	Maximum keel block & side block loading calculations	See UGL report in ***Appendix I***			
4.8.5	Maximum pontoon deck loading at other than keel block & side block location	Uniform load over the pontoon deck	7.9 tonnes per m^2	26 MPa	8.0
4.8.6	Longitudinal & transverse watertight bulkhead	Hydrostatic head from water ballast	Hydrostatic head of 8.2 m	64 MPa	3.2

		Blocking load on centreline block	63 tonnes	105 MPa	1.9
4.8.7	Maximum allowable differential head between adjacent tanks	Hydrostatic head from water ballast	Hydrostatic head of 5.6 m	11 MPa	18.8
4.8.8	Maximum allowable differential head between tanks & exterior dry dock draft	Hydrostatic head from external draft	Hydrostatic head of 10.5 m	63 MPa	3.2
4.8.9	Mooring attachments loading calculation	Mooring line load	23 tonnes	124 MPa	1.67
4.8.10	Maximum allowable differential head between adjacent tanks to produce a bending moment equal to the maximum allowable value	Load from fully filled tank No.4,5,6,7,8,9	1785 tonnes	64.4 MPa	3.2

5 Stability Assessment

5.1 Introduction

The stability assessment of the existing floating dock has been carried out to determine if both the intact and damage stability characteristics comply with the MIL-SPEC requirements.

The intent of the intact stability requirement is to ensure that the floating dock has sufficient stability to withstand both static and environmental conditions throughout its various phases of operations. The damage stability and reserve buoyancy requirements are to ensure the dock has the capacity to withstand a moderate level of damage and resultant flooding without unduly endangering a docked vessel.

This assessment is a preliminary assessment because the only stability data available (lightweight and VCG) is from the floating docks' inclining experiment in 1974. As the floating dock is currently being refurbished, once the work is completed an inclining experiment is to be carried out.

The Wolfson Unit HST stability software has been used to calculate the docks' hydrostatics and damage stability characteristics.

5.2 General Information

5.2.1 Datum

The location of the datum for the floating dock are:

Direction	Location	+ve
Vertical	Baseline; underside of keel	Upwards
Longitudinal	Midships	Forward
Transverse	Centreline	Port

5.2.2 Ballasting Arrangement

The following ballast tank soundings were used for the five phases of operation to keep the floating dock at a level trim:

	Phase 1	**Phase 2**	**Phase 3**	**Phase 4**	**Phase 5**
Dock Draft (m)	8.68	6.10	4.10	2.90	2.38
Tank No.	**Tank Sounding (m)**				
1, 3, 10, 12	5.00	2.04	1.14	0.79	0.30
2, 4, 5, 6, 7, 8, 9, 11	100% pressed	2.04	1.14	0.79	0.30

5.3 Weight Determination

For the preliminary stability assessment, the lightship weight of this floating dock was taken from the original inclining experiment as stated in ***Section 4.4.1***.

5.4 Stability Criteria

This section summarised the stability and buoyancy criteria in Section 5.1.3.3.1 of the MIL-STD.

5.4.1 Buoyancy requirements

- The minimum rated freeboard at the lowest point of the pontoon deck of the dock with the ship lifted shall be 12 inches (0.305 m).

- The Minimum freeboard (measured from the top deck at side) in the fully ballasted-down condition shall be 3.25 feet (0.991 m).

Notes: “Fully ballasted-down” shall mean:
(a) Tanks 100 percent full in docks where the bottom of the tank vent terminates at the level of the top of the tank.
(b) In docks designed on the isothermal compression principle, to the ballast free surface level in the compressed state. Calculations shall be provided to prove the setting of the vent bottoms will limit submergence. Condition of maximum submergence shall be verified during the submergence test required by 5.1.6.3 of the MIL-STD.

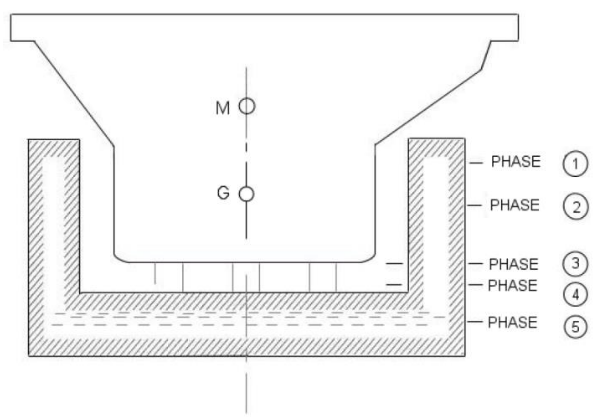
5.4.2 Intact stability requirements

The intact stability shall be determined for all modes of operation, including the five critical phases of stability shown on ***Figure 5.4.2.1***. Longitudinal stability shall be included for phases 3 and 4. Free surface effects shall be determined and included in the calculations. Intact stability shall meet the requirements stated below:

- Metacentric Height (GM) in the phase of minimum stability shall not be less than 5 feet (1.524 m). A lifting capacity curve of ship's adjusted VCG versus lifting capacity as shown in ***Figure 5.4.2.2*** shall be presented based on the dock in the phase of minimum intact stability with the minimum GM stated from above.

- The dock shall withstand the effects of beam winds stated below without heeling more than 15 degrees.

  (a) Determine the angle of heel under a 100-knot beam wind, when the ship is fully docked, ship and dock system in phase 5 shown on ***Figure 5.4.2.1***.
  (b) Determine the angle of heel under 20-knot beam wind, when the ship and dock system is in its minimum-stability phase.
  (c) Determine the wind that would cause 15-degree heel when the ship and dock system is in its minimum-stability phase.



Phase 1 - Fully ballasted-down condition. The ship is floating independently and the dry dock is in the submerged condition before the ship bears on the blocks.

Phase 2 - Partial liftoff. The ship starts bearing on the blocks and one-half of the ship's weight is supported by the floating dock.

Phase 3 - Ship keel at water level. The ship's keel is about to leave the waterplane.

Phase 4 - Top of pontoon at water level. The water level between the wingwalls is just above the top of the pontoon.

Phase 5 - Normal-operating condition. Top of pontoon is at or above the minimum freeboard.

Figure 5.4.2.1: Phases in the docking operations for stability calculations

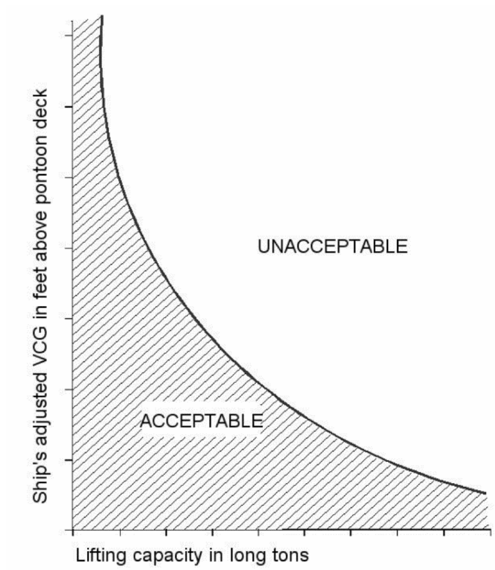


Figure 5.4.2.2: Limiting curve of docked vessel adjusted VCG vs. dock lifting capacity

5.4.3 Damaged stability and reserve buoyancy requirements.

The dry dock shall withstand the following damage and resultant flooding for the worst combination of sinkage, heel, and trim without heeling more than 15 degrees, trimming more than the lesser of 3 degrees or 20 feet, submerging the margin line (see 3.2.12 of the MIL-STD) or exceeding the maximum allowable differential heads provided under 5.1.3.4.1.h and 5.1.3.4.1.i of the MIL-STD.

- In the fully ballasted condition, phase 1 shown on ***Figure 5.4.2.1***, the following two types of casualties and resultant flooding shall be assumed:

  (a) Side shell damage: Damage shall be assumed to occur between main transverse bulkheads with penetration up to but not through the inner wing wall. The safety deck shall be assumed to be ruptured.
  (b) Bottom shell damage: Damage shall be assumed to occur between main and transverse bulkheads such that the complete space between main transverse bulkheads floods. The safety deck may be assumed to remain watertight.

- In the de-ballasted condition with the ship on the blocks, phase 5 shown on ***Figure 5.4.2.1***, the following two types of casualties and resultant flooding shall be assumed:

(a) Side shell damage: Damage shall be assumed to occur on the side shell at a main transverse bulkhead such that the two adjacent tanks or spaces are flooded. Damage shall be assumed to penetrate up to but not through the inner wing wall. The safety deck shall be assumed to be ruptured. For closed-ended docks, the basin shall be assumed flooded.
(b) Bottom shell damage: Damage shall be assumed to occur on the dock bottom at the intersection of a main transverse watertight bulkhead and a main longitudinal watertight bulkhead such that all tanks or spaces adjacent to the intersection are flooded. The safety deck shall be assumed to be undamaged. For closed-ended docks, the basin shall be assumed flooded.

5.5 Assessment Results

5.5.1 Buoyancy requirements

The calculated maximum lifting capacity of the floating dock versus the range of docked vessel longitudinal positions is as shown in ***Figure 5.5.1.1***.

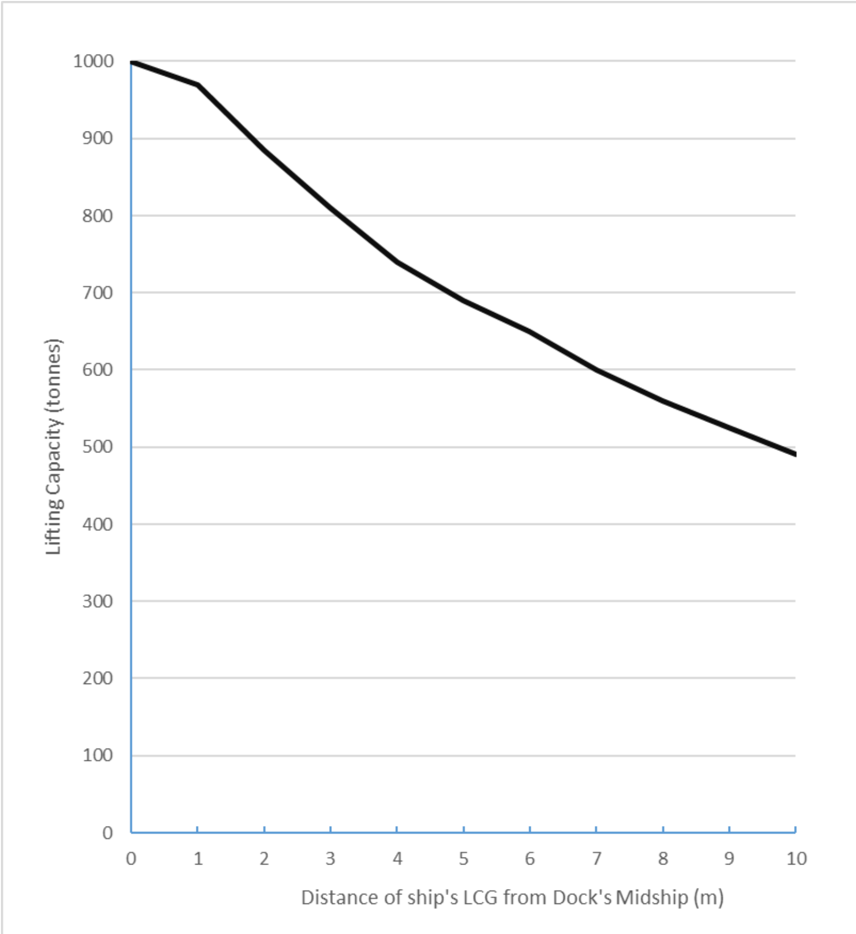


Figure 5.5.1.1 Floating dock lifting capacity variation with docked vessel longitudinal locations.

The minimum freeboard in the fully ballasted down position is to be verified through a submerging test in accordance to the Clause 5.1.6.3 of the MIL-STD.

5.5.2 Intact stability requirements

5.5.2.1 GM Calculation

The calculated maximum lifting capacity versus docked vessel adjusted VCG in Phase 3 operation is as shown in ***Figure 5.5.2.1.1*** below.

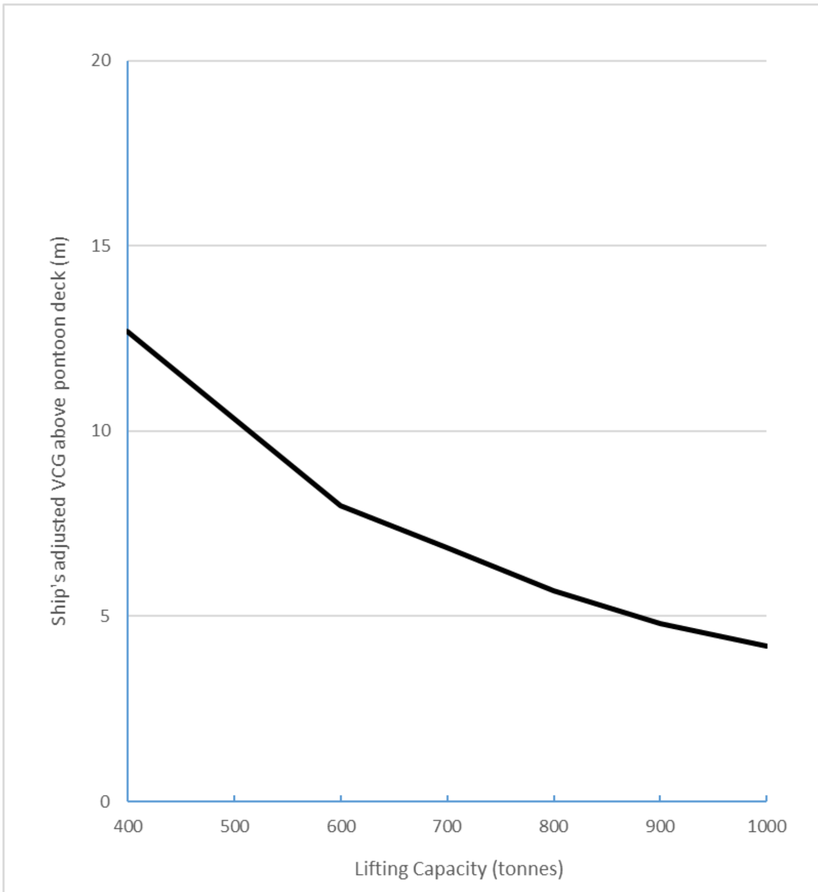


Figure 5.5.2.1.1: Limiting curve of docked vessel adjusted VCG vs. dock lifting capacity

The floating docks' GM for the other phases of operation with a 1000 tonnes docked ship were calculated as follow:

Table 5.5.2.1.1: GM in four phase of operations

	Ship	Ballast	Total	VCG	Draught	GM	Status
	tonne	tonne	tonne	m	m	m	
Phase 1	-	3314	4763	3.61	8.68	2.56	Comply
Phase 2	500	2222	4179	4.47	6.10	1.98	Comply
Phase 4	1000	839	3304	6.26	2.90	3.73	Comply
Phase 5	1000	308	2773	7.34	2.30	7.90	Comply

Note: the adjusted VCG of the docked ship is 5.2m from the pontoon deck

5.5.2.2 Heeling from beam winds

The calculated angles of heel under wind loading are summarized in ***Table 5.5.2.2.1***.

Table 5.5.2.2.1: Heeling from beam winds effect

Criteria	Requirement	Actual	Status
Heel angle under 100 knot beam wind with ship docked in Phase 5	Maximum 15 degree	1.68	Comply
Heel angle under 20 knot beam wind with ship dock minimum stability	Maximum 15 degree	0.24	Comply
Determine windspeed that would cause 15-degree heel in minimum stability Phase	-	155 knots	N/A

5.5.3 Damaged stability and reserve buoyancy requirements.

The damage stability calculations were carried out for the side shell damage in way of the forward transverse bulkheads. This is to investigate if the Dock will comply with the MIL-STD under the worst-case scenario.

The Floating Dock loading condition in Phase 5 operation (1 foot slack ballast in all tanks, vessel docked) prior to damage is listed in the following:

Table 5.5.3.1: Dock loading condition prior to damage – Phase 5 operation

Items	**Weight (tonnes)**	**VCG (m)**
Floating Dock	1449	5.585
Docked Vessel	1000	8.100
Tank No.1	21	0.152
Tank No.2	26	0.152
Tank No.3	21	0.152
Tank No.4	27	0.152
Tank No.5	35	0.152
Tank No.6	27	0.152
Tank No.7	27	0.152
Tank No.8	35	0.152
Tank No.9	27	0.152
Tank No.10	21	0.152
Tank No.11	26	0.152
Tank No.12	21	0.152
Total:	**2763**	**7.348**

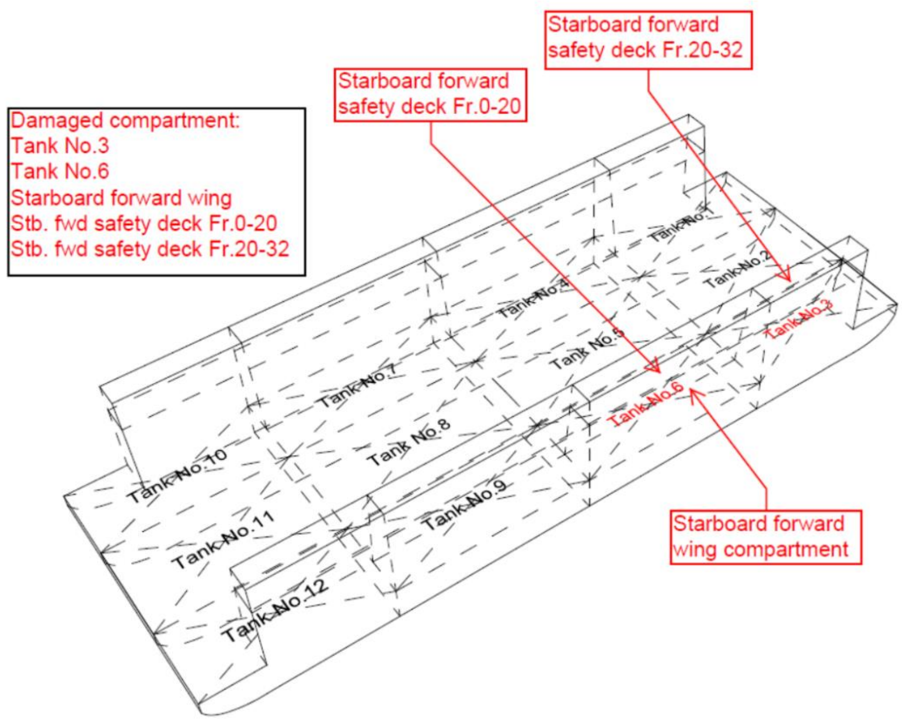
Table 5.5.3.2: Dock damaged condition – Phase 5 operation, side shell damage

Damaged Compartments	Equilibrium GM (m)	Equilibrium angle of heel (degree)	Equilibrium draft (m)	Equilibrium trim (m)	Comply
Tank 1 & 4	2.74	20.4 to Port	3.44	3.09 (by bow)	Not Comply
Tank 3 & 6	2.74	20.4 to Starboard	3.44	3.09 (by bow)	Not Comply
Tank 4 & 7	3.98	20.4 to Port	2.94	0.00	Not Comply
Tank 6 & 9	3.98	20.4 to Starboard	2.94	0.00	Not Comply
Tank 7 & 10	2.74	20.4 to Port	3.44	3.09 (by stern)	Not Comply
Tank 9 & 12	2.74	20.4 to Starboard	3.44	3.09 (by stern)	Not Comply

Table 5.5.3.3: Dock damaged condition – Phase 5 operation, bottom shell damage

Damaged Compartments	Equilibrium GM (m)	Equilibrium angle of heel (degree)	Equilibrium draft (m)	Equilibrium trim (m) / (deg)	Compliance
Tank 2 & 5	2.608	0	3.87	4.575 / 5.1 (by the bow)	Not Comply
Tank 5 & 8	0.456	0	2.94	0	Comply
Tank 8 & 11	2.608	0	3.87	4.575 / 5.1 (by the stern)	Not Comply

In both the fully ballasted (Phase 1) and de-ballasted (Phase 5) conditions, the above case consisted on damage tank No.1 & No.3, starboard forward wing compartment, safety deck compartment from frame 0 to 20 and frame 20 to 32 as shown in ***Figure 5.5.3.1*** were assessed.



5.5.3.1: Damaged compartments for stability calculations

Summary of calculations of both conditions are listed in ***Table 5.5.3.1.1***. and it indicates that neither of the conditions comply with the MIL-STD criteria.

	Fully ballasted	De-ballasted
Displacement (tonnes)	4155	2773
Initial Draft (m)	8.68	2.38
Vertical Centre of Gravity (m)	2.80	6.93
Equilibrium GM (m)	0.00	3.04
Equilibrium Heel Angle (deg.)	112	30
Equilibrium trim (m)	12.50	2.97

The large angle of heel after damage was due to the significant loss of reserves buoyancy from the forward wing compartment an also the side ballast tank at the floating docks’ end (Tank No.3).

6 Conclusion

The structural assessment was carried out to identify the loading limit on both the longitudinal strength and the local structural component strength, which were specified within section 5.1.3.4 of the MIL-STD.

The maximum allowable longitudinal bending moment was calculated and found to be 169,269 kN.m. This corresponds to 1,740 tonne of load acting on the floating dock amidships. The midships deflection due to the above load was calculated and found to be 99 mm. The calculated deflection should be used by the floating dock operator to check if the dock is within its loading limit throughout its operations.

The results show that the longitudinal bending moment in each of the docked vessel scenarios are within the stress limitation.

The loading limit of each of the local structural components were calculated as follows:

- The maximum transverse strength was calculated to support a maximum pontoon deck load of 65 tonnes per block and its corresponding load of 22.5 tonnes per linear foot.
- The maximum keel block stand load from UGL assessment was calculated at 30 tonnes.
- The watertight bulkheads were assessed with loading from the both the tank head and also the docked vessel, and results show that their maximum stress are within the limitation.
- The maximum pontoon deck loading at other than keel block and side block locations was calculated to 7.9 tonne per metre square.
- The maximum mooring bollard load was calculated at 23 tonnes.

The intact and damage stability were calculated to determine the floating dock stability characteristics and its compliance with 5.1.2.3 of the MIL-STD

The intact stability characteristics of the dock were calculated and both the GM and the maximum wind heeling are in compliance with the MIL-STD.

The maximum lifting capacity versus docked vessel adjusted VCG and also the maximum lifting capacity of the dock versus the range of docked vessel longitudinal positions were calculated with result presented in Section 5.5 of this report. These results are to be used as a guidance when lifting vessels with various VCG and longitudinal placement on the floating dock.

The damaged stability calculations shown that in both the fully ballasted and de-ballasted conditions, the angle of heel due to the side shell damage does not comply with the MIL-STD. The large angle of heel was due to the significant loss of the reserve buoyancy from the forward wing compartment and also from the side tank at the floating dock end.

To comply with the damage stability requirements, additional watertight bulkheads could be added to reduce the size of the tanks.

This preliminary stability assessment is subject to change once the actual stability data is obtained through the inclining experiment.

7 Disclaimer

The under signed shall not be liable in any way to any person or company in respect to any claim for any kind, including claims for negligence, for loss occasioned to any person or company in consequence of any person or company acting or refraining from action as a result of material in this report.

Signed,

Prepared by:

Martin Mok
Naval Architect

for Shearforce Maritime Services Pty. Ltd.
16th November 2016

Validated by:

Lina Diaz
Senior Naval Architect

for Shearforce Maritime Services Pty. Ltd.
16th November 2016

Appendix D – Curriculum Vitae – Rick Plain

Royal HaskoningDHV
Enhancing Society Together

Curriculum Vitae

Rick Plain

Civil Engineer

richard.plain@rhdhv.com
T: +61 2 8854 5000
M: +61 402 244 632

Rick Plain is an Engineer at Royal HaskoningDHV in Brisbane, Australia.

He has professional experience in coastal and maritime engineering, geotechnical engineering and construction management. Through this, Rick has been involved in the implementation of the full project lifecycle from planning and investigation through to detailed design documentation, environmental assessment and overseeing construction of the projects.

Rick has developed specific skills in design and investigation of seawalls and revetments, undertaking coastal process studies, design of maritime structures including boat ramps and jetties, navigation impact assessments and boating studies, dredging investigations, flood studies, river stabilisation works, design of scour protection works and geotechnical investigations.

Nationality
Australian
Years of experience
7 years
Years with Royal HaskoningDHV
7 years
Professional memberships
Member of Engineers Australia (IEAust)
Qualifications
2014 University of New South Wales (UNSW), BEng (Hons 1) (Civil)
2014 University of New South Wales (UNSW), BCom (Dist) (Financial Economics)
Industry Certificates
WorkCover Construction Induction "White" Card
Transport for NSW Rail Industry Safety Induction (Expired)
Languages
English

Professional experience
Foreshore Protection

Palm Beach Shoreline Project
(City of Gold Coast)
> 2018-2019, Gold Coast, QLD, Australia

The Palm Beach shoreline project involved design and construction of an artificial reef to provide surf amenity and coastal protection. RHDHV were initially engaged to undertake numerical modelling and design of the artificial reef. Our engagement extended throughout the detailed design process, contractor engagement and construction certification.

Rick was involved in preparing Tender documentation including the Technical Specification and Schedules and he was involved in the Early Tender Involvement (ETI) process, which involved a number of meetings with shortlisted Contractors. During construction, Rick undertook quarry inspections to certify quality of the rock and he will be involved in certification of construction.

Rip Road Reserve
(Central Coast Council)
> 2018-2019, Central Coast, NSW, Australia

RHDHV were engaged to design and document a vertical sandstone block seawall with integrated foreshore access steps and a dinghy launching skid. A rip rap revetment was designed for a section of foreshore to reduce foreshore excavation, where aboriginal artefacts were identified.

Iron Cove Seawall
(City of Canada Bay)
> 2015-2017, Central Coast, NSW, Australia

A 1km section of degraded foreshore were upgraded. Heritage aspects were particularly important. The project initially comprised rock mounds and salt marsh berms to enhance the local ecosystem. However, due to issues regarding land boundaries and funding, the rock mounds and salt marsh berms were removed from the design.

Dobroyd Point Seawall
(Inner West Council)
> 2020, Dobroyd, NSW, Australia

The existing seawall was proposed to be upgraded to accommodate widening of the footpath for the Bay Run and GreenWay projects. The design included saltmarsh berms and vegetated swales to enhance the environment.

Coffs Creek
(Coffs Harbour City Council)
> 2020, Coffs Harbour, NSW, Australia

Two separate sites in Coffs Creek were identified in the CZMP as requiring remediation. Both sites comprised timber seawalls, which were dilapidated and undercut. The preferred solution comprised a combination of rock revetment, sandstone blocks and KYOWA rock bags.

Brooms Head
(Clarence Valley Council)
> 2020, Brooms Head, NSW, Australia

The project involved an extension of the existing back beach revetment and the design of beach access stairs. An end control structure was incorporated in the design to limit the impact of end effects.

Kingscliff Seawall
(Tweed Shire Council)
> 2016, Kingscliff, NSW, Australia

Kingscliff is a recognised coastal erosion hot spot in NSW. RHDHV was engaged to design and document coastal protection works, which comprised a rock revetment, secant pile wall and concrete bleachers to protect the Surf Life Saving Club, caravan park and council owned land. Rick was involved in the detailed design and documentation of the work.

Lyne Park Seawall Reconstruction
(Woollahra Municipal Council)
> 2015-2016, Woollahra, NSW, Australia

A section of seawall 290m in length required reconstruction. RHDHV investigated the seawall and prepared a detailed design and tender documentation for the works. Subcontractors involved in the project included marine ecologist, heritage consultant, geotechnical consultants, environmental consultants and surveyors.

Woollahra Emergency Seawall Repairs
(Woollahra Municipal Council)
> 2016, Woollahra, NSW, Australia
The NSW coast experienced a severe East Coast Low (ECL) between the 4th and 6th June 2016, which produced large swells and high wind from the north east. The ECL combined with a Spring Tide that resulted in higher than normal high tide levels. Wide spread damage was experienced along the NSW coast, including two sandstone block seawalls at Woollahra.

RHDHV was engaged by Woollahra Municipal Council to provide advice to secure the site and prepare designs to reconstruct the seawall. The total length of wall requiring reconstruction was in excess of 50 m. Rick was the project manager for the job and was involved in detailed design, preparing all documents and coordinating sub-consultants.

Elfin Hill Road Reserve Foreshore Stabilisation
(Gosford City Council)
> 2014, Green Point, NSW, Australia
Elfin Hill Road Reserve was identified as an unstable, receding shoreline. Foreshore stabilisation design undertaken by RHDHV included a site investigation and development of conceptual designs. The designs focused on environmentally friendly seawalls that would enhance the estuarine environment in a sustainable manner while protecting public interests and recreational amenity. The designs incorporated structures, which could be amended in the future to allow for climate change.

Natural Waterways Assets – High Priority Site Assessments
(The Hills Shire Council)
>2015, The Hills Shire Council, NSW, Australia
A number of natural waterways within The Hills Shire Council were identified to be in poor condition. A field investigation was undertaken to examine the waterways and determine the risk of the waterway to life, property, infrastructure and the environment. Concept designs and cost estimates were provided for each site to remediate and improve the condition of the waterway.

Riverbank Protection

Guthega Power Station Riverbank Protection
(Snowy Hydro Pty Ltd / Leed Engineering and Construction Pty Ltd)
> 2020-2021 Snowy River, NSW, Australia
Preparation of detailed design documentation for repair of a failed section of stone pitching. stabilisation of eroded creek bank areas adjacent to sewer and roads assets. Design documentation included detail design drawings, technical specification, schedule of quantities, pre-construction cost estimate and design report.

Oxford Creek Bank Restoration and Batter Stabilisation
(Warringah Council)
> 2015 - 2016 Oxford Falls, NSW, Australia
Preparation of detailed design documentation for stabilisation of eroded creek bank areas adjacent to sewer and roads assets. Design documentation included detail design drawings, technical specification, schedule of quantities, pre-construction cost estimate and design report.

Scour Protection

Southport Superyacht Facility
(MGN Civil)
> 2020, Southport, QLD, Australia
A Design and Construct Contract was awarded for a superyacht facility at Southport Yacht Club. RHDHV were engaged to undertake the design of a revetment adjacent to the berthing pocket. A key consideration in the design was the propeller wash directed towards the revetment from the bow thrusters.

Overseas Passenger Terminal Scour Protection
(McConnell Dowell / PANSW)
> 2021, Sydney, NSW, Australia
A Design and Construct Contract was awarded for installation of scour protection at the Overseas Passenger Terminal in Sydney Cove. The project aimed to limit erosion and deposition, in order to maintain chartered depths. The scour protection mattress comprised a 350mm thick grout filled mattress. Physical modelling was undertaken by the Water Research Laboratory. A key consideration in the design was the edge of the scour protection, which comprised a hinged

edge block placed in a trench to limit the potential for underscour.

Boating Infrastructure

NSW Boat Launching Ramps Guidelines Update
(NSW Roads and Maritime Services)
> 2014-2015, NSW, Australia

The NSW Boat Launching Ramps Guidelines were prepared by the Public Works Department in 1985. The document remains largely relevant and had stood the test of time. However, in recent decades, changes have emerged with recreational boats and launching facilities including an increase in engine capacity, an increase in the size of trailerable boats and an increase in the number of trailerable boats registered with RMS. The changes prompted a review and update of the Boat Launching Ramps Guidelines. A Performance Enquiry was included to determine public perception towards boat ramps and performance of boat ramps in recent decades.

Sans Souci Marine Centre
(Roads and Maritime Services)
> 2019, Sydney, NSW, Australia

RHDHV has been recently engaged to prepare concept designs, performance specification and construction certification for the marine centre at Sans Souci, which is shared be 3 governments agencies. The project includes design of a marina, boat ramp and associated facilities.

Picnic Point Boat Ramp
(Murray River Council)
> 2019, Picnic Point, NSW, Australia

RHDHV were engaged to undertake detailed design of the boat ramp and adjacent foreshore protection at Picnic Point on the Murray River.

Snowy 2.0
(Snowy Hydro Pty Ltd)
> 2018, Cooma, NSW, Australia

RHDHV were engaged to prepare concept designs for the boat ramp at Talbingo Reservoir.

Tonkin Oval Boat Ramp
(Sutherland Shire Council)
> 2015, Cronulla, NSW, Australia

RHDHV were engaged to undertake investigations and concept design of the boat ramp at Tonkin Oval.

Burnum Burnum Boat Ramp
(Sutherland Shire Council)
> 2015, Cronulla, NSW, Australia

RHDHV were engaged to undertake investigations and concept design of the boat ramp at Burnum Burnum.

Lake Jindabyne and Eucumbene Boat Ramps
(Snowy Monaro Regional Council)
> 2015, Jindabyne, NSW, Australia

RHDHV were engaged to undertake investigations and concept design of boat ramp upgrades at Lake Jindabyne and Lake Eucumbene.

Dredging and Reclamation

Snowy 2.0
(Snowy Hydro Pty Ltd)
> 2018-2019, Cooma, NSW, Australia

Snowy 2.0 is a pumped hydro-electric scheme connecting two existing reservoirs within the Snowy Scheme. RHDHV were initially engaged to prepare reference designs for the placement of excavated rock within the reservoirs. The reference designs included numerical modelling, physical modelling of sediment behaviour and assessment of operational impacts. Our role continued throughout Contractor, to inform the Client of risks associated with the Contractors proposed methodology, and provided input into the Environmental Impact Statement.

Rick was directly responsible for the physical modelling of sediment behaviour and undertaking a navigation impact assessment. He provided significant input into the reference designs and was involved in Contractor engagement.

HMAS Cerberus
(Aurecon)
> 2020-current, Western Port, Victoria, Australia

RHDHV were engaged to undertake design and documentation of maintenance dredging and ancillary marine works including repairs to the lead channel markers and boat ramp. Our engagement included preparation of an environmental assessment for the proposed works. Rick is the project manager for the project and has been involved in all facets of the project.

The Entrance
(Central Coast Council)
> 2020, The Entrance, NSW, Australia

RHDHV were engaged to undertake design and documentation of maintenance dredging at The Entrance, including sediment sampling and analysis. The material was proposed to be pumped to the ocean beach on the northern side of The Entrance.

Clontarf Tidal Pool Dredging and Seawall Projects
(Northern Beaches Council)
> 2019, Clontarf, NSW, Australia

The Clontarf Tidal Pools are periodically dredged to improve amenity. In addition, Council prepared a landscape masterplan to improve amenity of the adjacent shoreline. Rick was involved in preparing the design and documentation for the dredging and beach nourishment. Rick also undertook detailed design of the shoreline structures including a seawall, bleachers and disabled access ramp.

Ourimbah Creek Dredging Project
(Wyong Shire Council)
> 2015 - 2016 Tuggerah Lakes, NSW, Australia

Development of a dredging strategy for removal, handling and disposal of dredged material from the entrance to Ourimbah Creek. The scope of work involved hydrographic survey, sediment sampling, navigation channel design and preparation of a Dredging Plan and REF for implementation of the project which aims to improve navigability.

Shoalhaven Dredging Project
(Shoalhaven City Council)
> 2014-2015, Shoalhaven, NSW, Australia

Shoalhaven City Council engaged RHDHV to investigate and design dredging plans at 5 separate sites and reuse the sand for coastal protection works at 4 nearby locations. The project involved site investigations, detailed design, preparation of the technical specification and associated environmental plans including Review of Environmental Factors (REF) and Acid Sulphate Management Plans.

Settlement Shores Canal Maintenance Plan Review
(Port Macquarie-Hastings Council)
> 2015 - 2016 Port Macquarie, NSW, Australia

Review and update of the existing Canal Maintenance Plan last prepared in 2004. The scope of investigative work included collection of hydrographic and land survey, inspection of assets within the canal system (including boat ramps, jetties, pontoons revetment walls, beach areas, rock protection, stormwater outlets and footpaths), sediment sampling and analysis. The main deliverables for the project comprise an updated Canal Maintenance Plan and an REF for the proposed dredging works.

Boating Studies and Navigation Impact Assessments

Navigation Impact Assessments – Pattons Slipway, Noakes Boat Yard, Western Harbour and Beaches Link Tunnel, Barangaroo, Kangaroo Point Snowy 2.0.
(Various)
> 2016-current, NSW, Australia

Rick has been involved in the preparation of navigation and safety impact assessments for numerous public and private companies. These studies range from small scale investigations to large scale investigations that disrupt shipping and ferry services.

South West Rocks Boating Study
(Transport for NSW)
> 2020-current, South West Rocks, NSW, Australia

RHDHV have been engaged to undertake a study at South West Rocks to investigate options to improve offshore access for recreational, commercial and cruise vessels.

Murray River Bank Erosion
(Transport for NSW)
> 2019-2020, Corowa, NSW, Australia

RHDHV were engaged to assess the impact of boat wash on the banks of the Murray River between Corowa and Bundalong.

Mid North Coast Boating Plans
(NSW Roads & Maritime Services)
> 2016 Mid North Coast, NSW, Australia

Investigation of study areas in the Lower Hastings River, Camden Haven River, Cundletown and South West Rocks to develop concept designs for recreational boating infrastructure including boat ramps, floating pontoons, passive craft launching facilities, jetties/wharves and upgrades/repairs to existing boating infrastructure.

Great Lakes Boating Studies
(NSW Roads & Maritime Services)
> 2016 Port Stephens and Myall River, NSW, Australia

Investigation of study areas at Tea Gardens/Hawks Nest, North Arm Cove, Nerong Harbour and Tahlee to develop concept designs for recreational boating infrastructure including boat ramps, dinghy storage, boat moorings, floating pontoons, passive craft launching facilities and jetties/wharves.

Construction Supervision

Beresford Foreshore Coastal Protection
(City of Greater Geraldton)
> 2014-2015 and 2017, Geraldton, WA, Australia

Beresford Foreshore is a receding shoreline. RHDHV were initially engaged to undertake site investigations, wave modelling and prepare concept designs, detailed design and technical specifications for the project. The detailed design involved beach nourishment and design of more than 1 km of revetments, detached breakwaters and groynes.

Rick was seconded to the City of Greater Geraldton for 10 months to serve as the Superintendents Representative. Rick was based onsite fulltime and his role involved overseeing construction of the works to ensure they were carried out in accordance with the design documentation.

Little Sandy Creek Bridge
(Camden Valley Council)
> 2020, Camden, NSW, Australia

RHDHV were engaged to undertake detailed design of scour protection works adjacent to the bridge abutment at Little Sandy Creek Bridge. Rick was involved in detailed design and construction supervision.

Lord Howe Island Revetment Construction
(Lord Howe Island Board)
> 2015, Lord Howe Island, NSW, Australia

Various foreshore protection works have been constructed at Lord Howe Island over the last 50 years. The latest of which was an emergency rock revetment at Windy Point. The revetment was designed by RHDHV and it was 6 m high and over 60 m long. The revetment tied in with adjacent structures.

Rick was seconded to Lord Howe Island Board on a short term basis to provide cover for the board's project manager. His role involved overseeing construction of the seawall and compliance of the works in accordance with the design documentation.

Stockton Revetment
(Newcastle City Council)
> 2016, Newcastle, NSW, Australia

RHDHV was engaged to design and document a rock revetment at Stockton, NSW. The revetment is over 75 m long. Rick was involved in quarry inspections, rock selection, drop testing of rock to ensure conformance and compliance with the requirements of the design.

Frazer Street Collaroy
(Private Resident)
> 2015, Collaroy, NSW, Australia

Collaroy and Narrabeen beach is 3.5 km long and it is recognised as a coastal erosion hot spot in NSW. As part of any DA submitted to Council, the applicant is required to ensure the foundations of the proposed structure would not be undermined. Rick was involved in overseeing construction of a rock revetment and ensure conformance and compliance of the work. In a recent storm event, that lead to significant erosion, the revetment performed as expected while neighbouring properties were evacuated.

Shellharbour Boat Ramp Upgrade
(Shellharbour City Council)
> 2015, Shellharbour, NSW, Australia

The boat ramp at Shellharbour was in poor condition and identified as an asset requiring repair. The design of the upgrade was completed by RHDHV and included an eastern ramp and a western ramp, separated by the existing slipway.

Rick was involved in detailed design and site inspections during construction to ensure conformance and compliance of the works in accordance with the design documentation.

Beach Nourishment and Dune Restoration

Wooli Beach Management Scheme (Clarence Valley Council)

> 2020-current, Wooli, NSW, Australia

RHDHV were engaged to prepare a beach management scheme for Wooli Beach, which involved beach scraping and sand backpassing. The investigation was underpinned by an analysis of the beach using photogrammetry and aerial photography (CoastSat).

Wooli Sand Sourcing Investigation (Clarence Valley Council)

> 2014-2015, Wooli, NSW, Australia

Wooli Beach was reported to be receding at a rate of 0.5 metres per year. Beach nourishment was identified as an option to offset recession and protect the village from coastal erosion. The study identified and assessed a number of different sand sources around Wooli including offshore marine sand, dune sand and estuary sand from Wooli Wooli River. A field investigation including sediment sampling was conducted at accessible sand sources to determine compatibility of the sand source with native beach material. A cost estimate was produced for each sand source along with details of legislative constraints and restrictions in accessing the different sand sources.

Soldiers Beach Dune Restoration Plan (Central Coast Council)

> 2016 Soldiers Beach, NSW, Australia

Preparation of a restoration plan for management of bitou bush within the degraded dune vegetation at Soldiers Beach. This included field inspection and mapping of bitou bush extents, preparation of drawings and specifications, and community consultation.

Professional Training

2017 26th NSW Coastal Conference, Port Stephens, Australia

2016 26th NSW Coastal Conference, Coffs Harbour, Australia

Publications

Plain, R., Blumberg, G., Cross, J., Dufour, M., 2017, Beresford Foreshore Coastal Protection Project – Getting Dirty in the West. NSW Coastal Conference, 2013, Port Stephens, Australia.

FLOATING DRY DOCK - PRELIMINARY HAZARD ANALYSIS

Stannards Marine Pty Ltd v North Sydney Council - Contentions 2 and 6

Stannards Marine Pty Ltd
Document No. RCE-21137[FDD-PHA-RPTFinal(Rev1)-3Dec21
Date 3/12/2021

FLOATING DRY DOCK - PRELIMINARY HAZARD ANALYSIS

Stannards Marine Pty Ltd v North Sydney Council - Contentions 2 and 6

Stannards Marine Pty Ltd

Prepared by

Riskcon Engineering Pty Ltd
Unit 618/159 Ross Street
Forest Lodge, NSW 2037
www.riskcon-eng.com
ABN 74 626 753 820

Stannards Marine Pty Ltd

Document No. RCE-21137[FDD-PHA-RPTFinal(Rev1)-3Dec21

Date 3/12/2021

Quality Management

Report No: RCE-21137[FDD-PHA-RPTFinal(Rev1)-3Dec21

Rev	Date	Remarks	Prepared By	Reviewed By
A	14 September 2021	Draft	Steve Sylvester	Renton Parker
B	23 September 2021	Draft incorporating comments		
0	1 October 2021	Final		
1	3 December 2021	Final, incluiding additional hazards		

EXECUTIVE SUMMARY

Introduction, Objectives & Scope

The PHA has been prepared in response to SOFACs 2 and 6 of the Stannards Marine Pty Ltd v North Sydney Council. Contention 2 of councils SOFACs and contention 6 of the objector parties.

Noakes leases a boatyard in Berrys Bay, Sydney Harbour NSW (the Boatyard) from Stannards Marine Pty Ltd (Stannards), where it is proposed to operate a Floating Dry Dock (FDD). A Development Application (DA) has been submitted to North Sydney Council for approval to operate the FDD, which has been rejected on various grounds. Stannards has lodged an Appeal with the Land and Environment Court for which a number of Statements of Facts and Contentions (SOFACs) were filed, two (2) of which state relate to State Environmental Planning Policy No.33 - Hazardous and Offensive Developments (SEPP33) and failure to comply with the SEPP.

As part of addressing the SOFACs, it was identified that SEPP33 applies to the site under the potentially “Offensive” component of the policy and therefore a Preliminary Hazard Analysis (PHA) is required and is the subject of this report. The PHA assesses the hazards and risks to the land uses surrounding the Noakes Boatyard (the Boatyard) at Berrys Bay, Sydney Harbour, NSW, and was conducted in relation to operations associated with a proposed floating dry dock (FDD) to be operated at the Boatyard.

Methodology

The methodology used for the PHA was the approach recommended in Hazardous Industry Planning Advisory Paper No.6 - Hazard Analysis Guidelines (HIPAP6, Ref.4). The study approach resulted in the development of a Hazard Identification Table (**Appendix A**), which was used to identify those hazards that have the potential to impact offsite (physical and offensive). Those incidents with the potential for physical and offensive offsite impact were assessed in detail in the PHA report and where it was evident that the hazard scenarios demonstrated potential offsite impact (physical and offensive), the incidents were carried forward for consequence analysis. The results of the consequence analysis were then compared to acceptable risk criteria, detailed in HIPAP4, Risk Criteria for Land Use Safety Planning (Ref.5). Where consequence criteria were exceeded, the incidents were carried forward for frequency and risk analysis. Risk results were compared to the acceptable risk criteria in HIPAP4 (Ref.5) and where risk criteria was exceeded, risk reduction was implemented and risks reassessed. Where required, this process continued until the risks were below acceptable criteria.

The hazard analysis conducted for the proposed FDD operations identified the following hazards that would have the potential to impact offsite or result in an offensive impact to surrounding land uses or the environment:

- Paint container on the FDD- paint spill or leak from paint container, release to the environment and potential environmental impact.
- Paint container on the FDD- paint spill or leak from paint container, ignition and pool fire on the FDD pontoon deck - Heat Radiation impact to surrounding areas.
- Diesel Fuel Tank - replenishing fuel (transfer of fuel to the diesel tank), fuel spill, release to the environment and potential environmental impact.
- Diesel Fuel Tank - replenishing fuel (transfer of fuel to the diesel tank), fuel spill/release, ignition and pool fire on the wind deck (adjacent to the diesel generator) - Heat Radiation impact to surrounding areas.

- Diesel fuel system leak on the diesel generator engine, hot engine components ignite the fuel leak resulting in diesel engine fire - Heat Radiation impact to surrounding areas.
- Surface preparation (abrasive blasting), Spray painting, welding cutting, grinding, etc. on the vessel on the FDD - Potential offensive impact from noise at sensitive land uses adjacent to the boatyard [Note: Noise assessment prepared by Day Design, potential offensive impacts as a result of noise are provided in the Day Design report].
- Surface preparation (abrasive blasting), Spray painting, welding cutting, grinding, etc. on the vessel on the FDD - Potential offensive impact from dust, particulates and fumes generated during operations at the FDD [Note: Air quality assessment prepared by Astute Environmental, potential offensive impacts as a result of air quality are provided in the Day Design report .
- Water enters ballast tanks whilst FDD in raised position at the Noakes Boatyard wharf - Potential for FDD to capsize, with a ship inside, whilst alongside the Noakes Boatyard wharf resulting in damage to infrastructure and environmental impact.
- Docking of the ship in the FDD - Ship capsizes in the dock, potential for imbalance and dock capsize resulting in damage to infrastructure and environmental impact.
- Docking of the ship in the FDD, de-ballasting and raising the FDD using ballast pumps - FDD overloaded, structural failure, FDD capsizes/sinks resulting in environmental damage.
- Docking of the ship in the FDD, de-ballasting (opening the ballast valves and filling ballast tanks with seawater) - ballast tanks overfilled, FDD sinks and strikes the harbour floor leading to environmental damage.
- Fuel release (diesel) from fuel tanks within the vessel (ship/boat), ignition and large fire within the FDD resulting in heat radiation and products of combustion impact to surrounding areas.
- Combustible materials (solids) fire in a ship/boat within the FDD resulting in heat radiation and products of combustion impact to surrounding areas.

The detailed hazard analysis conducted for the hazardous scenarios listed in the dot points above, identified that five incidents have the potential to impact offsite, these were:

- Paint Container (5 L) on FDD - Paint Release, Ignition and Fire;
- Paint Container (20 L) on FDD - Paint Release, Ignition and Fire;
- Diesel Tank Refuelling - Fuel Spill, Ignition and Fire;
- Diesel Fuel System Leak - Fuel Spray, Ignition and Fire;
- Combustible Materials (fibreglass) Fire – heat radiation and products of combustion impact.

The remaining incidents all related to potential offensive impacts or impacts to the environment. It was identified that the proposed safeguards to be implemented at the site are considered to be adequate to control the risks to as low as is reasonably practicable.

The consequence analysis, applied to the fived incidents listed in the dot points above, identified that all incidents, with the exception of the diesel engine fuel system fire, did not result in an offsite impact that exceeded the risk criteria published in HIPAP4 (Ref.5). Hence, no further analysis was necessary for these incidents and only the diesel engine fuel system fire was carried forward for frequency & risk assessment.

The results of the frequency and risk assessment for the diesel engine fire identified that the individual fatality risk, at the closest Boatyard lease boundary was 0.413 chances in a million per year, the risk at boundary points further away are less than this value. The acceptable individual fatality risk criteria at the land use in Berrys Bay is 10 chances in a million per year (i.e. active open space, Ref.5). The heat radiation contours from potential fires at the FDD do not impact any residential areas, hence, the injury risk criteria is not exceeded.

Conclusions

As the acceptable individual fatality risk criteria and the injury risk criteria are not exceeded for both current and future land uses, as a result of the operation of the FDD, and as the potentially offensive nature of operations has been effectively considered in the design and operation of the FDD, it is concluded that the FDD is suitable in the land use, on which the Boatyard is located, under the provisions of SEPP33.

Recommendations

Notwithstanding the conclusion reached in **Section 7.2**, that the FDD is suitable in the proposed land use, under SEPP33, a number of recommendations are made to ensure the risks are controlled to as low as reasonably practicable.

The following recommendations are made:

1. This PHA report has relied upon the assessment results of a number of expert reports associated with the operation of the FDD. The three reports on which this PHA has relied upon are:

   - Noise and Vibration Assessment, prepared by Day Design*;
   - Air Quality, prepared by Astute Environmental*; and
   - Structural and Stability Assessment, Shearforce - 16 November 2016 (Ref.9).

   Each report contains a number of recommendations, which are made so that the report conclusions remain valid. It is therefore recommended that those recommendation made in the Noise, Air Quality and Stress/Stability reports are implemented.

2. It was identified that as part of the diesel fuel refuelling operation, spill containment would be established around the diesel fuel IBC and generator. It is recommended that the methodology for establishing the spill control be incorporated into the FDD diesel generator refuelling procedure.

3. During the analysis conducted in this document, it was identified that regular maintenance and inspection is important in maintaining ballast tank integrity (i.e. prevention of corrosion and leaks). It was noted that the FDD has been moored and not in use since its refit in November 2018. Hence, to ensure the FDD is fit for purpose, prior to commencement of operations, it is recommended that a detailed independent survey be conducted including confirmation of the ballast tank condition and its suitability for the proposed operations.

4. It was identified that solid materials combustible fires (e.g. fibreglass) may occur within the vessels (ships/boats) in the FDD. The heat radiation and toxic products of combustion impacts were identified not to exceed acceptable risk criteria at surrounding land uses. In order to minimise the likelihood of large combustible materials fires, a fire main system has been installed on the FDD. To ensure the fire main system is effective in providing adequate fire water within the FDD, it is recommended that a Fire Safety Study (FSS) in accordance with HIPAP2 (Ref.24) for the proposed FDD facility be conducted.

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Abbreviations

Abbreviation	Description
$\mu g/m^3$	Micro-grams per cubic metre
μm	micro metres
ADG	Australian Dangerous Goods Code
AIDGC	Australasian Institute of Dangerous Goods Consultants
AMSA	Australian Maritime Safety Authority
BLEVE	Boiling Liquid Expanding Vapour Explosion
DA	Development Application
DG	Dangerous Goods
DPIE	Department of Planning, Industry and Environment
EEHA	Electrical Engineering Hazardous Areas
EPA	Environmental Protection Authority
EPL	Environmental Protection Licence
FDD	Floating Dry Dock
FEA	Finte Element Analysis
FSE	Functional Safety Engineer
GM	Metacentric Height
HIPAP	Hazardous Industry Planning Advisory Paper
IBC	Intermediate Bulk Container
ID	Identification
kg	kilograms
kg/m^3	kilograms per cubic metre
kg/s	kilograms per second

Abbreviation	Description
kW/m^2	kilo Watts per square metre
L	Litres
m	metre
m/s	metres per second
m/s^2	metres per second squared
m^3	cubic metres
m^3/s	cubic metres per second
MIL-STD	Military Standard
mm	millimetres
mm	millimetres
MPa	Mega Pascals
NCA	Noise Catchment Area
NPI	Noise Policy for Industry
PHA	Preliminary Hazard Analysis
PM	Particulate Matter
pmpy	per million per year
SEPP33	State Environmental Planning Policy No.33 -Hazardous and Offensive Developments
SMS	Safety Management System
SOFAC	Statement of Facts and Contentions
SOPEP	Shipboard Oil Spill Emergency Plan

1.0 INTRODUCTION

1.1 Background

The PHA has been prepared in response to SOFACs 2 and 6 of the Stannards Marine Pty Ltd v North Sydney Council.

Stannards Marine Pty Ltd (Stannards) currently operates a boat repair and maintenance facility at Berrys Bay in the local government area of North Sydney, NSW. A Development Application (DA57/2019) was lodged with North Sydney Council (the Council) on 5th March 2019 for the removal of two fixed jetties to accommodate the operation of a Floating Dry Dock facility (FDD) to service commercial and recreation craft.

On 1st September 2020 the Council refused the DA on various grounds and Stannards lodged an Appeal with the Land and Environment Court through a Class 1 Application on 4th March 2021. A number of Statements of Facts and Contentions (SOFACs) were filed on 13th of May 2021, two (2) of which state to the following:

- SOFAC 2 - the development application fails to meet the requirements of SEPP33 at clause 13(e) as it does not consider future use of nearby land, in particular the public Jetty identified in condition D51 of DA1164/90.
- SOFAC 6 - No Hazard Analysis has been produced for the Proposed Development so that the risk of a major hazardous incident on-site is prevented or minimized as is advised/required by the Hazardous Industry Planning and Assessment Guidelines and in particular HIPAP No.6.

Based on the requirements to demonstrate that potential hazards and risks have been effectively addressed as part of the proposed FDD operations, Stannards has engaged RiskCon Engineering Pty Ltd (RiskCon) to prepare a Preliminary Hazard Analysis (PHA) to address the hazards and risks associated with potential impacts to the land uses surrounding the proposed FDD.

This document provides RiskCon's PHA study for the operation of a FDD at the Noakes Boatyard, Berrys Bay, Sydney Harbour, NSW.

1.2 Objectives

The Department of Planning, Industry and Environment (DPIE) has developed an integrated assessment process for safety assurance of development proposals, which are potentially hazardous. As part of this process, a PHA study is undertaken to support the DA by demonstrating risks do not preclude approval.

The objectives of the PHA are to determine whether the potential hazards and risks, as a result of the operation of the FDD, do not exceed acceptable risk criteria published in Hazardous Industry Planning Advisory Paper (HIPAP) No.4 or exceed the licence conditions listed in the Environmental Protection Licence (EPL).

1.3 Scope of Services

The scope of the PHA covers the FDD operations at the Noakes Boatyard including the following:

- Docking vessels;
- Maintenance and repair work on vessels within the FDD;
- Undocking Vessels; and
- Maintenance of the FDD itself whilst moored at the Noakes Boatyard .

The scope does not include the assessment of hazards and risks associated with the current operations at the Noakes Boatyard nor the construction component which is normally assessed under the Construction Safety Study requirements in the event the DA approval has been granted (Figure 1, Ref.1).

1.4 Qualifications and Competencies – DG Consultant

The study was conducted by Steve Sylvester, P.Grad.Dip.Bus.(Deakin), BEng.(Mech.Hons), FIE(Aust.), NER, RPEQ, Technical Director at RiskCon Engineering.

Steve Sylvester is a mechanical and marine engineer with over 50 years engineering experience including 20 years in marine and chemical plant operations and over 30 years in risk engineering consultancy. Steve is a founding member of the Australasian Institute of Dangerous Goods Consultants (www.aidgc.org.au), an internationally accredited Functional Safety Engineer (FSE) with TUV Rhineland (2203/10) and Electrical Engineering Hazardous Areas Engineer [EEHA] (Competency Training Certificates - CT05984a&b & CR16285) In his 30 years consultancy experience he has conducted over 500 risk, engineering safety and DG studies over a wide range of industries including marine, aerospace, warehousing, chemical and petrochemical, oil and gas (upstream and downstream), nuclear and mining & mineral processing.

As a member of the AIDGC, Steve is considered to be a competent person by the Regulator, SafeWork NSW, to assess and report on compliance of DG storage and handling facilities under the Work Health and Safety Act (2011) & Regulation (2017).

A full Curriculum Vitae is provided at **Appendix C**.

2.0 METHODOLOGY

2.1 Application of State Environmental Planning Policy No.33

State Environmental Planning Policy No.33 - Hazardous and Offensive Developments (SEPP33), issued by the DPIE, relates to developments where operations at the proposed development may result in impacts on the adjacent areas that cause hazard or offense to the surrounding land use.

As noted, the application of SEPP33 has two elements which "trigger" the application of the policy; Hazardous storage and/or operations and Offensive storage and/or operations, both have been reviewed for application to the proposed FDD operations.

2.1.1 Hazardous Storage and/or Operations

Hazardous Storage and/or Operations – the policy itself (Clause 8, Ref.2) states that -

> "In determining whether a development is –
>
> (a) A hazardous storage establishment, hazardous industry or other potentially hazardous industry; or
>
> (b) An offensive storage establishment, offensive industry or other potentially offensive industry,
>
> Consideration must be given to current circulars or guidelines published by the Department of Planning (*now the DPIE*) relating to Hazardous or offensive development."

With regards to consideration of "guidelines" published by the DPIE, the DPIE has released a guideline issued as "Applying SEPP33 – Hazardous and Offensive Developments" (Ref.3). This guideline provides a methodology for determining whether a facility is subject to the SEPP33 under the "hazardous" component.

The methodology is based on the storage, handling and use of Dangerous Goods (DGs) as listed in the Australian Dangerous Goods Code (or ADG). Where a site stores, handles or uses DGs below certain threshold values (listed in the guidelines), the site is not subject to SEPP33 and a Preliminary Hazard Analysis (PHA) is not required. Where the threshold levels, listed in the guideline, is exceeded, SEPP33 applies and a PHA is required. The guidelines provides a list of Dangerous Goods (DG) and maximum suitable threshold levels for use by proponents to identify whether the "hazardous" components of SEPP33 applies.

Thresholds include maximum suitable storage quantities, maximum number of delivery/ despatch vehicle movements per week/year and maximum load carried by each delivery vehicle. The owners of Noakes Boatyard indicate that the only hazardous materials (DGs) that will be used on the FDD are:

- Paint - classified as a Class 3 PGII & III flammable liquid. A maximum of 250 L of paint would be stored on the FDD for the application to the hulls of vessels docked within the FDD.
- Diesel Fuel - classified as a combustible liquid Class C1. A maximum of 1,000 L would be stored in the emergency generator located on the top of the Starboard wing of the FDD.

Figure 9 of Applying SEPP33 (Ref.3) is used to determine whether SEPP33 applies, based on the storage of flammable liquids. The figure shows that SEPP33 is not applicable until the quantity of flammable liquids exceed 5 tonnes. The volume of paint stored for use on the FDD is 250 L, which equates to a mass of 250 kg, based on a density of paint of 1 L = 1 kg, which is conservative, as the paint would be slightly lighter than the selected value. Based on this, 250 kg is significantly less than 5 tonnes (5,000 kg), hence, SEPP33 does not apply to the paint stored on the FDD.

Diesel fuel is classified as a Combustible Liquid C1. Page 16 of “Applying SEPP33 (Ref.3)” states that where a combustible liquid (Class C1) is stored in its own bund, with no flammable liquids, the storage is not subject to SEPP33.

Based on this assessment, SEPP33 does not apply to the hazardous storage component of the FDD operations.

2.1.2 Offensive Storage and/or Operations

Clause 8 of SEPP33 also applies to the offensive “side” of the policy. The application of the Offensive “side” of the policy does not stipulate threshold levels for storage or operations associated with hazardous or Dangerous Goods. The offense relates to impacts as a result of the operations to the surrounding environment such as noise, dust, environmental impact. Clause 3 of SEPP33 states the following:

> .."potentially offensive industry" means a development for the purposes of an industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would emit a polluting discharge (including for example, noise) in a manner which would have a significant adverse impact in the locality or on the existing or likely future development on other land, and includes an offensive industry and an offensive storage establishment.”

Operations at the FDD involve a range of repair and maintenance functions including grinding and cutting with electric and air powered hand tools, removal of hull surface coatings on vessels and the protection of vessel hulls using the application of paint. These operations have the potential to result in noise, dust generation and potential environmental impact. Hence, SEPP33 would apply based on the potentially offensive nature of the operations, as defined in SEPP33, conducted at the FDD.

2.1.3 Scope of the SEPP33 Assessment

Whilst it has been identified that the site would not be subject to SEPP33 as a result of Hazardous Storage/Operations, the site is subject to SEPP33 under the offensive storage/operations component. Hence, the scope of the PHA would cover both the Hazardous and Offensive components of the policy.

2.1.4 Hazard Related Assessment Process under the Provisions of SEPP33

Hazardous Industry Planning Advisory Paper No.10, Land Use Safety Planning (Ref.1) provides details of the Hazard-Related Assessment Process and the context in which this process is applied. It provides information on the overall philosophy and the application of strategic planning and development control with regards to hazards associated with land use safety planning.

The DPIE has developed an integrated assessment process for safety assurance of development proposals, which are potentially hazardous. The integrated hazards-related assessment process includes a range of studies, which are applied at various stages of the development process. It is important to understand the development process and its application in order to confirm that the appropriate hazard and risk studies and assessments are conducted at the appropriate stages of the development. In development cases it is not possible to prepare all studies prior to the development application (DA) approval of the facility, hence, additional studies are normally required to confirm the hazards and risks have been effectively controlled within acceptable criteria.

Figure 2.1 shows the hazards-related assessment process and the range of studies that may be required as part of the various stages of development.

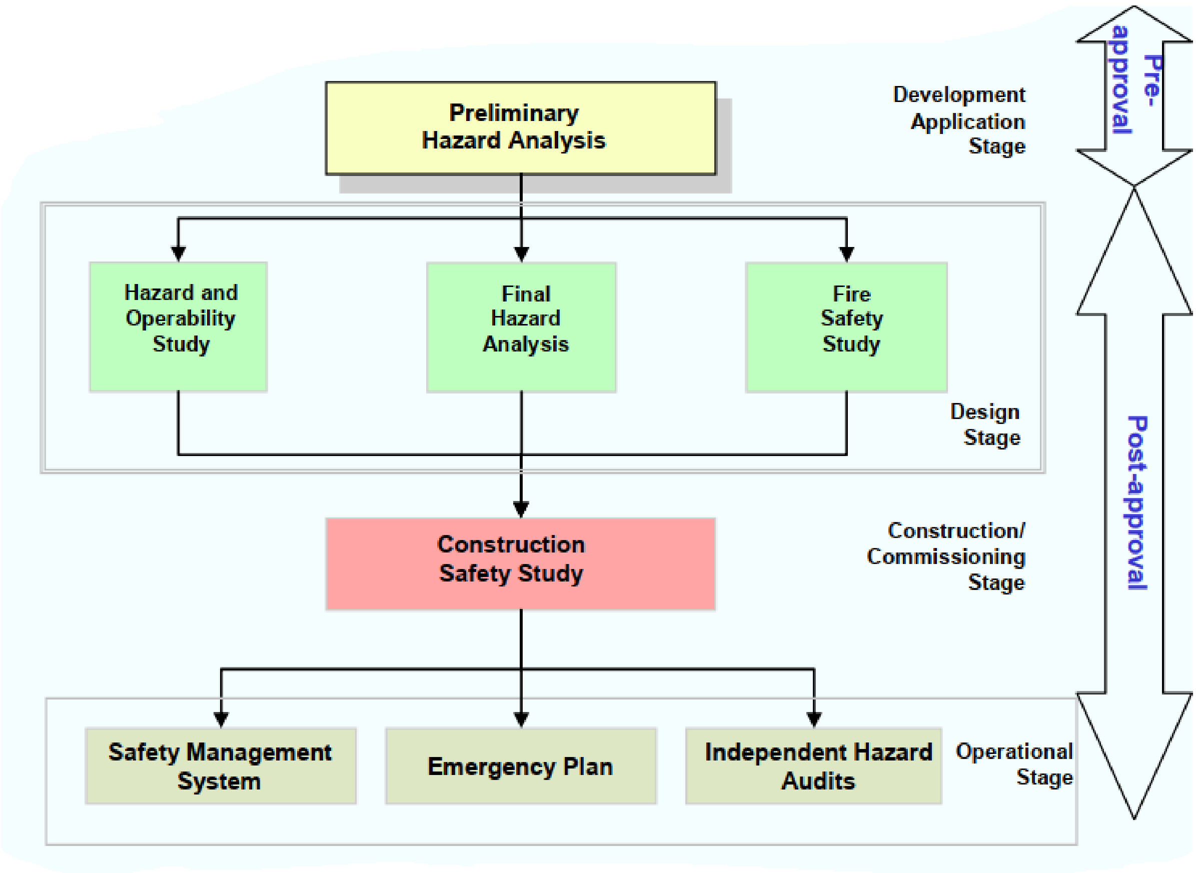


Figure 2.1: The Hazards Related Assessment Process (Ref.1)

It can be seen from **Figure 2.1** that the as part of the pre-approval stage or DA process, a Preliminary Hazard Analysis is required. This study, as it is titled, is preliminary in nature and is based on hazards and risks identified in the early stages of development. Once approval is granted, additional studies are developed based on further information that is developed as the project progresses. The PHA study is the subject of this report prepared for the DA stage of the FDD development.

The post approval studies required for a development may include those listed in Figure 1, however, the list of studies for a particular facility would depend on its complexity and overall risk profile. For example, HAZOP studies would not be prepared for a warehouse site, as these studies are particularly focused on process systems. Hence, the list of studies required by the regulator would be operation dependent.

Key studies that would demonstrate the effectiveness of operations and emergency response systems are:

- Fire Safety Study – this assessment is focused on the postulated fires, fire safety systems, their effectiveness (first attack and availability for use by the Combat Agencies), control of fire growth, location of Combat Agencies and how quickly they can attend the site. This study would Address those issues of fire safety systems and compliance with the relevant codes, standards and regulations. The study is usually reviewed by the DPIE with comments from Fire & Rescue NSW.

- Safety Management System – this assessment identifies the requirements for Safety Management Systems (SMS), including operational procedures and the effectiveness of these in managing the hazards and risks. The assessment reviews procedure implementation and impacts associated with failure to apply the procedures correctly (e.g. human error). This enables incident response to be developed and incorporated into the procedures. The study is usually reviewed by the DPIE.
- Emergency Response – this assessment results in the preparation of effective emergency response plans for implementation at the site, including incidents that may result in potential impact offsite. The response plans include procedures for implementation in the event of a range of emergencies to minimise any potential offsite impact. The study is usually reviewed by the DPIE with comments from Fire & Rescue NSW.
- Construction Safety Study – the Construction Safety Study (CSS) is performed to assess potential impact s of the facility construction on sites where existing operations already occur. The study is aimed at ensuring the proposed development does not initiate any incidents that may give rise to hazards associated with the existing p[lant, equipment and operations. The study is usually reviewed by the DPIE.
- Final Hazard Analysis – on completion of the final designs and operation development, a Final Hazard Analysis (FHA) is performed to review any changes to the design that may affect the results of the PHA study. The Final Hazard Analysis will then provide the site risk profile, demonstrating risk are within acceptable criteria.

2.2 Hazardous Storage/Operations Assessment Approach

The PHA study reported in this document follows the recommended assessment approach detailed in HIPAP6 (Ref.4), which is illustrated in **Figure 2.2** (extracted from HIPAP6).

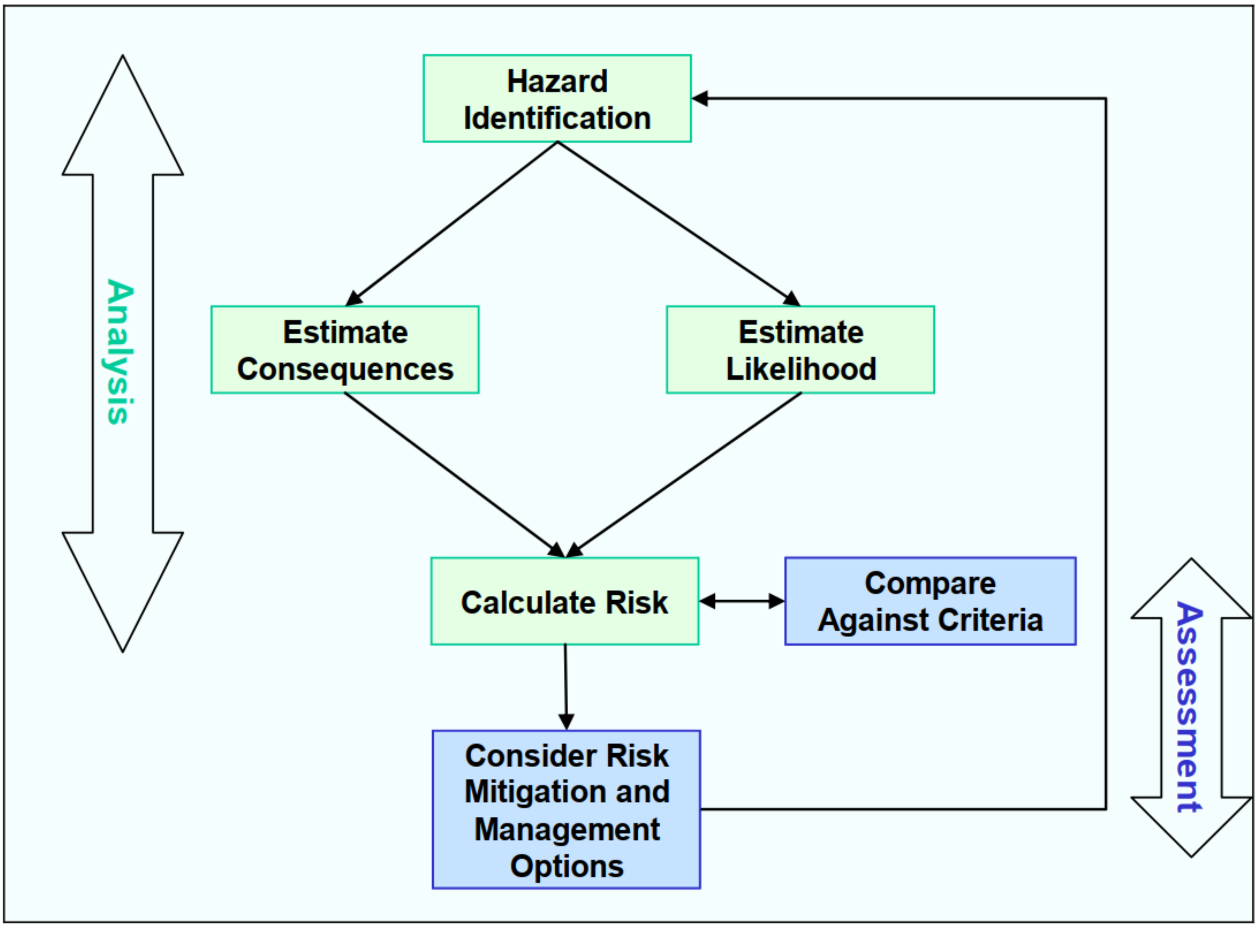


Figure 2.2: Basic Methodology for Hazard Analysis (Ref.4)

The assessment approach for each component of the analysis is provided in the following sub-sections.

2.2.1 Hazard Analysis

A review of the FDD operations is conducted, in conjunction with the operators, to identify any hazards which may be present during the FDD operation. This study was conducted at the Noakes Boatyard with the Noakes Managing Director and the Boatyard General Manager Defence & Commercial Operations. A basic hazard identification (Hazard ID) word diagram was developed during the Hazard ID study which was updated and reviewed as part of the PHA.

The detailed hazard analysis is conducted to identify potential off-site impacts, which are included in the recorded hazard identification word diagram (**Appendix A**). The hazard identification word diagram, developed in conjunction with Noakes Boatyard, lists incident type, causes, consequences and safeguards. This was performed using the word diagram format recommended in HIPAP No. 6 (Ref.4).

The recommended approach in HIPAP 6 (Ref.4) requires each postulated hazardous incident in the Hazard Identification Table (**Appendix A**) to be assessed qualitatively in light of proposed safeguards (technical and management controls). Where a potential offsite impact is identified, the incident is carried into the main report for further analysis. Where the qualitative review in the main report determined that the safeguards were adequate to control the hazard, or that the consequence would obviously have no offsite impact, no further analysis was performed. This follows the recommended approach in HIPAP 10 (Ref.1).

Section 4 of this report provides details of values used to assist in selecting incidents required to be carried forward for further analysis.

2.2.2 Consequence Analysis

For those incidents qualitatively identified in the hazard analysis to have a potential offsite impact, a detailed consequence analysis is conducted. For the Hazardous Storage/Operations component of the SEPP, the analysis models the various postulated hazardous incidents and determines impact distances from the incident source. The results were compared to the consequence criteria listed in HIPAP No. 4 (Ref.5). For the Offensive Storage/Operations component of the SEPP, existing assessments for potentially offensive operations (e.g. noise, dust, environmental impact) were reviewed and conclusions drawn regarding effectiveness of hazard & risk controls.

Where an incident is identified to result in an offsite impact, it is carried forward for frequency analysis. Where an incident is identified to not have an offsite impact, and a simple solution was evident (i.e. move the proposed equipment further away from the boundary), the solution was recommended and no further analysis was performed.

2.2.3 Frequency Analysis

In the event a simple solution for managing consequence impacts is not evident, each incident identified to have potential offsite impact is subjected to a frequency analysis. The analysis considers the initiating event and probability of failure of the safeguards (both hardware and software). The results of the frequency analysis are then carried forward to the risk assessment and reduction stage for combination with the consequence analysis results.

2.2.4 Risk Analysis and Reduction

Where incidents are identified to impact offsite and where a consequence and frequency analysis is conducted, the consequence and frequency analysis for each incident is combined to determine the risk and then compared to the risk criteria published in HIPAP No. 4 (Ref.5). Where criteria are not exceeded, the risk is considered to be within the As Low As Reasonably Practicable (ALARP) range and is considered acceptable with regards to the SEPP33 process, no further assessment is performed within the PHA study where risk criteria are not exceeded. Where the criteria are exceeded, a review of the major risk contributors is performed and the risks reassessed incorporating the recommended risk reduction measures. Recommendations are then made regarding risk reduction measures.

2.2.5 Reporting

On completion of the study a draft report is developed for review and comment by the operators of the FDD to confirm all facts within the report are correct. A final report is then developed, incorporating the comments for points of fact received from the FDD operator.

2.3 Consequence Analysis Modelling

The fire consequence modelling has been performed using the proprietary software “Effects” (Ref.23). Effects is a comprehensive modelling software package developed using the models contained within the TNO coloured books (yellow and green books) which were established following research funded by the government of the Netherlands. The software has over 2,200 individual chemicals and the associated properties which are inputs for the models.

Effects can model a range of incidents including pool fires, jet fires, explosions, toxic gas dispersions, flammable gas dispersions, Boiling Liquid Expanding Vapour Explosions (BLEVEs) for the purposes of consequence modelling for risk assessment and management.

The Effects software is marketed by Gexcon, a world leading company in risk modelling software development. Gexcon has undertaken numerous modelling exercises to validate the results of the software in practical situations. In addition continuous research and development is undertaken to constantly improve the accuracy of the software.

3.0 BRIEF DESCRIPTION OF THE FDD OPERATIONS

3.1 Site Location and Surrounding Land Uses

The Noakes Boatyard (Boatyard) is located on the eastern side of Berrys Bay within the Local Government Area of North Sydney. **Figure 3.1** shows the regional location of the Boatyard and **Figure 3.2** shows the Boatyard location in Berrys Bay and the surrounding land uses.

The land uses adjacent to the site are:

- North - John Street; single occupancy residential property directly across John Street from the Noakes Main Entrance - 55m from the proposed FDD; multi-storey residential property adjacent (east) to the single occupancy property - 60 m from the proposed FDD; access road & pathway to Waverton Park along the edge of Berrys Bay - closest point of the pathway to the proposed FDD is 50m.
- East - Railway embankment and Lavender Bay railway branch line - 80m from the proposed FDD to the railway line boundary, residential properties across the railway line - 105 m from the proposed FDD to the closest residential property,
- South - Berrys Bay, Multi-storey residential property - 70m from the proposed FDD to the boundary of the property; Munro Street public access - 55m from the proposed FDD to the property boundary of the Boatyard and Munro Street; small building (shed) owned by North Sydney Council (formerly a station masters office at Central Station relocated to Munro Street) and currently vacant; and
- West - Berrys Bay, South Steyne Ferry (currently for sale & un-occupied) - 90m from the proposed FDD, Balls Head Reserve shoreline - closest point 150m from the proposed FDD.

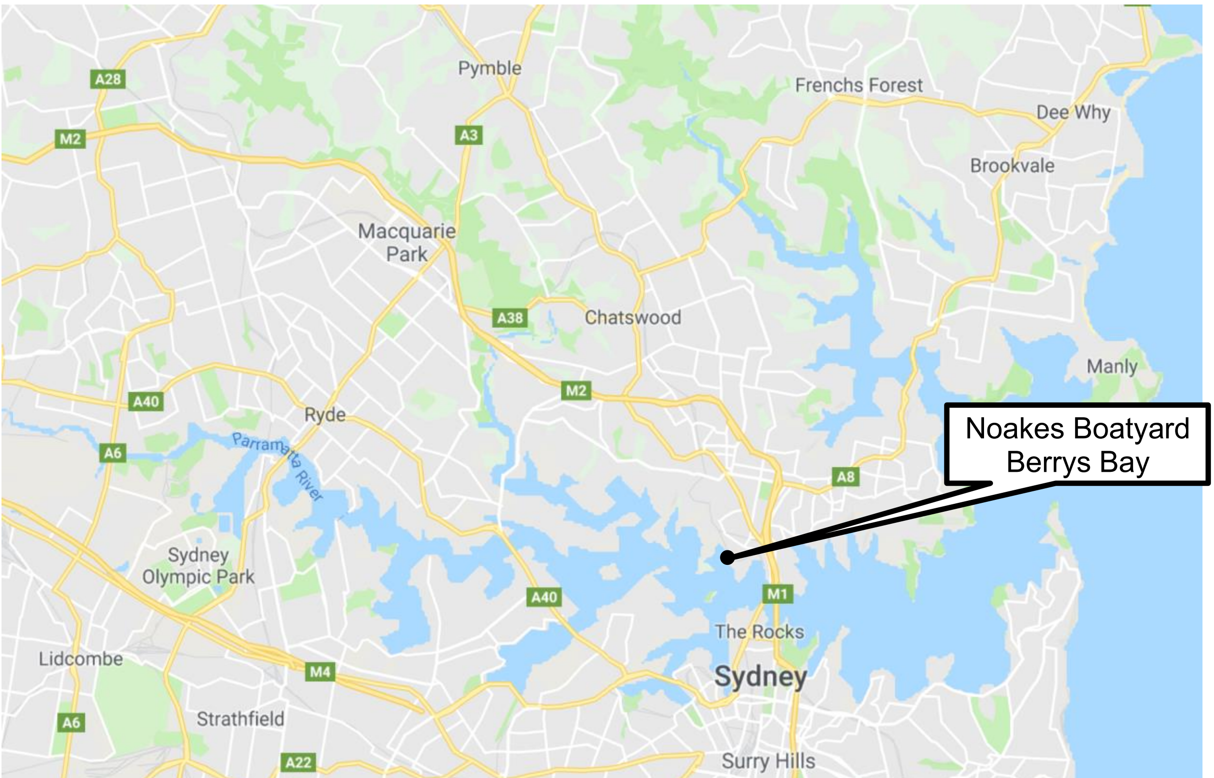


Figure 3.1: Regional Location of the Noakes Boatyard and Proposed FDD

Figure 3.2: Aerial Photo showing Noakes Boatyard & Surrounding Land Uses

3.2 Brief Description of the Noakes Boatyard

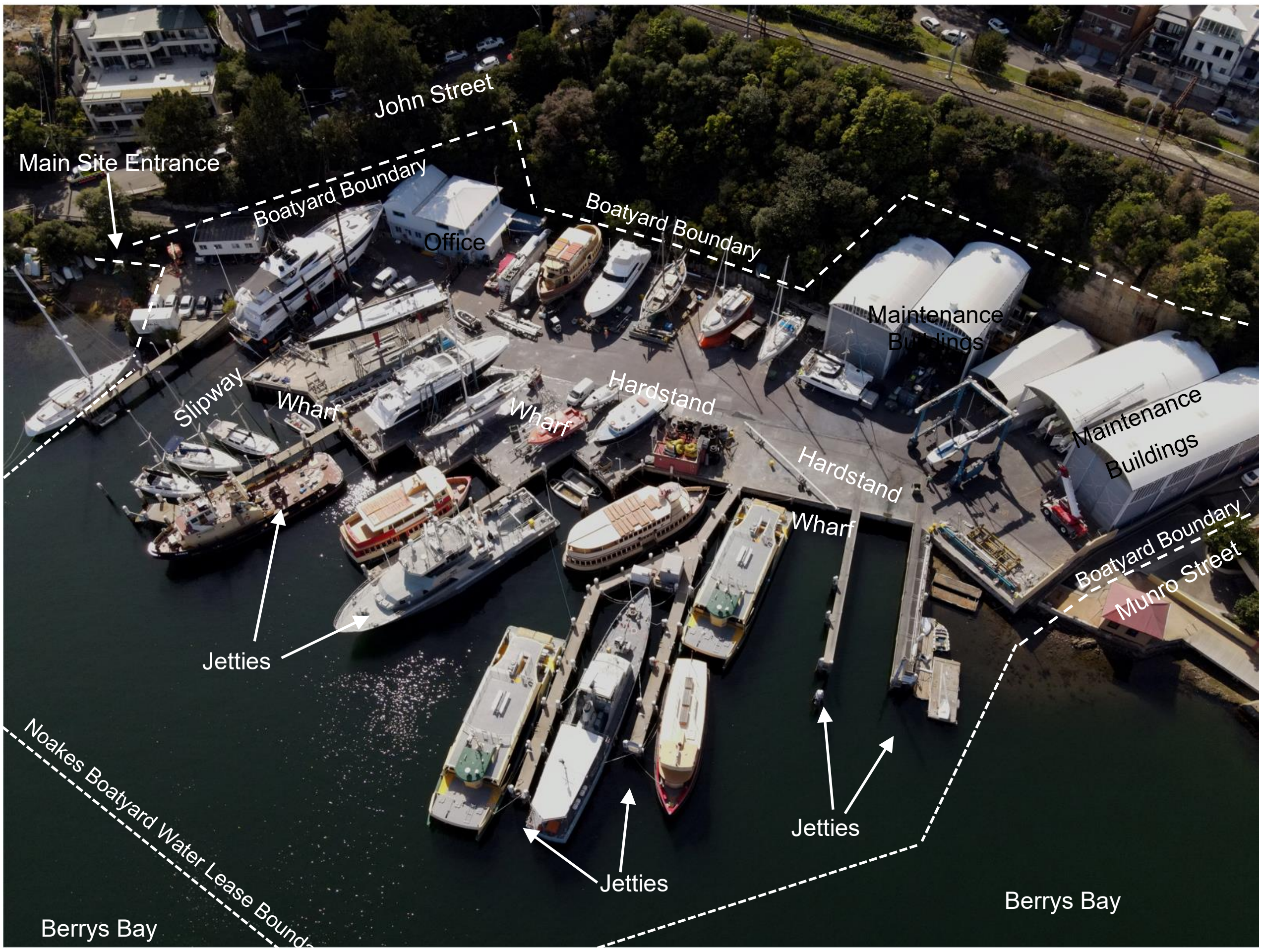
The Boatyard site has been in use as a boat building and marine repairs/maintenance facility for nearly 150 years. Previous heritage studies indicate the site has been occupied by boatbuilding organisations from as early as 1858. Hence, the site has a long history in the marine repair/ maintenance community.

Over the years, the site has undergone a number of upgrades and new infrastructure development, with the most comprehensive upgrades to the site occurring just prior to the Noakes Group occupying he property in 1995.

The boatyard provides an important service to the marine industry in Sydney Harbour, repairing and maintaining vessels for a range of clientele including Naval services, NSW Water Police, Roads and Maritime Services and private clients. The split of services is generally 60% for naval and public service organisation and 40% for private individuals.

The current site layout is shown in the aerial photograph at **Figure 3.3**. It can be seen from this figure that the site comprises a number of wharves, jetties, a slipway, open hardstand areas and buildings, including offices and maintenance facilities.

The site has development approval to employ a maximum of 120 people with the maximum number of boat spaces at the site not to exceed 26. Operating hours are between 07:00 and 18:00 six days per week.



Boatyard Figure 3.3: Aerial Photo showing the Current Noakes Layout (2021)

3.3 Description of the FDD and its Operation

3.3.1 Background to the FDD and Location at the Boatyard

The proposed location and operation of an FDD at the Noakes Boatyard has a number of key objectives including the provision of a much-needed maritime facility, of the appropriate scale, to service the marine industry at a Federal, State and local level and to increasingly contribute to the state and local economies through employment generation as well as the use of local facilities, services and industries.

It is proposed to locate the FDD at the site to service commercial and private vessels and given the length of the FDD the maximum vessel length that can be accommodated within the FDD is 60m, hence, vessel tonnage would be unlikely exceed 750 tonnes, and is more likely in the order of 600 tonnes.

The technical specifications of the FDD allow for a maximum vessel weight of up to 1,000 tonnes, however, as noted above, in practice it is not possible to fit a vessel of this weight into the dock due to the limitations of vessel overhang beyond the dock platform and the confinement of vessels within the acoustic screens of the dock.

The FDD is proposed to be located on the western side of the site, against the hardstand areas and wharves along the harbour front of the site at the land/water interface. **Photo 3.1** shows the proposed FDD location in relation to the boatyard and wharf area, **Figure 3.4** shows the site layout plan and FDD location with regards to the overall boatyard layout.

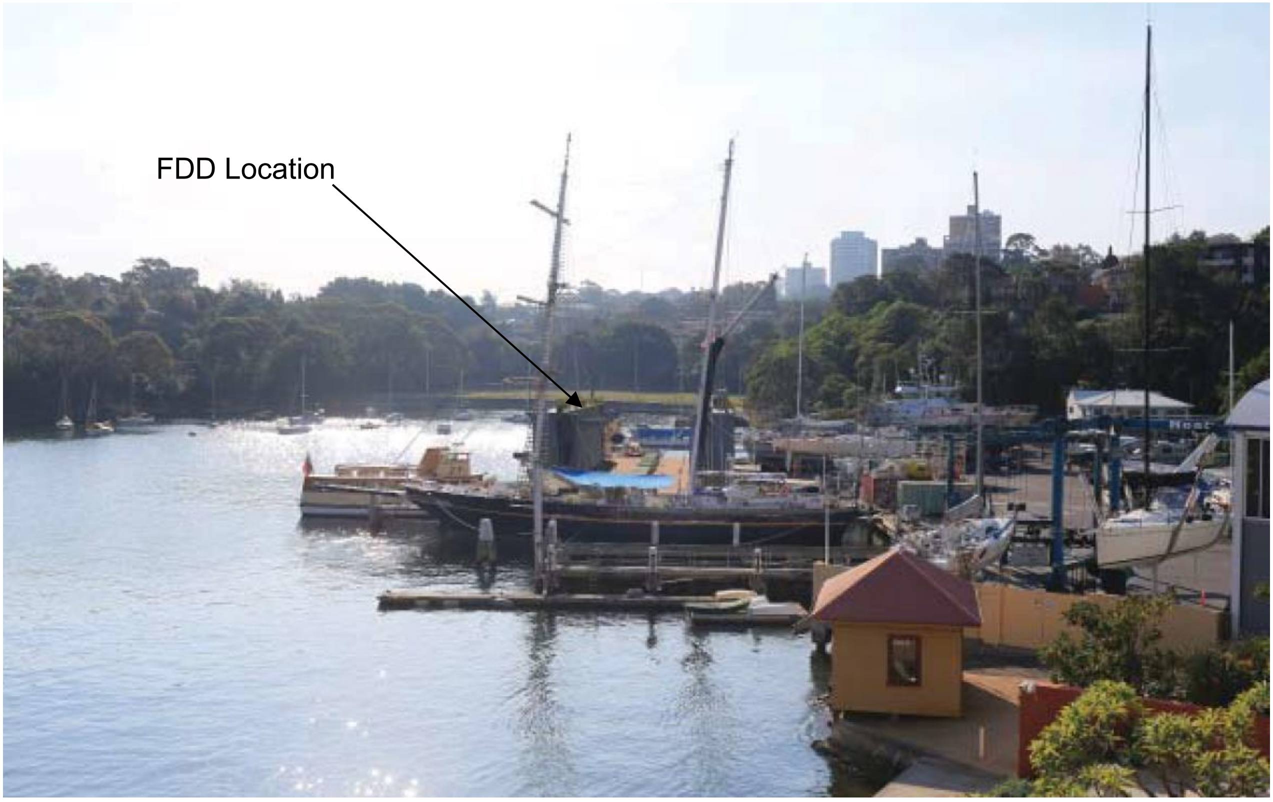


Photo 3.1: FDD Alongside Noakes Boatyard

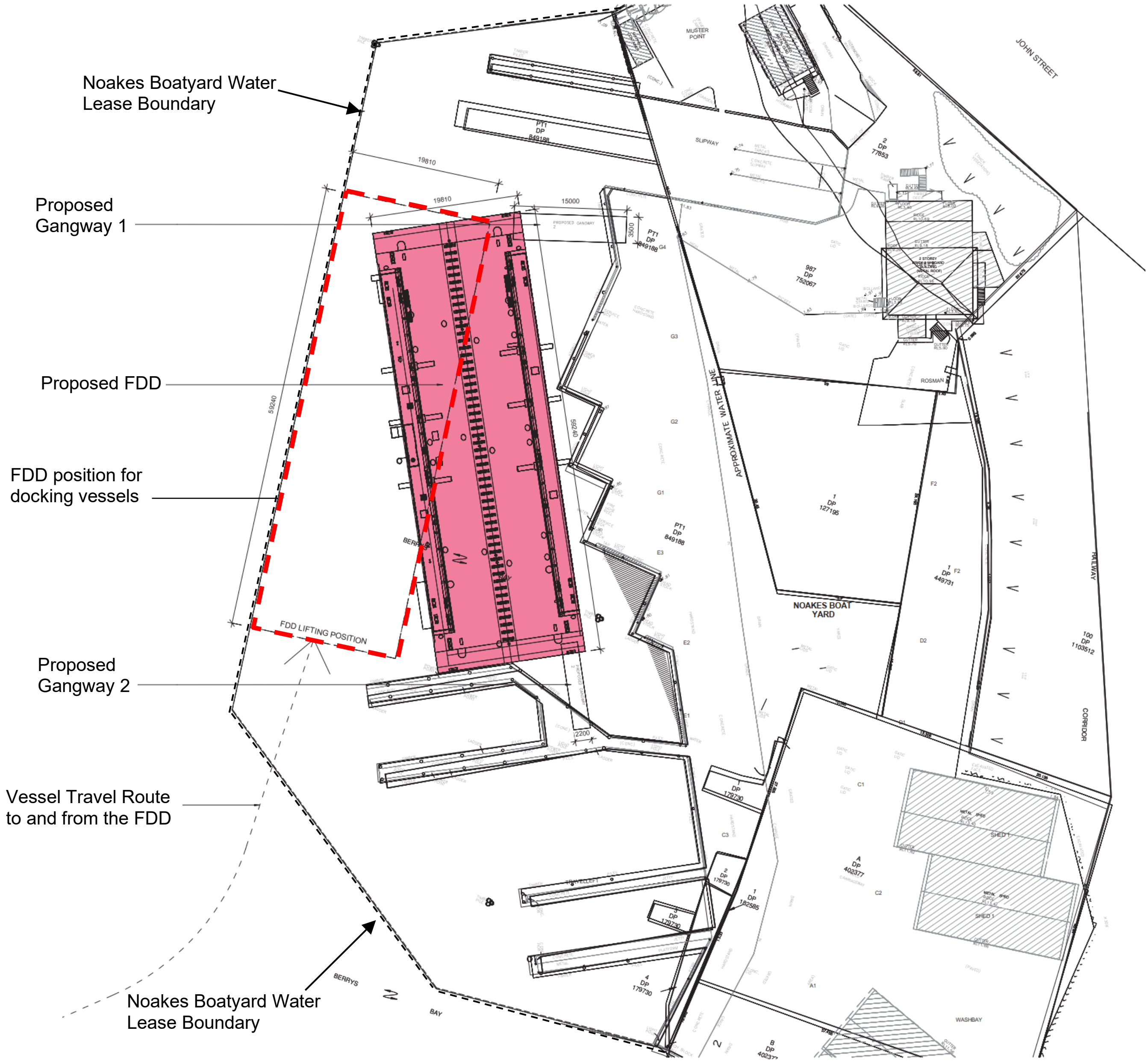


Figure 3.4: Noakes Boatyard Layout showing the FDD Location

3.3.2 FDD Operations - Docking and Undocking Vessels

The FDD plan and elevations are shown in **Figure 3.5**. These plans, along with other referenced figures, can be used to assist in understanding the descriptions provided in this section. The FDD is constructed from steel and is painted with Jotun Hardtop AX (light grey on the top of the structure and darker grey below. An anti-fowl treatment is applied to the pontoon hull and is black in colour. The anti-fowl treatment prevent marine growth accumulating on the vessel hull and also assists in minimising hull corrosion.

The FDD would be berthed adjacent to the hardstand at Noakes Shipyard (see **Figure 3.4**), which is referred to as the berthing pocket. Fenders would be installed along the seaward face of the hardstand to prevent damage to the FDD and/or hardstand when the FDD is berthed alongside. A gangway positioned at either end of the FDD would provide access to the FDD when it is berthed alongside the hardstand. The gangway would be removed when the FDD is repositioned for docking a vessel.

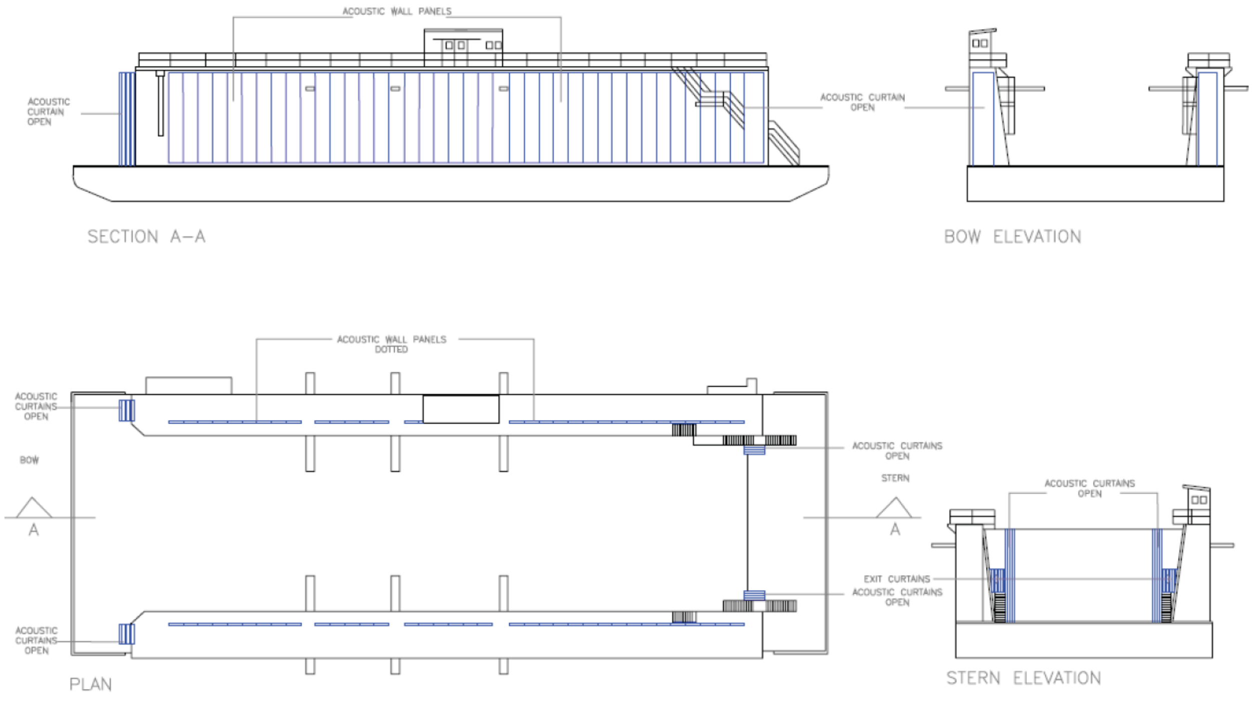


Figure 3.5: FDD Plans, Elevations and Sections

When vessels require docking in the FDD, it would be cold move slewed to the seaward extent of Noakes boatyard seaward boundary for loading and unloading of vessels. A cold move slew means that the FDD is relocated by mooring lines with the assistance of hand operated capstans (winches). **Figure 3.4** shows the position of the FDD ready for the arrival of a vessel to be docked. The position of the FDD against the seaward boundary of the boatyard is referred to as the loading pocket. The FDD would remain within Noakes water lease boundary during all phases of operation. Capstans are positioned on each corner of the FDD, on the upper wall.

A procedure has been developed for the docking of a vessel in the FDD, which forms part of the overall site Safety Management System (SMS). The procedure and SMS has been developed in accordance with the requirements of the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 (the Act) and the guidelines issued by the Australian Maritime Safety Authority (AMSA), the administrator of the Act. The Noakes Boatyard SMS has been approved by AMSA and is regularly audited by the independent Surveyor to ensure continued application of the SMS at the boatyard.

The stages for docking of a vessel are summarised in the following points:

- **Stage 1** - Relocate Mooring Lines. During this stage, the athwartship mooring lines and spring lines would be retained. Supplementary mooring lines would be cast off and/or relocated to slew the FDD. The supplementary mooring lines are required in severe weather but would not be required in favourable (calm) weather conditions. The gangways would be removed in this stage.
- **Stage 2** - Slew south end of FDD. This would involve releasing the southern athwartship mooring line and spring lines while using the hand operated capstan on the FDD to take up

and pull in the relocated line for slewing the FDD. The maximum length of the athwartship mooring line would be such that the FDD is physically contained within the lease area (see **Figure 3.4**).

- **State 3 -** Slew northern end of the FDD. This would involve releasing the northern athwartship mooring line and spring line while using the hand operated capstans on the FDD to take up and pull in the relocated lines for slewing the FDD (Note, depending on the vessel draught to be docked, Stage 3 may not be required).
- **Stage 4 -** Lower/submerge the FDD and align vessel. The keel blocks would be positioned prior to this Stage of operation. The FDD would be submerged by flooding the ballast tanks. The vessel would be aligned with the assistance of the vessel's engines. Where necessary, a tug may be used to assist in positioning the vessel. This would be the exception rather than the rule.
- **Stage 5 -** Dock vessel (float in) and float the FDD. The vessel would be manoeuvred into the FDD with the assistance of the vessel's engines and docking lines. The manoeuvring of the dock does not require a tug and it would not be part of the Standard Operating Procedure (SOP) to use a tug for manoeuvring vessels into the dock. However, in emergency situations, a tug may be required at the stern of the vessel to assist in docking operations, but this would be unlikely due to the availability of docking lines and vessel's engines. A tug would be available as a safety precaution only. The use of tugs in vessel docking operations is a current standard procedure in the operation of the slipways at the boatyard. Following docking and positioning of the vessel, using alignment ropes and positioning procedure, the FDD ballast tanks would be pumped out to float the FDD. Pumps would operate using shore power, with emergency diesel generator power if required. As the FDD rises, a diver is utilised to ensure the vessel keel aligns with the keel blocks, eliminating the potential for misalignment of the vessel and subsequent capsize.

Vessels would only be loaded from the southern end of the FDD. The intake and pump out to submerge and float the FDD would be located on the western side of the FDD (i.e. away from the shoreline) and approximately 1.5m above the bottom of the pontoon. This eliminates the potential for impact on the harbour floor and disturbance of sediments into the harbour waters.

Undocking a vessel would be undertaken in a similar manner. Berthing of the FDD adjacent to the hardstand would be as described in Stage 1, 2 and 3. However, the sequence would be in the reverse order for the undocking procedure.

3.3.3 Ballasting and De-ballasting Operations

The Ballasting/De-ballasting operation is used to fill and empty the ballast tanks in the FDD. **Figure 3.6** shows a schematic diagram of the FDD illustrating the ballast tanks in the pontoon section of the dock.

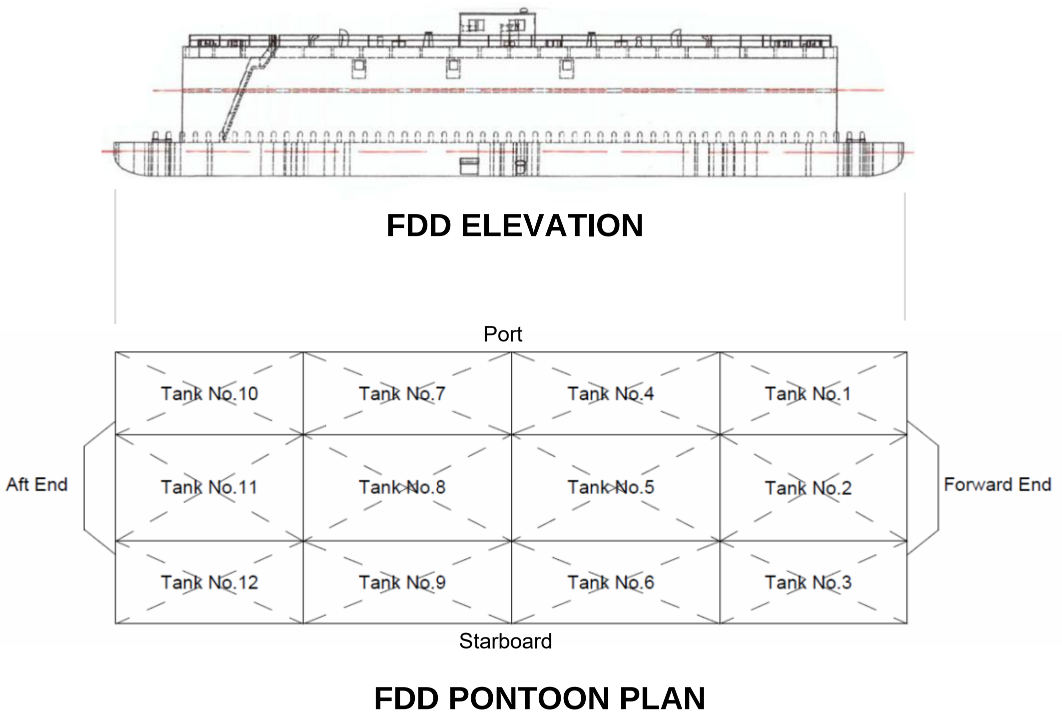


Figure 3.6: FDD Pontoon Plan and Elevation showing the Ballast tanks

To ensure the FDD does not impact the harbour floor, the under keel clearance, between the FDD keel and harbour floor, of 500mm has been adopted from the Harbour Masters Directions Sydney Harbour and Port Botany (15 February 2021).

Noakes has record the depth of the harbour, within the harbour lease area, at all tide levels (i.e. low and high tides) and as part of the docking plan the vessel draft will be obtained from the vessel specifications and use to determine the maximum de-ballasting required for the specific docking operation. The resultant calculation will then be used to confirm that the draft of the FDD will ensure a minimum of 500mm is maintained above the harbour floor. Details of specific vessel and FDD drafts during docking operations are provided in the Haskoning Note/Memo (Ref.25).

For shallower draught vessels, the FDD does not need to be submerged to its maximum draught when docking/undocking vessels. The FDD would need to be submerged so that the keel blocks are 300mm below the deepest point of the vessel to be floated in for docking. Further, docking and undocking could be undertaken at high tide to ensure increased water depth is available, if required.

Based on previous use of the FDD, the docking/undocking process, described in stages in **Section 3.3.2**, is estimated to take the following time periods:

- Slewing of the FDD out into the loading pocket – approximately 30 minutes;
- Submerging of the FDD – approximately 45 minutes;
- Loading of a vessel into the FDD – approximately 90 minutes (Note: the time required to unload a vessel would be less than the time required to load a vessel);
- Floating of the FDD – approximately 120 minutes;
- Slewing the FDD back into the berthing pocket – approximately 30 minutes

- Total Time – 5.25 hours.

In total the process is estimated to take between 5 to 6 hours, with submerging and docking undertaken on the flood tide and as close to practicable to a high tide. Floating the FDD would be undertaken on the ebb tide; slewing is not tidally dependent.

The use of the FDD will occur on a vessel by vessel basis and due to restrictions in working hours, it is unlikely that vessels would be loaded and unloaded on the same day.

3.3.4 Purpose and Use of the FDD

The FDD will be used only for the maintenance and repair of marine vessels, serving both existing and new clientele. As stated previously, there is a split between both private and government related works that are undertaken and this will remain; however, the site will provide one of the few locations whereby significantly sized vessels, particularly for government purposes, are able to be serviced within the Sydney metropolitan region. This will result in improved maintenance regimes being available, with a more positive outcome for the economy. There will be no vessel (boat or ship) construction undertaken in the FDD or at the Noakes Boatyard.

The dock is designed to accommodate vessels with a maximum overall length of 60m and a beam of 12.5m. The maximum tonnage that the FDD can accommodate is 1000 tonnes; however, due to the restriction in vessel length, a result of the use of acoustic curtains at the ends of the FDD, the tonnage would unlikely exceed 750 tonnes, and is more likely in the order of 600 tonnes.

The FDD provisions for repair and maintenance vessel at the site is determined on an as-needs basis and the scheduling of work is managed having regard to those vessels on the site at any one time. The anticipated timeframe for a vessel to remain on the FDD is up to one month.

In terms of the two gangways, these will be a drawbridge style which will be raised when the FDD is docking and undocking a vessel. To ensure that the existing jetties are not affected by the lifting of the gangways, the demolition plan demonstrates that the existing jetties will be reduced to accommodate the lifting movements.

3.3.5 Storage and Handling of Dangerous Goods as Part of the FDD Operation

As noted above, the FDD will be used for the repair and maintenance of marine vessels only. There will be no vessel construction conducted in the FDD. Based on this, the use of Dangerous Goods is limited to mainly paints and surface coating materials.

Vessel hulls and superstructures are protected from the marine environment using paints. Paints are classified as Class 3 flammable liquids by the Australian Dangerous Goods Code (ADG, Ref.6). It is proposed to limit the volume of paint stored on the FDD to immediate use quantities. A maximum of 250 L of paint would be stored on the main pontoon deck, only when painting of vessel components is required. This is anticipated to be less than 50% of the operational time.

Paint would be stored in on a bunded pallet located on the main deck of the pontoon and held in sealed containers, which are only opened when paint application to the vessel is required.

In addition to the paint, a diesel generator is located on the top-aft of the starboard wing. The diesel generator holds diesel fuel (1,000 L) to supply the emergency generator as required. The diesel fuel is held in an integrally bunded tank in the base frame of the engine. Regular engine tests are completed (weekly) to confirm the emergency readiness of the power supply. Diesel fuel is topped up around once every 3 months using an Intermediate Bulk Container and air powered transfer pump.

There are no other Dangerous Goods stored and handled at the FDD.

3.3.1 Operational Safety Management System (SMS)

Noakes has developed an operational safety management system for the FDD, which has been submitted to the Australian Maritime Safety Authority (AMSA). AMSA has approved the SMS for use in operating the FDD. Components of the SMS include:

- Policies - safety and environment, quality, drug & alcohol, smoking and equal opportunity;
- Operations - Dock Master Responsibilities, Staff Responsibilities, Standing Orders, Record keeping;
- Procedures - FDD Start-up, Ballasting & Pump Operations, Pumping Plan, FDD Loading Calculations;
- Emergency Procedures - Emergency Response to Fires, Floods, Person Overboard, Pollution/Spill, Power Failure, Collision, Adverse Weather, Terrorism/Security Threat (Bomb Threat), Collision/FDD Aground, Dockmaster Incapacitated, Evacuation/Abandonment; and
- Maintenance - Preventative Maintenance, Inspections and Checks (Checklists), Mechanical Equipment (e.g. Pumps), Documentation.

The implementation of an approved Safety Management System provides a system which can be audited to confirm the safeguards required by the SMS are being met. It is understood that AMSA require the independent Surveyor to review the SMS and confirm its implementation at the Boatyard.

4.0 HAZARD ANALYSIS RESULTS

4.1 Introduction

A hazard identification table has been developed and is presented at **Appendix A**. This table has been developed following the recommended approach in Hazardous Industry Planning Advisory Paper No .6, Hazard Analysis Guidelines (Ref.4). The Hazard Identification Table provides a summary of the potential hazards, consequences and safeguards at the site. The table has been used to identify the hazards for further assessment in this section of the study. Each hazard, carried forward for Hazard Analysis is assessed in detail in the following subsections.

In order to determine acceptable impact criteria for fire & heat radiation impact incidents that would not be considered for further analysis, due to limited impact offsite, the following approach has been applied:

- *Fire Impacts* - It is noted in Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 (Ref.5) that a criterion is provided for the maximum suitable heat radiation at the site boundary (4.7 kW/m^2) above which the risk of injury may occur and therefore the risk must be assessed. Hence, to assist in screening those incidents that do not pose a significant risk, for this study, incidents that result in a heat radiation less that at 4.7 kW/m^2, at the site boundary, are screened from further assessment, in accordance with the HIPAP (Ref.5).

  Those *incidents* exceeding 4.7 kW/m^2 at the site boundary are carried forward for further assessment (i.e. frequency and risk). This is a conservative approach, as HIPAP No. 4 (Ref.5) indicates that values of heat radiation of 4.7 kW/m^2 should not exceed 50 chances per million per year at sensitive land uses (e.g. residential). It is noted that the closest residential property is over 50 m from the proposed FDD, hence, by selecting 4.7 kW/m^2 as the consequence impact criteria (at the boatyard boundary) the assessment is considered conservative.

- *Property Damage and Accident Propagation* - It is noted in HIPAP No. 4 (Ref.5) that a criterion is provided for the maximum suitable heat radiation at the site boundary (23 kW/m^2) above which the risk of property damage and accident propagation to neighbouring sites must be assessed. Hence, to assist in screening those incidents that do not pose a significant risk to incident propagation, for this study, incidents that result in a heat radiation heat radiation less than 23 kW/m^2, at the site boundary, are screened from further assessment. Those incidents exceeding 23 kW/m^2 at the site boundary are carried forward for further assessment with respect to incident propagation (i.e. frequency and risk).

- *Societal Risk –* HIPAP No. 4 (Ref. [1]) discusses the application of societal risk to populations surrounding the proposed potentially hazardous facility. It is noted that HIPAP No. 4 indicates that where a development proposal involves a significant intensification of population, in the vicinity of such a facility, the change in societal risk needs to be taken into account. In the case of this facility there is currently no significant intensification of population around the proposed site and as the site is located in an industrial area, it is expected that a minimal population will surround the site. Hence, societal risk has not been considered in this study. The closest residential property is located over 50m from the FDD.

4.2 Properties of Dangerous Goods (DGs) located on the FDD

The type of DGs and quantities used on the FDD has been described in **Section 3**. **Table 4.1** provides a description of the DGs used on the FDD, including the Class and the hazardous material properties of the DG Class.

Table 4.1: Characteristics of Dangerous Goods Used in FDD Operations

UN No. & Material (Proper Chemical Name)	DG Class & Packing Group, GHS Category	Hazardous Properties
UN 1263 - Paint or Paint related materials	Class 3 PGII & III Category 2 & 3	Class 3 includes flammable liquids which are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc.) which evolve flammable vapours at temperatures of not more than 60°C closed-cup test or not more than 65.6°C open-cup test. Vapours released may mix with air and if ignited, at the right concentration will burn resulting in pool fires at the liquid surface. Class 3 liquids are potentially environmentally hazardous and may cause long-term adverse effects in the aquatic environment.
UN 00C1 - Diesel Fuel	Class C1 Combustible Liquid Category 4	Class C1 liquids include combustible liquids which are liquids or mixtures of liquids, or liquids containing solids in solution or suspension (for example diesel fuel, fuel oils, linseed oil, kerosene and ethylene glycol), which evolve flammable vapours at temperatures of more than 60°C but less than 93°C, closed-cup test. Where a combustible liquid is stored or used at temperatures exceeding 60°C, vapours released may mix with air and if ignited, at the right concentration will burn resulting in pool fires at the liquid surface. Combustible liquids are potentially environmentally hazardous and may cause environmental damage if released in large quantities.

4.3 Hazard Identification

Based on the hazard identification table presented in **Appendix A**, the following hazardous scenarios have been developed and assessed in this section of the report:

- Paint container on the FDD- paint spill or leak from paint container, release to the environment and potential environmental impact.
- Paint container on the FDD- paint spill or leak from paint container, ignition and pool fire on the FDD pontoon deck - Heat Radiation impact to surrounding areas.
- Diesel Fuel Tank - replenishing fuel (transfer of fuel to the diesel tank), fuel spill, release to the environment and potential environmental impact.

- Diesel Fuel Tank - replenishing fuel (transfer of fuel to the diesel tank), fuel spill/release, ignition and pool fire on the wind deck (adjacent to the diesel generator) - Heat Radiation impact to surrounding areas.
- Diesel fuel system leak on the diesel generator engine, hot engine components ignite the fuel leak resulting in diesel engine fire - Heat Radiation impact to surrounding areas.
- Surface preparation (abrasive blasting), Spray painting, welding cutting, grinding, etc. on the vessel on the FDD - Potential offensive impact from noise at sensitive land uses adjacent to the boatyard.
- Surface preparation (abrasive blasting), Spray painting, welding cutting, grinding, etc. on the vessel on the FDD - Potential offensive impact from dust, particulates and fumes generated during operations at the FDD.
- Water enters ballast tanks whilst FDD in raised position at the Noakes Boatyard wharf - Potential for FDD to capsize, with a ship inside, whilst alongside the Noakes Boatyard wharf resulting in damage to infrastructure and environmental impact.
- Docking of the ship in the FDD - Ship capsizes in the dock, potential for imbalance and dock capsize resulting in damage to infrastructure and environmental impact.
- Docking of the ship in the FDD, de-ballasting and raising the FDD using ballast pumps - FDD overloaded, structural failure, FDD capsizes/sinks resulting in environmental damage.
- Docking of the ship in the FDD, de-ballasting (opening the ballast valves and filling ballast tanks with seawater) - ballast tanks overfilled, FDD sinks and strikes the harbour floor leading to environmental damage.
- Diesel fuel leak from tanks in the ship in the FDD, ignition and internal fire in the ship – fire grows resulting in a full ship fire within the FDD.
- Ignition of fibre-glass hull of a ship in the FDD as a result of maintenance/repair work (welding, cutting, grinding) resulting in full ship fire within the FDD.

Each identified scenario is discussed in further detail in the following sub-sections.

4.4 Paint Container on FDD - Paint Release & Impact to Environment

Paint is used on the FDD for surface coating to ships hulls and superstructures. Painting procedures at the boatyard dictate that only paint required for the immediate painting operation is taken onto the FDD. Paint is held in 20 L drums within the main paint stores in the boatyard and a maximum of 2 x 20 L drums would be transferred at any given time to the FDD. The paint drums are stored on a bunded pallet on the deck of the FDD and handling of paint is performed within the confines of the bunded pallet. Further, the pontoon deck of the FDD is also bunded to prevent any materials being released to the environment during operations.

Sealed drums are opened on the bunded pallet and paint transferred to smaller containers (<5 Litres (L)) for application to the vessel hull or superstructure. During this operation there is a potential for a drum to be dropped or knocked over, releasing the drum contents (maximum 20 L) into the spill containment section of the bunded pallet. The bunded pallet would have the capacity to hold a minimum of 200 L, hence, there would be no release beyond the immediate bunded pallet location and no impact to the environment.

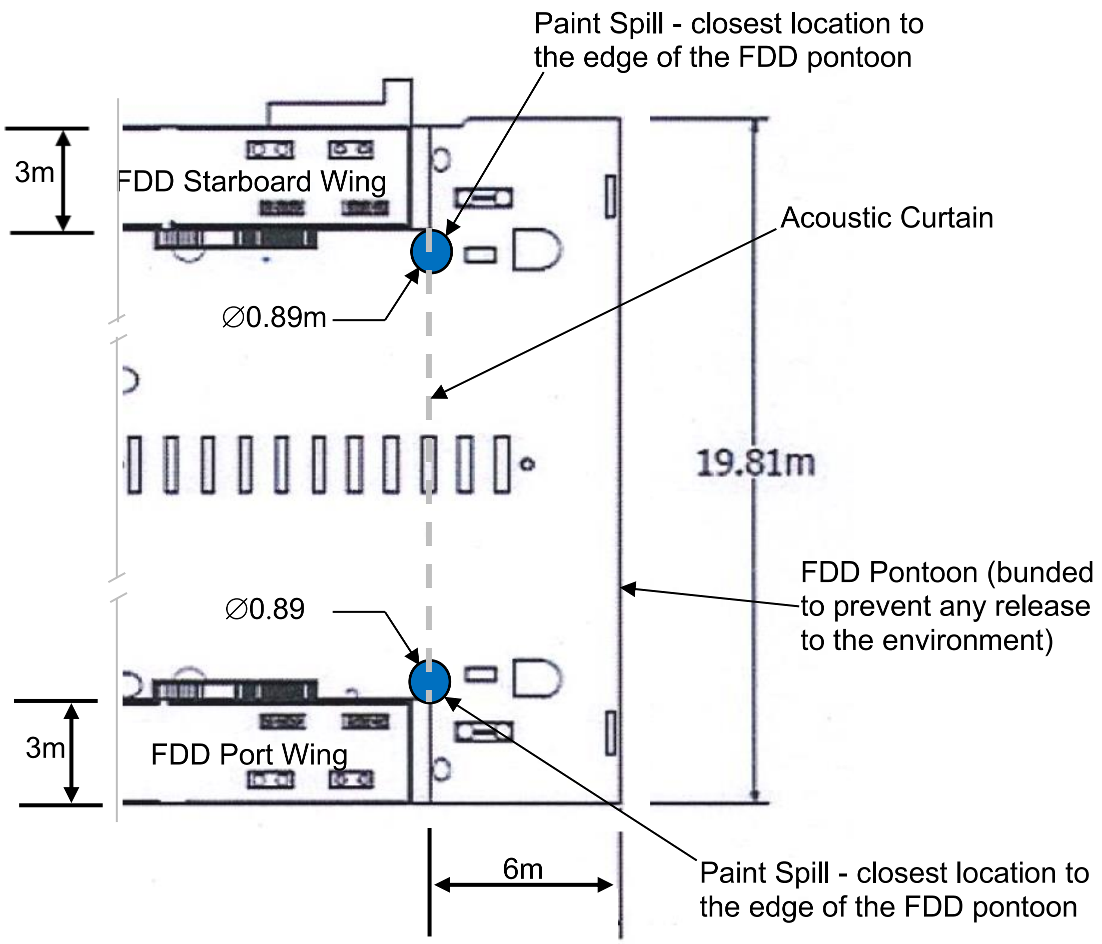
Smaller containers (<5 L) would be carried to various location around the vessel and on the pontoon deck. In the event a smaller container is dropped by error, the paint would spill to the deck of the

FDD and there would be a potential for this to escape to the environment. A liquid would spread on a solid surface (e.g. deck of the FDD pontoon) to a pool depth of 8mm (Ref.8). The estimated pool depth takes account of liquid viscosity, surface tension, volume of spill, etc. For a volume of 5 L and pool depth of 8mm, the pool diameter is:

$$D = (4/\pi \times 0.005m^3/0.008m)^{0.5} = 0.89m.$$

The closest point to the edge of the FDD pontoon (i.e. the deck edge to the harbour) would be at the acoustic curtain which is attached to the ends of the FDD wings. **Figure 4.1** shows a schematic plan of the curtain, FDD wings and distance from a potential dropped container point to the edge of the FDD pontoon. It can be seen from this configuration that a pool of spilled paint would not reach the edge of the pontoon and there would be no release to the environment.

It is noted that spill kits are located on the FDD pontoon, hence, in the event of a paint spill, the closest spill kit to the release would be deployed and the spill cleaned-up, further preventing potential release to the environment.



FDD AFT END PLAN

Note: "Fwd" end plan is identical to the aft end plan, spills at the "Fwd" end are the same as illustrated in the plan above.

Figure 4.1: FDD Pontoon Aft Plan showing Paint Spill Location and Spread on the Pontoon Deck

As there are no environmental consequences of a paint spill beyond the FDD, this incident has not been carried forward for further analysis.

4.5 Paint Container on FDD - Paint Release, Ignition and Fire

In the unlikely event of a paint release, as detailed in **Section 4.4**, there is a potential for ignition of the paint spill resulting in a pool fire in the bunded pallet or where the small container spill occurs. A pool fire would result in the formation of a cylindrical fire above the pool, radiating heat to the surrounding areas. Noting the containment bund where paint drums are located, the limited quantity of liquid spilled where paint may be used, the fire dimensions would be relatively small (≈1 m diameter).

Notwithstanding this, there is a potential for heat radiation impact into the areas to the north and south of the FDD in the event the acoustic curtains are open at the time of the spill. It is noted that this is highly unlikely, as painting would not commence until the acoustic curtains are in place, but to ensure a conservative analysis, the heat radiation has been assumed to occur with no acoustic curtains in place.

As there is a potential for heat adiation to impact offsite, this incident has been carried forward for further analysis to the consequence assessment section (**Section 5**).

4.6 Emergency Diesel Fuel Tank Refuelling - Fuel Spill & Impact to Environment

A diesel engine is located on the starboard wing deck (aft) of the FDD. The engine is used to provide power for when the ballast pumps are required to withdraw seawater from the ballast tanks. The engine is also tested weekly, for about 1 hour, to ensure the probability of engine failure to start is low when required for ship docking.

The diesel engine fuel tank is located within the engine frame (i.e. under the engine) and comprises an integrally bunded tank (i.e. a tank within a tank). The tank capacity is 1,000 L and is replenished with fuel when it reaches around 30% capacity. Based on a weekly test and an average monthly docking cycle, it is anticipated that the refuelling would occur once a month (12 times per annum).

Refuelling operations are currently conducted at the boatyard on a regular basis and the same refuelling operations currently used will be applied to the refuelling of the diesel fuel tank. The diesel engine fuel tank would be replenished from an Intermediate Bulk Container (IBC), with a capacity of 1,000 L, which is located adjacent to the diesel fuel tank bund. An air operated diaphragm pump is used to transfer the diesel fuel from the IBC to the fuel tank. This operation is performed under the constant attendance of an operator who monitors the fuel tank level and condition of pump and flexible pipework.

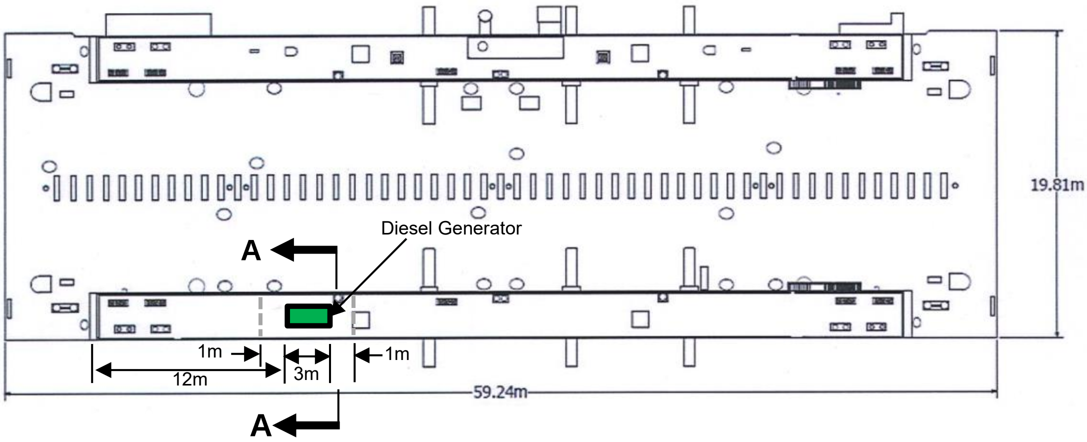
In the event of any sign of leak or fuel spill (i.e. tank overfilling), the transfer is immediately stopped by turning off the compressed air supply to the diaphragm pump. Noting that a tank overfill does not result in a spill, due to the integrally bunded tank, the potential leak source originates from the pump, pipework and IBC, which is monitored by the refuelling operator.

As part of the refuelling operation, the operator covers (seals) the deck scuppers (drains) prior to commencement of transfer and places a spill containment barrier across the wing deck 1m forward and 1m aft of the diesel generator, which is shown in **Figure 4.2**. Hence, any leaks are contained within the spill containment area of the deck. This comprises a raised steel bar section, 100mm at the deck edge and a 100mm spill containment barrier. The total spill volume that can be retained in this area is:

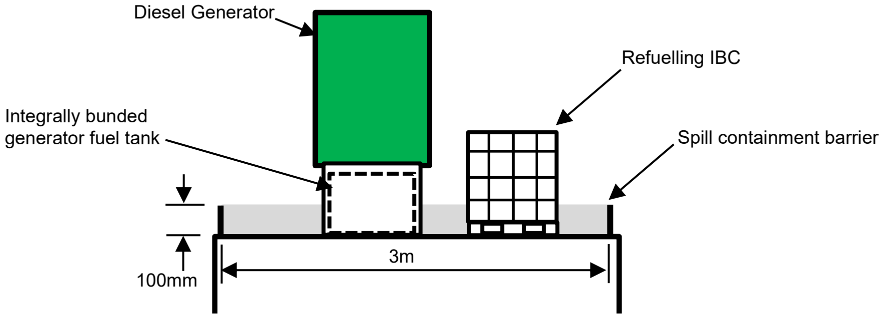
Spill Volume - Starboard Wing Deck - V_{spill} = 5m x 3m x 0.1m = 1.5 m^3 or 1,200 L.

Noting that the volume of an IBC is 1,000 L, there is adequate spill containment on the wing deck of the FDD to prevent release of diesel fuel over the side of the FDD.

In addition to the establishment of spill control systems on the FDD wing deck, a Shipboard Oil Spill Emergency Plan (SOPEP) spill kit will also be located adjacent to the transfer operation. All operations personnel on the FDD are trained in the use of the SOPEP equipment, which would be deployed in the unlikely event of any spills that may occur during the refuelling operation.



FDD PLAN



SECTION AA

Figure 4.2: FDD Plan showing Wing Sections, Diesel Gen. Location & Fuel Spill Containment

Based on this analysis, and the spill retention systems installed, effective spill control is provided for fuel transfer operation and no further analysis is conducted for this operation.

4.7 Emergency Diesel Fuel Tank Refuelling - Fuel Spill, Ignition and Fire

In the unlikely event of a diesel fuel spill during the refuelling operation, as detailed in **Section 4.6**, there is a potential for ignition of the paint spill resulting in a pool fire in the spill containment area on the wind deck of the FDD. Noting that diesel fuel is a combustible liquid with a high flash point (>60°C), the likelihood of ignition and fire at ambient temperature is very low, if not negligible. In addition, there are no ignition sources in the vicinity of the fuel transfer point as the fuel is transferred using an air powered diaphragm pump, which has no ignition source components.

Notwithstanding this, in the unlikely event of a diesel fuel spill, ignition and fire, a pool fire would result, forming a cylindrical fire above the pool, radiating heat to the surrounding areas. There is a potential for heat radiation impact into the areas to the north, west and south of the FDD, which may result in impact offsite, hence, this incident has been carried forward for further analysis to the consequence assessment section (**Section 5**).

4.8 Emergency Diesel Fuel System Leak - Fuel Spray, Ignition and Fire

During operation, diesel fuel is supplied to the fuel injectors at high pressure. Fuel lines may become fatigued and split, resulting in fuel spraying onto other engine components. Where fuel sprays impact hot engine parts (e.g. exhaust systems), there is a potential for the fuel to ignite, resulting in engine fires.

This scenario is well understood by engine manufacturers and fuel system design on diesel engines separates the fuel and exhaust systems on separate sides of the engine, virtually eliminating the potential for fuel to spray onto hot engine parts. Notwithstanding this, in the unlikely event a fuels system failure occurs and the fuel is ignited, an engine fire would occur radiating heat to the surrounding area, which may result in impact offsite. Hence, this incident has been carried forward for further analysis to the consequence assessment section (**Section 5**).

4.9 Repair/Maintenance Operations on the FDD - Noise Impacts

Repair and maintenance operations may require the use of various tools/equipment and may involve noise generating work. This may have the potential to result in the generation of noise at the site boundary and sensitive land uses, adjacent to the site, at levels that may exceed the acceptable noise criteria.

To identify the repair and maintenance operations that have the potential to generate noise and to assess the impacts at the boatyard boundary and sensitive land users, a detailed noise assessment has been conducted by Day Design of Peakhurst, NSW. The study conducted by Day Design has provided the required review and results to determine the potential “offensive” nature of the operations at the site and has made recommendations regarding noise minimisation.

The implementation of the recommendations made in the Day Design Noise assessment report (Ref.9) would ensure the noise generated at the FDD does not exceed the acceptable criteria and hence, the site would not be considered to be “offensive” with regards to the noise component of the operations.

4.10 Repair/Maintenance Operations on the FDD - Dust/Particulate Impacts

Repair and maintenance operations may require the use of various tools/equipment and operations that generate dust, particulates and vapours that may escape the FDD area, exceeding the regulatory air quality criteria for the specific operations and dust/particulate/vapour releases. Exceeding the acceptable air quality criteria may result in an offensive impact to land uses adjacent to the boatyard.

To identify the repair and maintenance operations that have the potential to generate particulates/dusts/vapours and to assess the air quality impacts at the boatyard boundary and sensitive land users, a detailed air quality assessment has been conducted by Astute Environmental of Carole Park, Qld. The study conducted by Astute Environmental has provided the required review and results to determine the potential “offensive” nature of the operations at the site and has made recommendations regarding minimisation of air quality impacts.

The implementation of the recommendations made in the Astute Environmental Air Quality assessment report (Ref.11) would ensure the release of potential air pollutants at the FDD does not exceed the acceptable criteria and hence, the site would not be considered to be “offensive” with regards to the noise component of the operations.

4.11 Ballast Tank Leak - FDD Sinks and/or Capsizes

4.11.1 FDD Stability - Background

The FDD is proposed to operate under various static and environmental conditions throughout the various phases of operation, hence, the stability of the FDD is critical in ensuring capsize does not occur during normal operations. In addition, in the unlikely event of a FDD breach of a ballast tank, or multiple tanks, the reserve buoyancy requirements must be assessed to determine whether the FDD is capable of withstanding a moderate level of damage, resulting in flooding, without endangering a docked vessel.

In the event of a FDD sinking or capsizing event, the potential for impact to people in surrounding land uses is negligible, however, environmental impact may result. A FDD sinking or capsizing event may result in the FDD hull impact the harbour floor and disturbing sediments resulting in environmental impact.

The FDD has been designed with 12 ballast tanks within the pontoon section of the dock. **Figure 4.3** shows an isometric view of the FDD showing the ballast tanks 1 to 12.

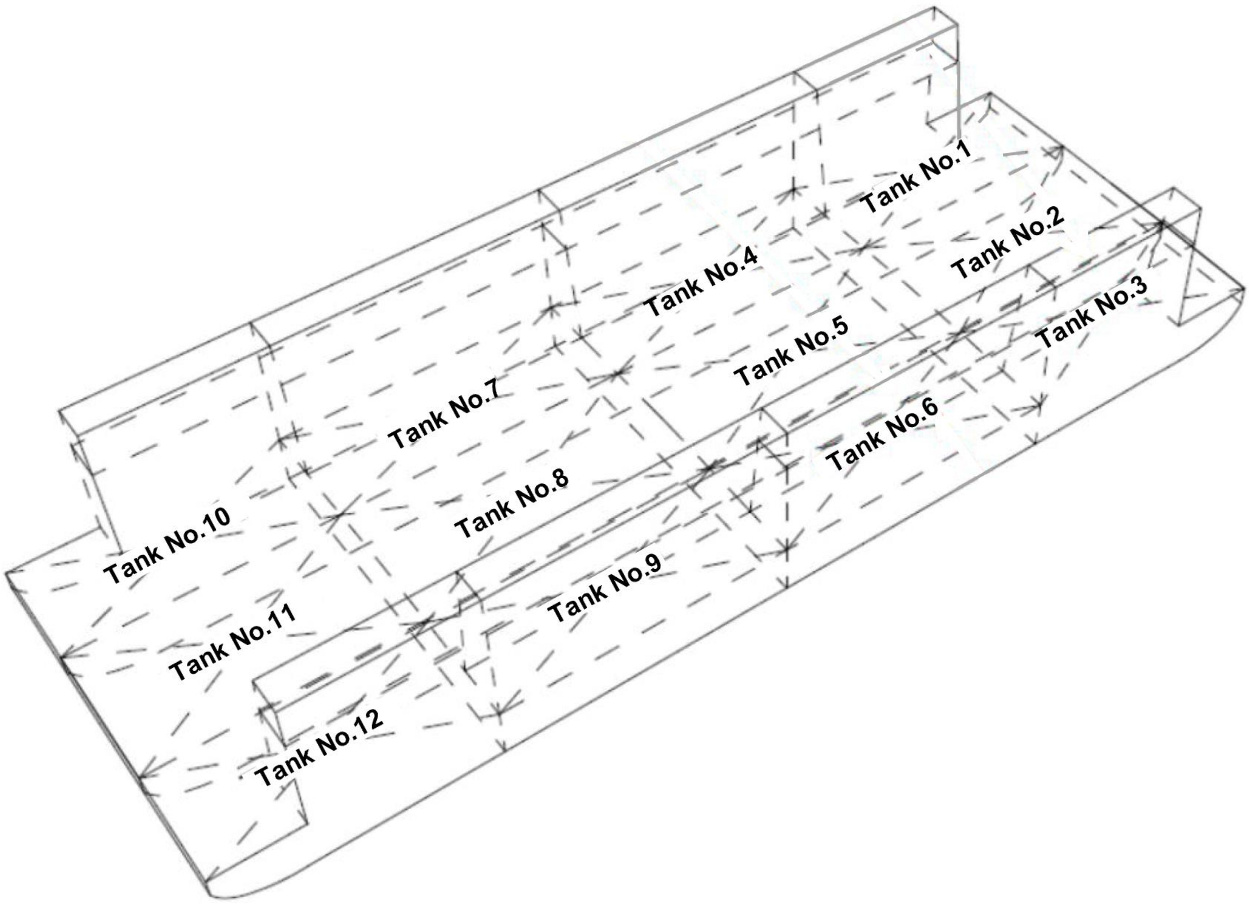


Figure 4.3: Isometric View of The FDD Showing Ballast Tanks

A review of the FDD stability, both during intact and damage conditions was conducted (Ref.9) to determine the capacity of the vessel to operate with adequate buoyancy in normal and damage conditions. For this purpose, the assessment was conducted using Military Standard (MIL-STD) 1625D (SH) (Ref.10).

4.11.2 Stability Under Normal Environmental Conditions (Wind)

During normal operations, when the FDD is in the raised position, the sides of the FDD are impacted by wind, which has the capacity to cause the FDD to "heel". Excessive wind impact may result in capsize, hence, an assessment of the impacts on the FDD from a 100 knot (185 km/hr) beam wind on a fully loaded FDD (1,000 tonnes) was conducted (Ref.9) which resulted in a "heel" of 1.68 degrees. This is significantly less than the maximum permissible angle of 15 degrees listed in MIL-STD-1625D (Ref.10). A heel angle of 1.68 degrees would not result in capsize of the FDD. Hence, the impact of wind is not considered further in this assessment.

4.11.3 Damage Stability – Compliance with MIL-STD-1625D

MIL-STD-1625D (MIL-STD) requires assessment of the damage stability associated with the operation of a floating dock. The MIL-STD requires an assessment of catastrophic damage to two adjoining tanks (see **Figure 4.3**), such that a rupture permits sufficient water to enter the tanks at a flow rate where the ballast pumps cannot maintain the tanks in the empty condition and sea water fills both tanks. Under these damage conditions, the MIL-STD indicates that the maximum permissible "heel" angle is 15 degrees or trim angle 3 degrees.

The analysis conducted in the stability assessment report (Ref.9) is summarised in **Tables 4.2** & **4.3**. This analysis has been conducted assuming the FDD docks a vessel of 1,000 tonnes.

Table 4.2: Dock Damage Condition - Phase 5 Operation (Fully Raised), Side Shell Damage

Damaged Compartments	Equilibrium GM (m)	Equilibrium Angle of Heel (Degrees)	Equilibrium Heel Criteria (Degrees)	Comply (Y/N)
Tanks 1 & 4	2.74	20.4 to Port	15	N
Tanks 3 & 6	2.74	20.4 to Starboard	15	N
Tanks 4 & 7	3.98	20.4 to Port	15	N
Tanks 6 & 9	3.98	20.4 to Starboard	15	N
Tanks 7 & 10	2.74	20.4 to Port	15	N
Tanks 9 & 12	2.74	20.4 to Port	15	N

Table 4.3: Dock Damage Condition - Phase 5 Operation (Fully Raised), Bottom Shell Damage

Damaged Compartments	Equilibrium GM (m)	Equilibrium Angle of Heel (Degrees)	Equilibrium Trim (m/Degrees)	Equilibrium Trim Criteria (Degrees)	Comply (Y/N)
Tanks 2 & 5	2.608	0	4.575/ 5.1 (by the bow)	3	N
Tanks 5 & 8	0.456	0	0	3	Y
Tanks 8 & 11	2.608	0	4.575/ 5.1 (by the stern)	3	N

It can be seen from **Tables 4.2** & **4.3** that the damage incurred to multiple tanks, listed in column 1 of the tables, results in "heel" and "trim" angles that exceed the required values listed in the MIL-STD. This is not to say that the FDD will capsize with the vessel inside, rather, the "heel" and "trim" angles do not meet the MIL standard. The Stability Assessment (Ref.9) indicates that military standards are stringent, which is due to their requirement to be used in military applications. The requirement for surviving two compartment flooding is related to the potential for damage during a conflict (war) situation, where such craft (FDD) may be a subject to damage from attack (i.e. torpedos, bombs, mines, etc.). However, there would be no requirement to survive catastrophic events in non-military applications (i.e. in time of non-conflict), hence, the stability assessment (Ref.9) indicates that that the stability criteria from a commercial standard (e.g. International Maritime Organisation or Lloyds) could be applied to achieve compliance.

Notwithstanding this, in this PHA, it is conservatively assumed that uncontrolled flooding of two ballast tanks, fails to meet the stability criteria. Three incidents that may result in uncontrolled ballast tank flooding have been assessed, these are:

- Human error during flooding of the dock when preparing for a docking operation;
- Tank damage as a result of collision and impact causing ballast tank breach and ingress of sea water; and
- Equipment failure (valves), permitting sea water ingress to the ballast tanks whilst a ship is docked in the FDD.

Each incident is assessed in further detail in the following subsections.

4.11.4 Human Error – Ballast Tank Flooding During Docking Event

During the docking operations (lowering & raising of the FDD), there is a potential for errors to occur, resulting in the commencement of uncontrolled flooding in ballast tanks. The ballasting operations are controlled from the Port Deck House, where the ballasting monitoring equipment is located. The Deck House contains a number of monitoring components, including ballast tank level instrumentation and trim (forward/aft) and heel (port/starboard) angle indicators.

During the ballasting operations, the dock master (person controlling the docking operation) monitors each of the instruments and controls the ingress/pump-out of sea water to lower/raise the FDD. During this operation, faults with components or operational errors may occur resulting in incorrect ballasting/de-ballasting of tanks. This would result in a trim or heel error and potential capsize.

It is noted that the docking operation (ballasting/de-ballasting) is a relatively slow process and normally takes around 5 to 6 hours (see **Section 3.3.3**). Where equipment failures or an initial control error occurs, the results of the failure/error manifests itself very slowly and is readily identified well in advance of incident effects. For example, a fault in a ballast valve opening would result in failure of sea water to ingress to the ballast tank. As the FDD begins to lower, it would gradually develop a list (i.e. minor heel to port or starboard or a slight change in the trim angle forward/aft). This would be detected by the docking master who is located in the Deck House and action can be immediately taken to shut down the ballasting operation and to hold the FDD in the stable position until the faulty component is repaired.

Where a control error occurs, for example the Dock Master issues incorrect instructions for valve control (incorrect valve opening sequence), a similar outcome to the valve failure scenario above would be manifested. As the dock raises or lowers, the FDD would heel or trim would be affected and would be indicated ion the heel/trim instruments in the Deck House. The Dock Master would then cease operations and rectify the error prior to dan unstable event occurring.

It is reiterated that the docking/undocking operations occur over many hours and failures/control errors are manifested well before unstable conditions are reached. It is also noted that the docking operation is conducted by a number of operations staff who are all aware of the requirements for trim and heel control and are trained to monitor these conditions during the docking/undocking operations. Where docking operations staff have any concerns regarding FDD stability, they are trained to raise the issues with the docking master.

Assuming the Dock Master and one assistant are involved with the docking events, the Dock Master is in the Deck House and the assistant is on the FDD wing deck, these two operators can be assumed to be independent, as they have different stability monitoring mechanisms and inputs to the stability conditions. The probability of human error for such an operation as a docking event involves the operation of commonplace, simple equipment (e.g. valves & pumps), which is performed regularly by the Noakes operations staff. Based on this, the probability of error leading to a major capsize event (i.e. failure of both the Dock Master & assistant to recognise incorrect control commands, failed equipment and stability responses) is estimated as 0.0001 per docking event (Error Type 2, Table 2.7, Ref.16). Assuming there are 24 docking events per annum (12 dockings x (1 raise + 1 lower)), the human error failure rate of the Dock Master and assistant resulting in a capsize event, is:

Human Error Failure Rate = Dock Master Failure Probability x Dock Assistant Failure Probability x number of dockings per annum

= 0.0001 x 0.0001 x 24

= 0.24×10^{-6} p.a.

Note that the failure probability is based on failure of both the Dock Master and assistant firstly to make a control error and then failure to correct this error, considering the length of time available for error response, the clear indications of error well before catastrophic results can occur and the ability of error correction well within the event development time frame.

The consequence associated with a FDD capsize event is mainly environmental, although fatalities may occur as a result of operations personnel on the FDD. In review of the risk criteria detailed in HIPAP 4 (Ref.5), fatality criteria is provided for impacts to adjacent land uses, however, no criteria is provided for environmental impact or onsite personnel. The fatality risk criteria for adjacent land uses is 1×10^{-6} p.a. or 1 chance in a million per year. Where site risks are determined to be below this criteria risks are considered to be ALARP.

Noting that the risk of capsize as a result of human error has been assessed as 0.24 chances in a million per year, then the risk to the environment and personnel operating the FDD is considered to be within the ALARP range. Hence, no further assessment is performed for this hazard.

4.11.5 Damage Stability – Tank Damage

It is noted that the stability assessment conducted by the Naval Architects (Ref.9) has assumed that a catastrophic event occurs and there is no response from the operators to repair the breach (temporarily) or to implement tank pump out until the breach can be repaired permanently.

In order to gain an understanding of the size of tank breach (hole), that would lead to ingress of sufficient water to overwhelm the pumps and hence the credibility of such a breach, water ingress and pump out assessment was conducted. The following data was used in the assessment:

- Total Volume of the Ballast Tanks = 3,000 m^3;
- Ballast Pump Flow Rate = 0.41 m^3/s (420 kg/s);
- Water Line to FDD Bottom = 2.5 m;

The formula for flow through a hole is:

$$G = Cd.A.\rho.(2gh)^{0.5} \qquad \text{(Ref.12)}$$

Where: Cd = co-efficient of discharge (0.6 for rough holes, Ref.12)
A = cross sectional area of the hole ($A = \pi/4 \times D^2$), where D - hole diameter
ρ = density of sea water (1025 kg/m^3)
g = acceleration due to gravity (9.81m/s^2)
h = depth of water from the surface to the hole (2.5 m)

Where a single hole is the cause of water ingress into a ballast tank, the formula is rearranged as follows to determine the hole equivalent diameter:

$$D = [G/(Cd.(\pi/4).\rho.(2gh)^{0.5})]^{0.5}$$

$$D = [420/(0.6x0.7854x1025x(2x9.81x2.5)^{0.5})]^{0.5}$$

D = 0.35 m or 350 mm

Where two tanks are breached simultaneously, for simplicity, the flow through each hole is assumed to be equivalent, hence, the flow is 0.205 m^3/s or 210 kg/s. The formula is rearranged as follows to determine the hole equivalent diameter:

$$D = [G/(Cd.(\pi/4).\rho.(2gh)^{0.5})]^{0.5}$$

$$D = [210/(0.6x0.7854x1025x(2x9.81x2.5)^{0.5})]^{0.5}$$

D = 0.25 m or 250 mm

It can be seen that the holes sizes that would result in water inflow into the tanks, that would overwhelm the ballast pumps, are considerable in size (350 mm for a single tank and 250 mm for holes in two tanks simultaneously). Damage to tanks which would result in holes of this magnitude would require considerable impact or corrosion degradation over an extended period (many years). Noting that the FDD will be subjected to regular maintenance and inspections, including independent inspections from AMSA, the likelihood of holes as a result of corrosion is low, if not negligible. Impact from external sources (other vessels) would be minimal as uncontrolled vessels in the area around the FDD (i.e. private craft accessing anchorages in the Berrys Bay area) are all small craft and collision with the FDD would not result in breach of the ballast tanks (i.e. 12mm thick steel or 9mm where corrosion allowance is included).

In addition, vessels that would have the capacity to result in damage to the FDD are required to be driven by licenced operators. In obtaining a licence, a vessel operator must pass a test, which includes knowledge of safe operating speeds. The vessel operator must ensure the vessel travels at a safe speed at all times. A safe speed gives sufficient time to stop or turn the vessel to avoid any sudden danger, such as a collision, injury to people, or damage to other vessel or infrastructure. A safe speed depends on many variables. These include the conditions, time of day, type of vessel, and the experience of the operator in command of the vessel. The operator of a vessel must ensure a safe speed is maintained at all times and must be constantly judged and adjusted as the vessel proceeds.

When judging a vessel's speed, the following requirements must always consider the following circumstances and conditions:

- visibility – for example, rain, fog, mist, smoke or glare;
- other vessels – on busy waterways and near moored or anchored vessels, commercial vessels displaying special signals, and large vessels that are restricted in their manoeuvrability;
- manoeuvrability of your vessel – in particular the distance it takes to stop or turn. Your manoeuvrability is affected by your speed, the wind and current, and the vessel's design;

- at night (between sunset and sunrise) – potential hazards may not be lit or easily seen, background lights on the shore – or even lights on your own vessel – can make it hard to see other vessels;
- navigation hazards – such as unmarked or unlit hazards, and signs, buoys, marks or lights that have moved or been damaged; and
- shallow water – water depth can vary and change frequently.

In these circumstances or conditions speed reduction and safer speeds must be considered by the operator, driving at speeds that are not safe for the conditions may result in licence cancellation. Based on this, it is considered unlikely in the confines of Berry's Bay that excessive speed would be a contributing factor to damage collision.

Larger vessels that are brought to the dock for docking would not result in collision with the ballast tanks as these would be submerged and clear of the docking vessel course. Whilst collision may occur, the docking vessel is under control conditions and would have fenders installed on the vessel sides to protect against impacts and damage.

Further, the Stability Assessment has been conducted based on the maximum capacity ship (1,000 tonnes) that can be docked in the FDD. As noted in **Section 3.3.4**, the installation of sound curtains limits the maximum size of vessel to around 600 tonnes, which is considerably less than the 1,000 tonne value used in the Stability Assessment.

In summary, the potential for breach of an FDD ballast tank during operations is considered low and the potential for the breach of two tanks simultaneously, that would result in inflow overwhelming the ballast pumps, is considered negligible.

Notwithstanding the assessment conducted in the section of the PHA, and the results of the Naval Architects assessment (Ref.9), it is noted that the integrity of the FDD ballast tanks is important in maintaining dock stability throughout it operation. As noted above, tank maintenance and inspection is important in maintaining ballast tank integrity. Whilst, the dock was repaired and refitted in November 2018, it has not been in regular use since this time. Although the Boatyard indicate that regular inspection and maintenance has been conducted on the dock in the lay-up period, **it is recommended that a full survey be conducted to confirm the FDD fit for purpose use at the Boatyard, including ballast tank condition**.

4.11.6 Equipment Failure – Uncontrolled Ingress of Sea Water in the Ballast tanks

A review of previous incidents associated with the operation of the FDD indicates that a valve on a ballast tank failed and allowed water to ingress into the tank resulting in the FDD listing and the movement of a keel block (i.e. the block that supports the vessel). This stability of the FDD and compliance with the stability criteria was maintained and there was no capsize of the dock. This event did not constitute a capsize, however, failure of two valves simultaneously may result in two flooded ballast tanks and failure to meet the stability criteria.

In order to minimise the potential for uncontrolled flooding of ballast tanks, level switches and alarms have been installed in each of the ballast tanks.

As an uncontrolled ballast tank flooding incident has occurred, this incident has been carried forward for consequence, frequency and the risk assessment to determine the risk of a failure of two valves simultaneously and failure to meet the stability criteria.

4.12 Ship Docking in the FDD - Ship Capsizes in the FDD

During the docking operations, ships that are being docked are floated into the FDD and aligned with the keel blocks, established along the pontoon deck of the FDD. As the FDD rises, the ships keel rests on the blocks and is supported by the blocks as it clears the water.

In the event the ship is misaligned with the keel blocks, there is a potential for the ship to slip from the blocks and capsize in the dock, resulting in instability of the dock and potential capsize of the dock, however, this is unlikely as the based on the maximum ship weight that may can be docked, the imbalance in the dock would be insufficient to cause the dock to capsize (Ref.9).

Notwithstanding the stability of the FDD under ship capsize conditions, there are a number of safeguards that are implemented to ensure the ship aligns with the docks and the potential for capsize is controlled, these include the following:

- Docking Plan - all docking operations will involve a details docking plan, which includes assessment of the ship to be docked and the required location of the keel blocks to ensure the stresses on the ships hull, associated with the docking are within the design parameters. All ships require docking at some stage in the shop's life, hence, the ship design includes the required location of keel blocks during the docking operation. The docking plan implemented by Noakes includes the optimum location of keel blocks based on the ships design parameters.
- Alignment Lines - once the ship has entered the dock it is aligned (fore and aft) using alignment lines. These lines stretch from the wings of the dock and are marked with a centre position. The bow and stern of the vessel are then aligned with the centre of the lines and the ship is secured by ropes to ensure is does not mode during the raising of the dock. The alignment of the vessel with the alignment lines is constantly monitored during the docking operation.
- Diver - as the FDD rises and the vessel approaches the keel blocks, the keel alignment with the blocks is monitored by a diver, who is employed to constantly monitor the keel and block alignment to ensure the keel is not misaligned when it rests on the blocks. The diver is in constant communication with the FDD master (i.e. the person in charge of the docking) via a sub-surface communication system.
- Hull Support Beams - as the ship's keel approached the keel blocks, side beams are deployed to prevent the vessel from capsizing in the dock. **Figure 4.4** shows the end elevation of the ship in the dock and the side stability beams deployed to hold the ship in position during the docking period. The side beams are solid steel section beams that are deployed and locked in place throughout the full docking period.

Based on the safeguards employed during the docking operation, the risk associated with the potential for ship capsize in the dock is negligible and no further risk reduction recommendation would be made regarding this operation. This event scenario is not carried forward for further analysis.

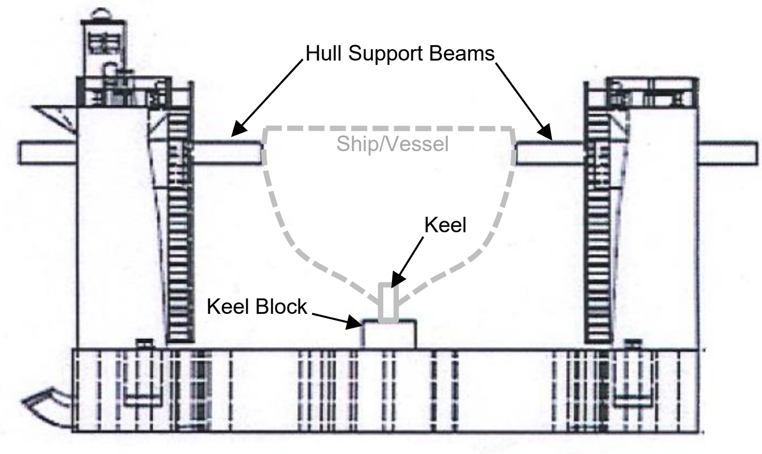


Figure 4.4: FDD Section showing Vessel on Keel Blocks and Supported by Hull Support Beams

4.13 Ship Docking in the FDD - Structural Overload & Failure of FDD

4.13.1 Background

The FDD will be used for docking vessels in several different configurations and operating conditions, as defined in MIL-STD1625D(SH). A structural assessment was conducted (Ref.9) to ensure the structural strength of the FDD is suitable for use in varying loading configurations and at different stages of the docking operation.

To assess the longitudinal strength of the FDD, three different types of docked vessels were used in the analysis and were selected as they were considered to provide the worst case loading scenarios during docking. The analysis was performed to determine whether the FDD bending moment is within acceptable limits when each of the vessels selected is in the dock (i.e. the maximum allowable bending moment and its corresponding deflection). The three types of vessels selected to represent typical vessels docked in the FDD were:

- 35 m Tug - represents the heaviest vessel that the FDD is rated to lift on the shortest keel block length;
- Huon Class Minehunter - represents the heaviest vessel that the FDD is rated to lift on the longest block length; and
- Paluma Class Surveying Ship - represents the heaviest catamaran type vessel that the FDD is rated to lift on the longest block length.

4.13.2 Strength of Materials Used in the Structural Assessment

FDD Analysis (Ref.9) used a material Yield Strength (YS) of 207 MPa and applied a Safety Factor of 1.67 to the analysis, resulting in a maximum suitable material strength of 124 MPa. This is considered conservative as typical medium strength carbon steels, used for structural applications, are in the order of between 250 MPa and 350 MPa. All steel used in refit work associated with the FDD refit and repair conducted at Harwood dockyard in November 2016, has a minimum yield strength of 285 MPa, which is commensurate with the typical medium strength steel used in structural applications. This was confirmed by review of the material specification & test sheets supplied by OneSteel, the plate suppliers.

In addition to the estimation of material strength, the FDD Analysis (Ref.9) also assumed a corrosion thickness allowance of 25%, which results in a material thickness reduction from the original thickness to 25% less. Hence, as an example, for an original 12 mm plate thickness, the assessment conducted in the structural strength analysis (Ref,12) used 9 mm plate. During the FDD "refit", conducted at Harwood Marine on the Clarence River, Northern NSW, a survey of structural plating was conducted and areas identified to be corroded were thickness tested (e.g. ballast tank bulkheads, working deck plates, etc.). The thickness testing was conducted by Harwood Marine to confirm material losses did not exceed 25% corrosion allowance. The assessment identified a number of locations where the thickness of structural plates were below 25% and for these locations Noakes specified plate replacement to ensure none of the affected areas were below the 25% limit. As an example, the full main pontoon deck was replaced with new steel. It is understood that those plates, where the corrosion allowance was below acceptable levels, were replaced such that the thickness of plates in all structural areas were above the 25% corrosion allowance.

4.13.3 Assessment Approach and Study Results

The assessment of the FDD structural strength was conducted using a Finite Element Analysis (FEA) approach. The assessment was conducted using Inventor^{TM} which uses ANSYS for the FEA calculations.

The result of the FEA assessment is summarised in **Table 4.4**. It can be seen from this table that the maximum suitable stress of 124 MPa is not exceeded for any of the docked vessels analysed in the structural strength analysis (Ref.9).

Table 4.4: Structural Assessment Results Summary (Ref.9)

Item	Load Category	Load Magnitude	Maximum Stress	Factor of Safety
Maximum allowable longitudinal bending moment	Single point load acting on dock mis-ships	1740 tonnes	124 MPa	1.67
Longitudinal bending moment from harbour tug	Harbour tug	1120 tonnes	53.6 MPa	3.9
Longitudinal bending moment from Huon Class Minehunter	Huon Class Minehunter	735 tonnes	15.1 MPa	13.7
Longitudinal bending moment from Paluma Class Surveying Ship	Paluma Class Surveying Ship	364 tonnes	21.0 MPa	9.8
Transverse strength substantiating maximum allowable pontoon deck loading (Phase 1 operation)	100% load on the centre line block	22.5 tonnes per linear foot	92 MPa	2.2
	50% load on the centre line block & 50% load on the side blocks		46.8 MPa	4.4
Transverse strength substantiating maximum	100% load on the centre line block		86.3 MPa	2.3

Item	Load Category	Load Magnitude	Maximum Stress	Factor of Safety
allowable pontoon deck loading (Phase 3 operation)	50% load on the centre line block & 50% load on the side blocks		44.8 MPa	4.6
Transverse strength substantiating maximum allowable pontoon deck loading (Phase 2.5 operation)	100% load on the centre line block		40.0 MPa	5.1
	50% load on the centre line block & 50% load on the side blocks		40.0 MPa	5.1
Maximum pontoon deck loading at other than keel block & side block location	Uniform load over the pontoon deck	7.9 tonnes per square metre	26 MPa	8.0
Longitudinal & transverse water-tight bulkhead	Hydrostatic head from water ballast	Hydrostatic head - 8.2m	64 MPa	3.2

4.14 Ship Docking in the FDD - Ballast Tanks Overfilled, FDD Sinks

During the docking process, the FDD ballast tanks are filled with seawater and the FDD is lowered to accept the ship to be docked. In most cases, the FDD will not require lowering to the full depth (i.e. all ballast tanks filled to lower the FDD to the maximum draft). In these cases, the ballast tank would only be partially filled and the docking operation would include the closing of ballast valves, at the required draft position, to prevent further ingress of water into the ballast tanks.

In the event of failure to close the ballast tank valves, the ballast tanks would continue to fill and the dock would continue to lower with the potential to reach a point where the FDD is submerged and contacts the harbour floor, disturbing sediments and resulting in potential, environmental damage.

To prevent this occurrence, the FDD has been designed with a fail-safe ballast system installed on ballast tanks 1, 3, 10 & 12. Each of these tanks are fitted with a reserve buoyance system, which maintains the FDD buoyancy in the event all ballast tanks are filled with sea-water. **Figure 4.5** shows a schematic diagram of the fail-safe buoyancy system employed in the FDD design.

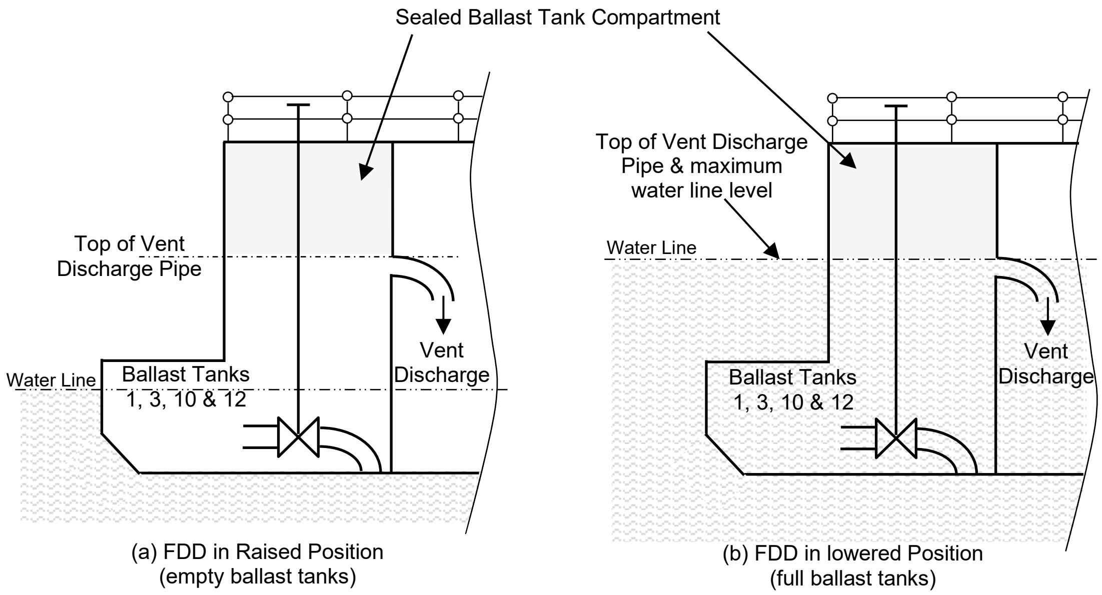


Figure 4.5: Fail Safe Buoyancy Design - Schematic Diagram

In **Figure 4.5**(a), the FDD is in the raised position and the ballast tanks are empty (no sea-water in the tanks). As the docking operation commences, the valves to the ballast tanks are opened, and sea-water enters the ballast tanks allowing the dock to be lowered. In the event the valves cannot be closed and water continues to enter the tanks, the FDD will continue to lower to a point where the vent discharge pipe is covered (see **Figure 4.5**(b)). At this point venting of the ballast tanks ceases and the remaining buoyancy in the reserve section of ballast tank retains the FDD buoyancy and prevents it sinking and striking the bottom of the harbour. The FDD design indicates that the maximum draft at this point is 8.68m (i.e. tanks fully ballasted).

The area to the west of the Boatyard, in Berrys Bay where the docking operations will be conducted, has a minimum depth of 10m from the harbour water surface level to the harbour floor, at low tide. Hence, in an emergency, the FDD can be towed by tug into the deeper section of the Berrys Bay where there is adequate clearance between the bottom of the FDD at maximum draft and the harbour floor, such that no contact with the harbour floor would occur and there would be no sediment disturbance as the result of a maximum draft event. Noting that ballasting operations take Over 30 minutes to complete and that a tug is available during FDD operations in the event of an emergency, this operation can be effectively completed should valve failure dictate the need to tow the FDD into the deeper water.

Based on the results of this assessment no further analysis is conducted for this incident scenario.

4.15 Vessel (ship) Fire in the Floating Dock (fuel/hull Fire)

4.15.1 Fuel Fire – Diesel Fuel Fire in the Vessel (Ship) in the FDD

Fuel is held within tanks internally within vessels (ships) located in the dock. In the event of a fuel tank leak, the fuel will accumulate in the ships “bilge” and would not be released beyond the internal area of the ship. Noting that diesel fuel is a combustible liquid, its flash point is higher than 60°C, hence, it does not vaporise at temperatures below this value. Combustible liquids do not ignite readily and usually require external heating to raise the liquids above the flash point before ignition occurs.

Notwithstanding this, in the unlikely event of ignition, the fire may grow resulting in an engine room fire (location of the diesel tanks) and growth of the fire to the deck and hull of the vessel; (ship). This would result in a major fire on the FDD and potential to radiate heat to the surrounding areas. This fire has therefore been carried forward for consequence analysis.

4.15.2 Fibre-Glass Fire – Hull Fire in the Vessel (ship) in the FDD

A review of the "literature" associated with fire in thick fibre-glass hull vessels, indicates that the fibre-glass is not in itself flammable and contains fire retardant additives to assist in controlling fire initiation and growth. Whilst the base resins used for the manufacture of fibre-glass (e.g. epoxy and polyester resins) are classified as flammable materials, the fixed resin within the fibre-glass material is not flammable. Whilst the fibre-glass material is not flammable, it is combustible and may catch fire under certain conditions.

The main reason for docking of vessels (ships/boats) in the FDD is to provide access to the hull for repairs and maintenance of underwater surfaces, equipment and fittings. This may require maintenance/repairs (welding, cutting & grinding) to metal components, operations that could result in ignition of fibre-glass hulls of vessels (ships/boats) with constructed from that type of material.

In the event of fire, maintenance/repair personnel would be present to respond and apply first attack fire-fighting, minimising the likelihood of fire growth beyond a minor event. It is noted that Noakes has implemented a "hot work" permit system for work on the FDD, as part of its Safety Management System, which requires a fire watch for all hot work operations (i.e. welding, cutting, grinding). A fire watch maintains a close inspection of the areas around the "hot-work" during and after (completion of) the work. Hence, in the event of an ignition as a result of hot work, the fire watch can apply first-attack fire-fighting to prevent fire growth.

In the unlikely event of a continuing fire in the fibre-glass hull materials of vessels (ships/boats) in the dock. The fire may grow to involve a large section of the vessel (ship/boat) before the combat agency (e.g. Fire & Rescue NSW or FRNSW) arrives to control the fire. This may result in an impact beyond the site boundary in the direction of the adjacent occupied land uses. This incident has therefore been carried forward for consequence analysis.

5.0 Consequence Analysis

5.1 Incidents Carried Forward for Consequence Analysis

The detailed Hazard Analysis, conducted in **Section 4**, identified a number of incidents that have the potential to impact offsite. These incident have been carried forward for consequence assessment to determine whether the consequence criteria published in HIPAP4 (Ref.5) are exceeded.

Those incidents carried forward for consequence analysis are:

- Paint Container (5 L) on FDD - Paint Release, Ignition and Fire;
- Paint Container (20 L) on FDD - Paint Release, Ignition and Fire;
- Diesel Tank Refuelling - Fuel Spill, Ignition and Fire;
- Diesel Fuel System Leak - Fuel Spray, Ignition and Fire;
- Ballast valve failure – uncontrolled ingress of sea water into ballast tanks resulting in potential capsize; and
- Vessel Fire – diesel fuel fire or hull fire involving major vessel fire in the FDD.

Each incident has been assessed for consequence impact in the following sections.

5.2 Paint Container (5 L) on FDD - Paint Release, Ignition and Fire

The Hazard Analysis conducted in **Section 4.4** indicates that the maximum container size that could spill outside the bunded paint container area is 5 L. The analysis identified that in the event of a spill of the full container contents, the paint would spread to form a pool of 0.89 m diameter. In the event of an ignition a pool fire would occur radiating heat to the surrounding areas.

In order to assess the heat radiation impact, fire impact modelling was performed using the “Effects” model was used (see **Section 2.3**). The following inputs were required for the model:

- Material - Acetone (this material was used as it is the flammable component of the paint);
- Pool Diameter - 0.89 m (based on a 5 L spill with a pool depth of 8mm);
- Ambient Temperature - 20°C; (representative temperature used for preliminary assessment)
- Wind Speed - 2 m/s (representative wind speed used for preliminary assessment)
- Humidity - 60% (representative humidity used for preliminary assessment)

This data was input to the “Effects” model with the resultant heat radiation impacts shown in **Figure 5.1**. Noting that the wind direction has been input to the model from the left of the fire (shown in **Figure 5.1**), as the wind changes direction the flame will be blown in the direction of the wind. Hence, the overall fire impact at the closest point to the edge of the FDD showing the heat radiation fire envelope to a value of 4.7 kW/m^2 is shown in **Figure 5.2**.

Note that a value of 4.7 kW/m^2 is the maximum suitable heat radiation at the site boundary, above which further assessment for frequency and risk is required.

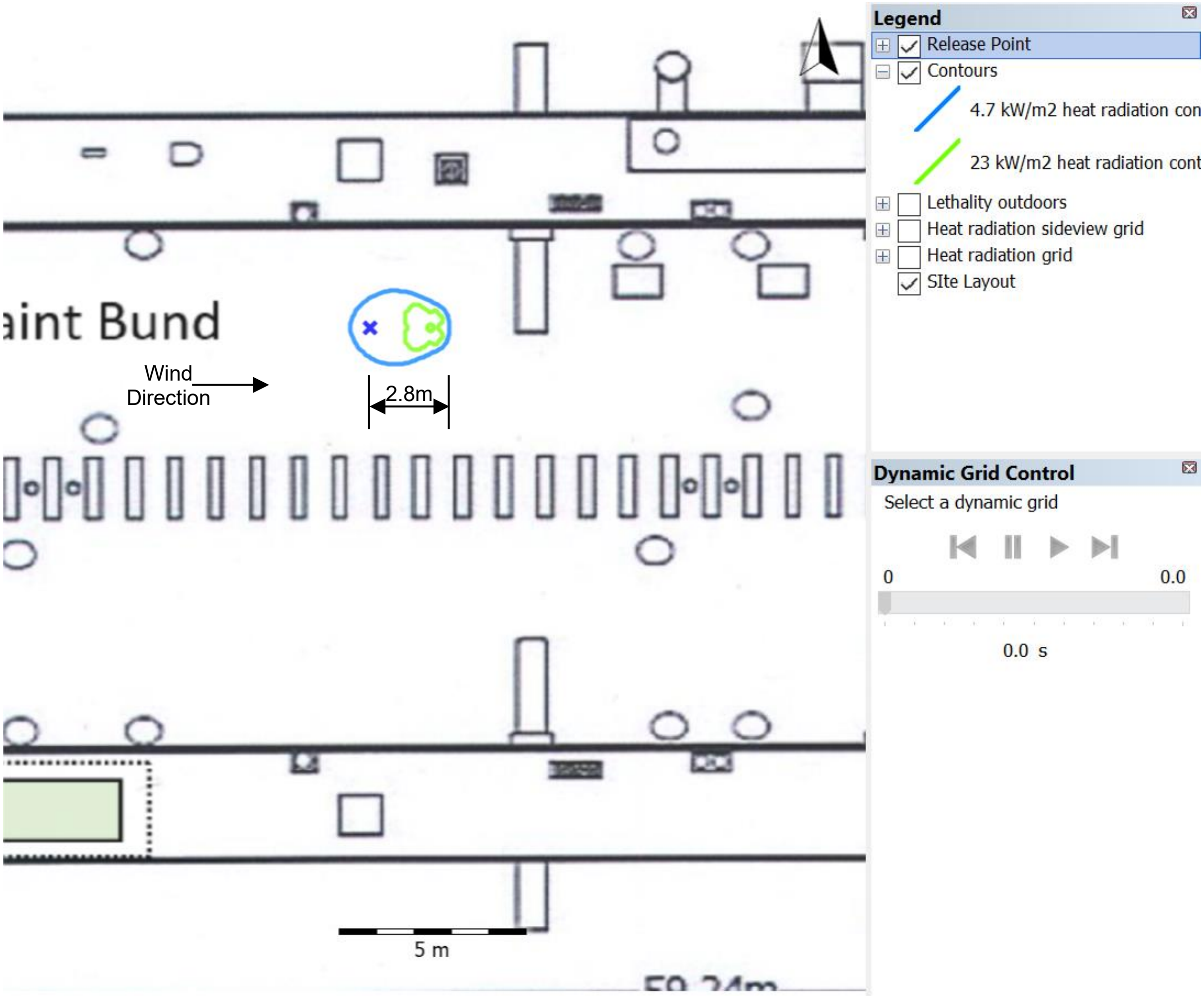
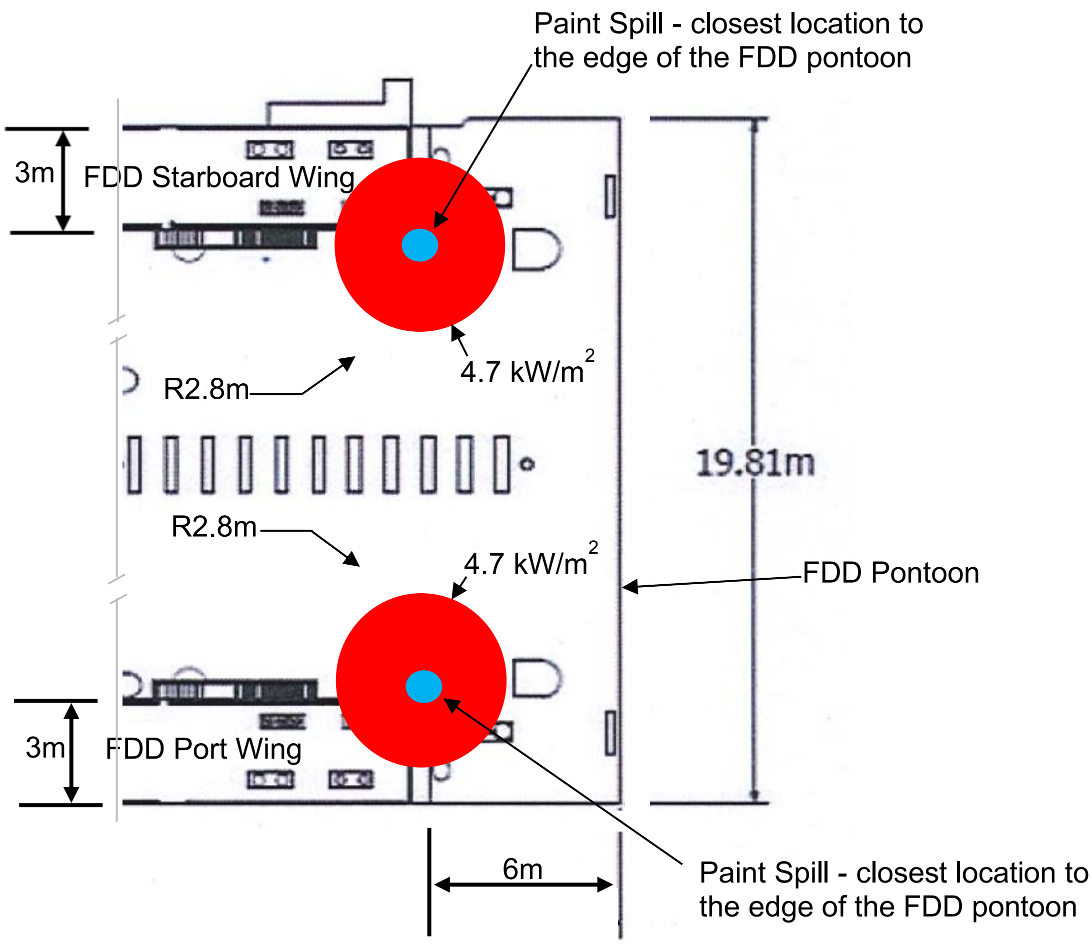


Figure 5.1: Heat Radiation Impacts - Paint Spill (5 L Container, ignition and Fire)



FDD AFT END PLAN

Note: “Fwd” end plan is identical to the aft end plan, spills at the “Fwd” end are the same as illustrated in the plan above.

Figure 5.2: Heat Radiation Impacts - Paint Spill (5 L Container, ignition and wind affected fire)

It can be seen from **Figure 5.2** that the heat radiation impact to a level of 4.7 kW/m^2 extends a maximum of 2.8m from the fire centre. At this impact distance a heat radiation of 4.7 kW/m^2 would not extend beyond the edge of the FDD pontoon deck. Noting that the closest land boundary from the edge of the FDD pontoon deck, in its operational position, is the to the north and is around 20m from the edge of the FDD pontoon. This location is accessible by residents and public users.

Based on this analysis, the 4.7 kW/m^2 heat radiation contour does not extend beyond the boatyard property boundary and, hence, meets the risk criteria published in HIPAP4 (Ref.5). No further assessment of the paint spill scenario (5 L container) is performed as the acceptable criteria is not exceeded.

5.3 Paint Container (20 L) on FDD - Paint Release, Ignition and Fire

The Hazard Analysis conducted in **Section 4.5** indicates that the two (2) lager containers (20 L) are held in a bunded location adjacent to the FDD wing bulkhead. In the event of a spill of 20 L of paint from a full paint drum, the liquid would fill the bund and if ignited would result in a bund fire. The bund has dimensions of 1 m x 1 m, which results in an equivalent pool diameter of 1.13 m.

In order to assess the heat radiation impact, fire impact modelling was performed using the "Effects" model was used (see **Section 2.3**). The following inputs were required for the model:

- Material - Acetone (this material was used as it is the flammable component of the paint);
- Pool Diameter - 1.13 m (bund area = 1 m x 1 m, equivalent diameter is 1.13 m)
- Ambient Temperature - 20°C; (representative temperature used for preliminary assessment)
- Wind Speed - 2 m/s (representative wind speed used for preliminary assessment)
- Humidity - 60% (representative humidity used for preliminary assessment)

This data was input to the "Effects" model with the resultant heat radiation impacts shown in **Figure 5.3**. Noting that the wind direction has been input to the model from the left of the fire (shown in **Figure 5.3**), as the wind changes direction the flame will be blown in the direction of the wind. Hence, the overall fire impact at the closest point to the edge of the FDD showing the heat radiation fire envelope to a value of 4.7 kW/m^2 is shown in **Figure 5.4**.

Note that a value of 4.7 kW/m^2 is the maximum suitable heat radiation at the site boundary, above which further assessment for frequency and risk is required.

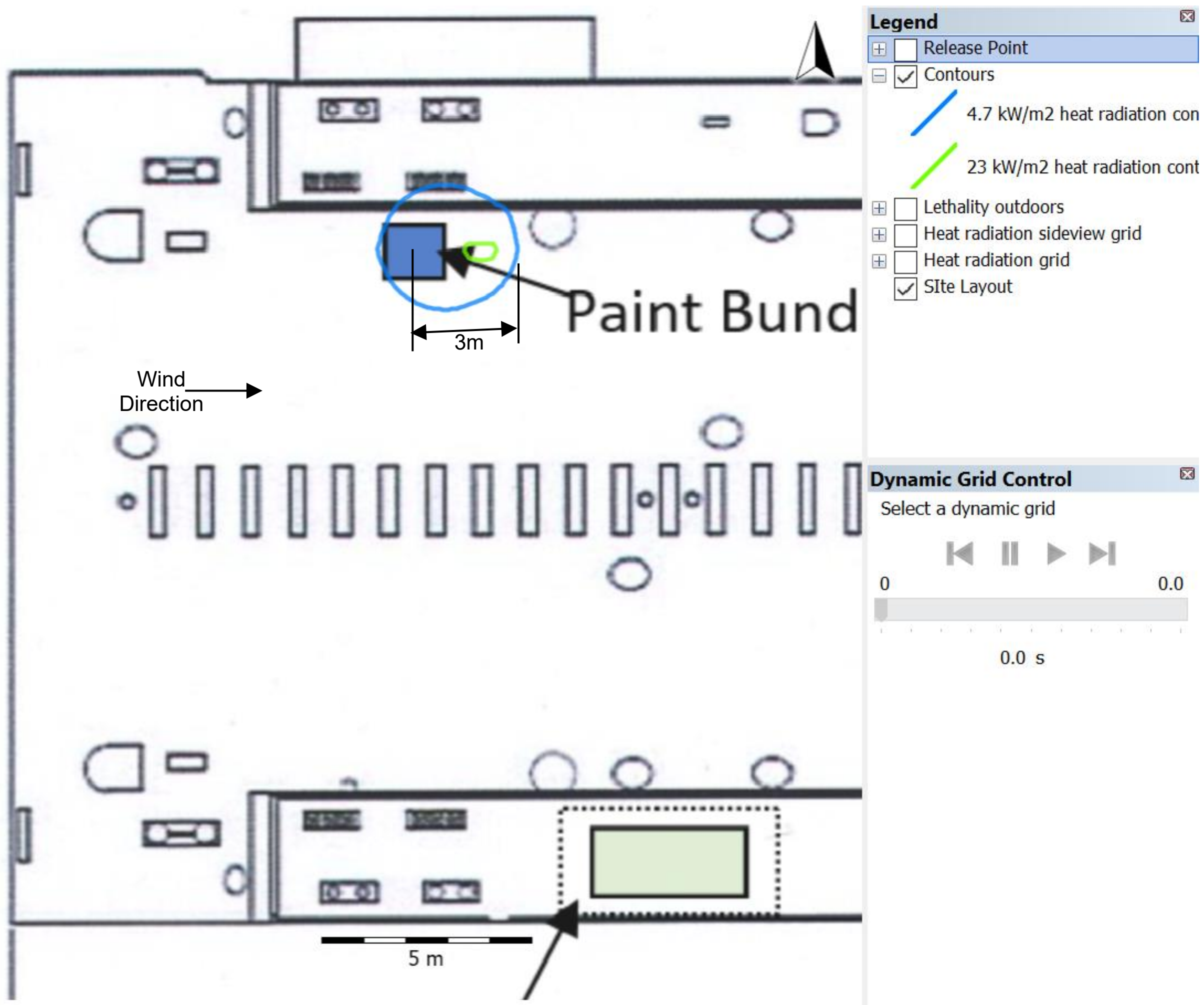
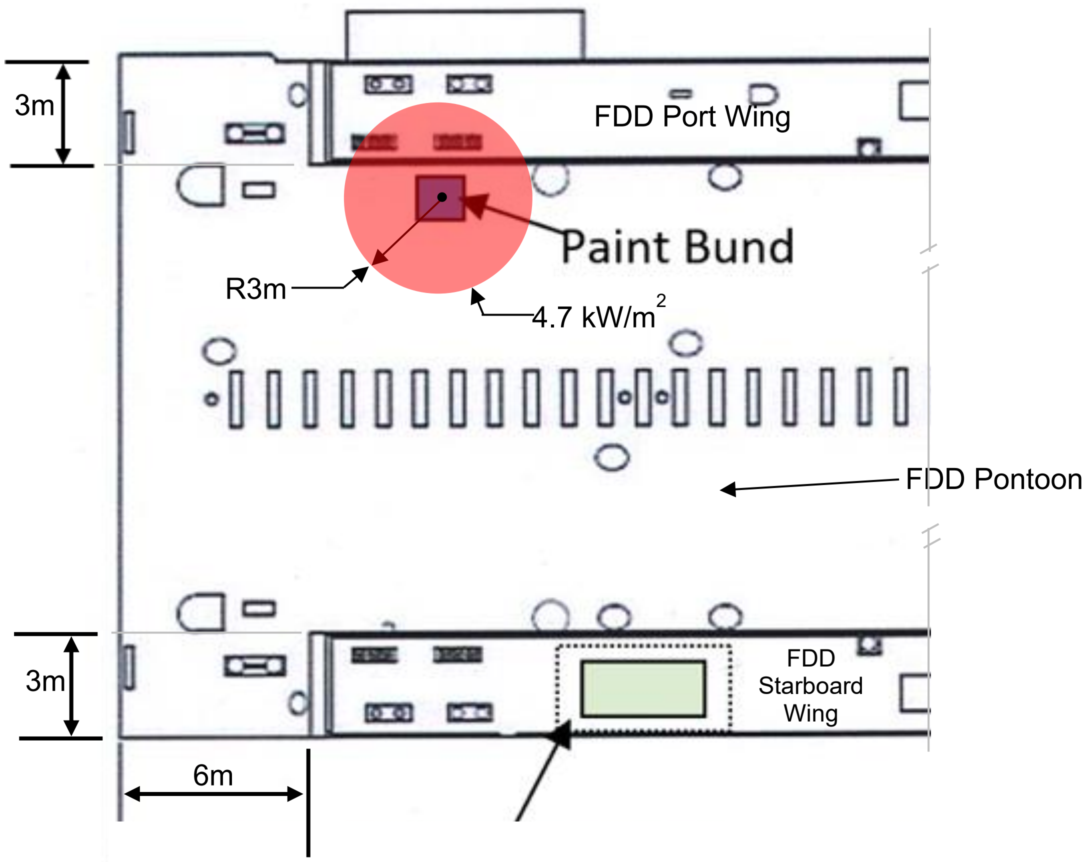


Figure 5.3: Heat Radiation Impacts - Paint Spill (20 L Container into the bund, ignition and Fire)



FDD AFT END PLAN

Figure 5.4: Heat Radiation Impacts - Paint Spill (5 L Container, ignition and wind affected fire)

It can be seen from **Figure 5.4** that the heat radiation impact to a level of 4.7 kW/m^2 extends a maximum of 3m from the fire centre (the bund). At this impact distance a heat radiation of 4.7 kW/m^2 would not extend beyond the edge of the FDD pontoon deck. Noting that the closest land boundary from the edge of the FDD pontoon deck, in its operational position, is the to the north and is around 20m from the edge of the FDD pontoon. This location is accessible by residents and public users.

Based on this analysis, the 4.7 kW/m^2 heat radiation contour does not extend beyond the boatyard property boundary and, hence, meets the risk criteria published in HIPAP4 (Ref.5). No further assessment of the paint spill scenario (20 L container in the bunded area) is performed as the acceptable criteria is not exceeded.

5.4 Diesel Tank Refuelling - Fuel Spill, Ignition and Fire

The Hazard Analysis conducted in **Section 4.7** indicates that in the event of a diesel fuel spill during refuelling of the diesel engine fuel storage tank, the fuel would be contained within the area around the transfer point by the spill containment components established as part of the diesel refuelling operation. In the event of an ignition of the diesel, a pool fire would result, radiating heat to the surrounding areas. The spill area has dimensions 5m x 3m with an equivalent pool diameter of 4.4m.

In order to assess the heat radiation impact, fire impact modelling was performed using the "Effects" model was used (see **Section 2.3**). The following inputs were required for the model:

- Material - Diesel fuel (material characteristics directly available in the "Effects" model);
- Pool Diameter - 4.4 m (spill containment area = 5 m x 3 m, equivalent diameter is 4.4 m)
- Ambient Temperature - 20°C; (representative temperature used for preliminary assessment)
- Wind Speed - 2 m/s (representative wind speed used for preliminary assessment)
- Humidity - 60% (representative humidity used for preliminary assessment)

This data was input to the "Effects" model with the resultant heat radiation impacts shown in **Figure 5.5**. Noting that the wind direction has been input to the model from the left of the fire (shown in **Figure 5.5**), as the wind changes direction the flame will be blown in the direction of the wind. Hence, the overall fire impact at the diesel fuel area, showing the heat radiation fire envelope to a value of 4.7 kW/m^2 is shown in **Figure 5.6**.

Note that a value of 4.7 kW/m^2 is the maximum suitable heat radiation at the site boundary, above which further assessment for frequency and risk is required.

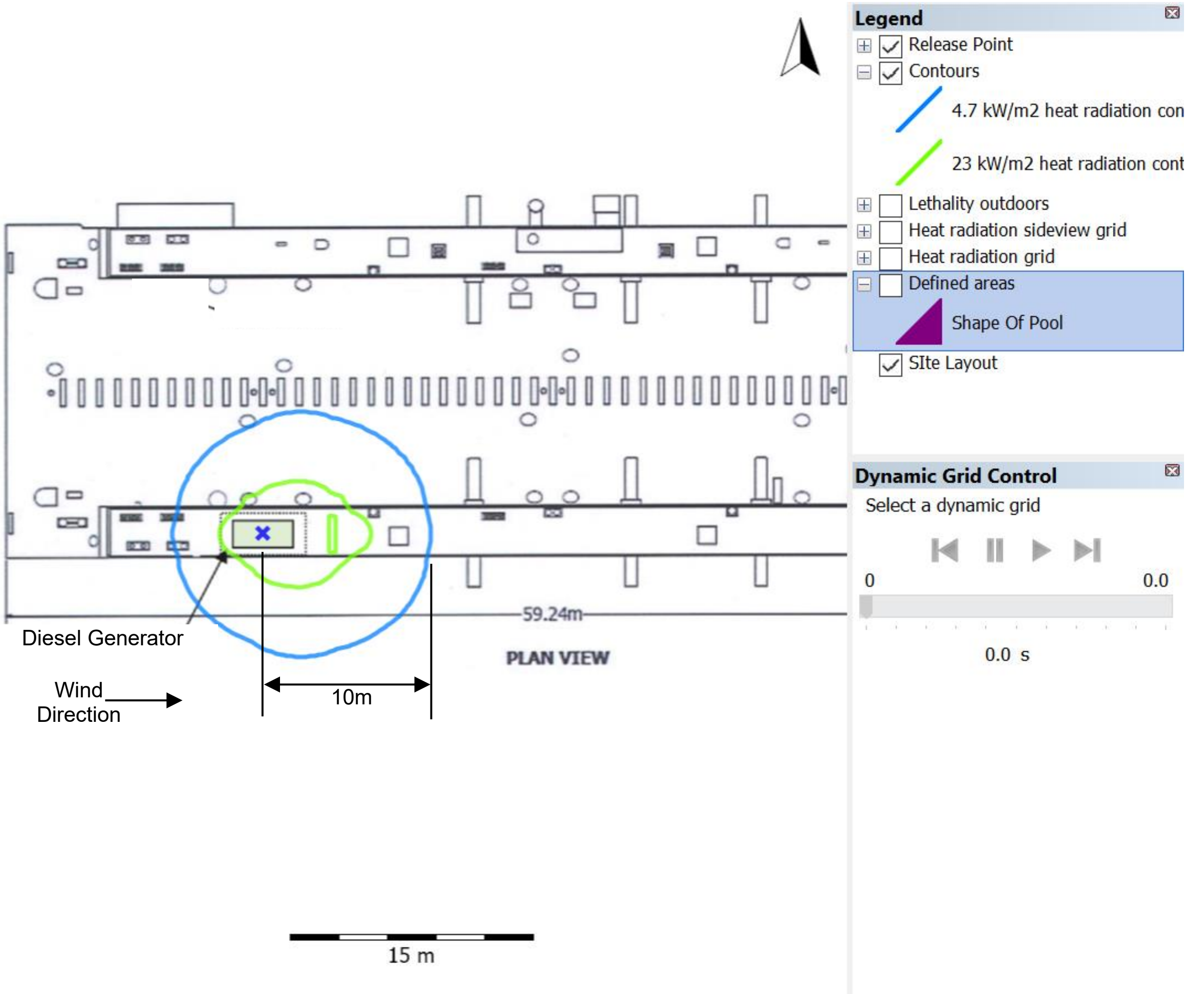


Figure 5.5: Heat Radiation Impacts - Diesel Fuel Spill (Diesel refuelling, ignition and Fire)

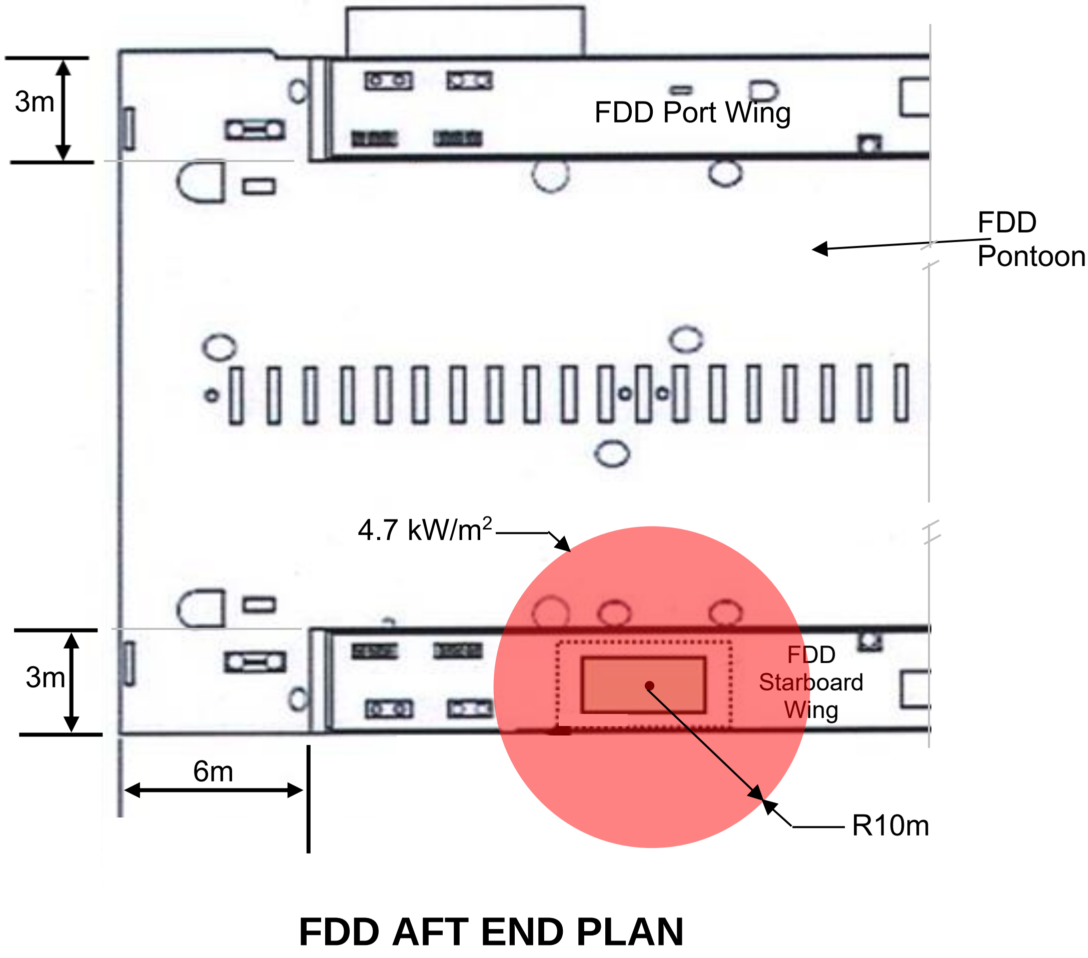


Figure 5.6: Heat Radiation Impacts - Paint Spill (5 L Container, ignition and wind affected fire)

It can be seen from **Figure 5.6** that the heat radiation impact to a level of 4.7 kW/m^2 extends a maximum of 10m from the fire centre (diesel generator). At this impact distance a heat radiation of 4.7 kW/m^2 extend beyond the edge of the FDD wing deck by around 8.5m. Noting that the closest land boundary from the edge of the FDD pontoon deck, in its operational position, is the to the north and is around 20m from the edge of the FDD pontoon. The distance from the diesel generator location to the edge of the pontoon deck, in the direction of the closest land boundary, is 18m and the total separation distance from the diesel generator location to the closest land boundary is around 38m. The closest land boundary is accessible by residents and public users.

In the westerly direction, the boatyard lease boundary is located around 20m from the side of the FDD. Noting that the 4.7 kW/m^2 contour extends around 8.5m from the side of the FDD, this contour does not extend beyond the lease boundary of the boatyard.

Based on this analysis, the 4.7 kW/m^2 heat radiation contour does not extend beyond the closest boatyard property boundary to the north, where residents public access is possible or to the closest boatyard lease to the west. Hence, the fire consequence does not exceed the risk criteria published in HIPAP4 (Ref.5). No further assessment of the diesel spill and potential fire scenario (diesel refuelling operation) is performed as the acceptable criteria is not exceeded.

5.5 Diesel Fuel System Leak - Fuel Spray, Ignition and Fire

A review of the diesel fuel system leak indicates that the leak would result in a fire at the diesel engine contained within the envelope of the engine (i.e. within the engine bunded compartment). The engine bunded compartment, contained within the overall engine enclosure, is 1 m x 1 m, which results in an equivalent fire diameter of 1.13 m.

In order to assess the heat radiation impact, fire impact modelling was performed using the “Effects” model was used (see **Section 2.3**). The following inputs were required for the model:

- Material - Diesel fuel (material characteristics directly available in the “Effects” model);
- Pool Diameter - 1.13 m (diesel engine bund area = 1 m x 1m, equivalent diameter is 1.13 m)
- Ambient Temperature - 20°C; (representative temperature used for preliminary assessment)
- Wind Speed - 2 m/s (representative wind speed used for preliminary assessment)
- Humidity - 60% (representative humidity used for preliminary assessment)

This data was input to the “Effects” model with the resultant heat radiation impacts shown in **Figure 5.7**. Noting that the wind direction has been input to the model from the left of the fire (shown in **Figure 5.7**), as the wind changes direction the flame will be blown in the direction of the wind. Hence, the overall fire impact at the diesel fuel area, showing the heat radiation fire envelope to a value of 4.7 kW/m^2 is shown in **Figure 5.8**.

Note that a value of 4.7 kW/m^2 is the maximum suitable heat radiation at the site boundary, above which further assessment for frequency and risk is required.

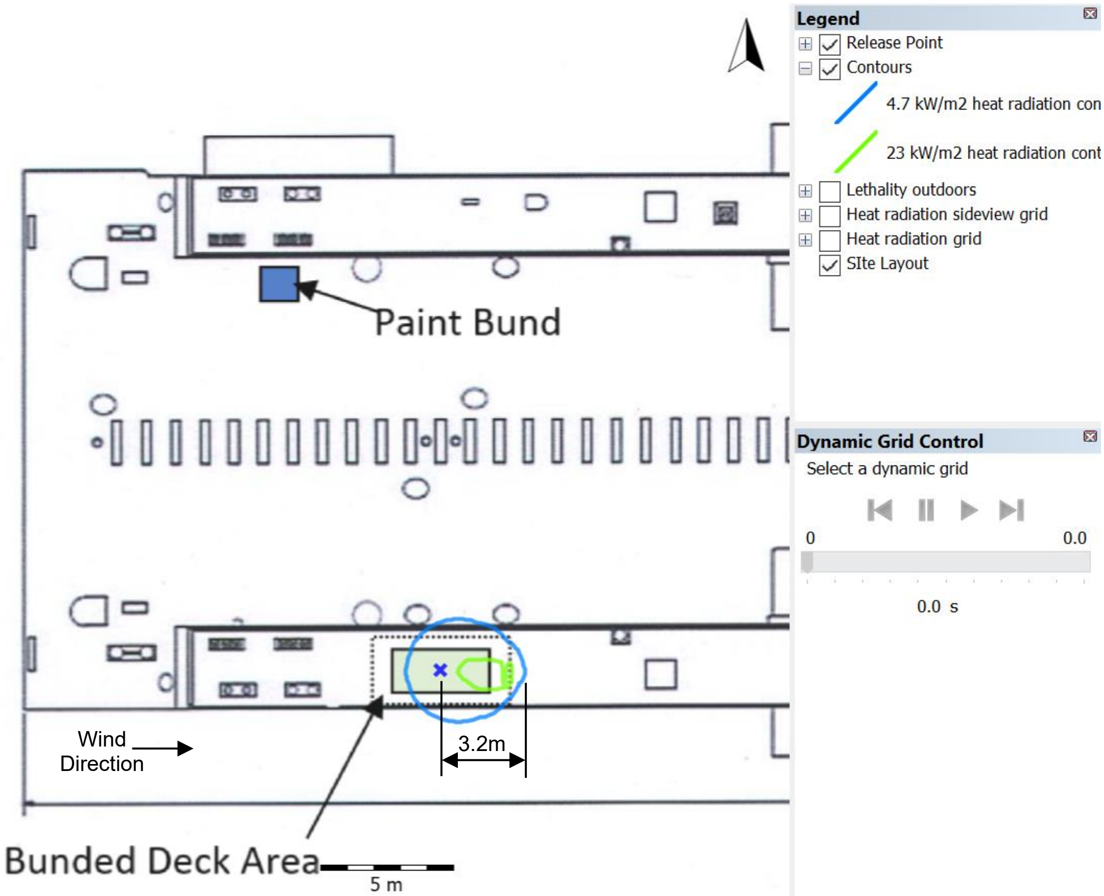


Figure 5.7: Heat Radiation Impacts - Diesel Engine Fuel Fire (Diesel system leak, ignition and Fire)

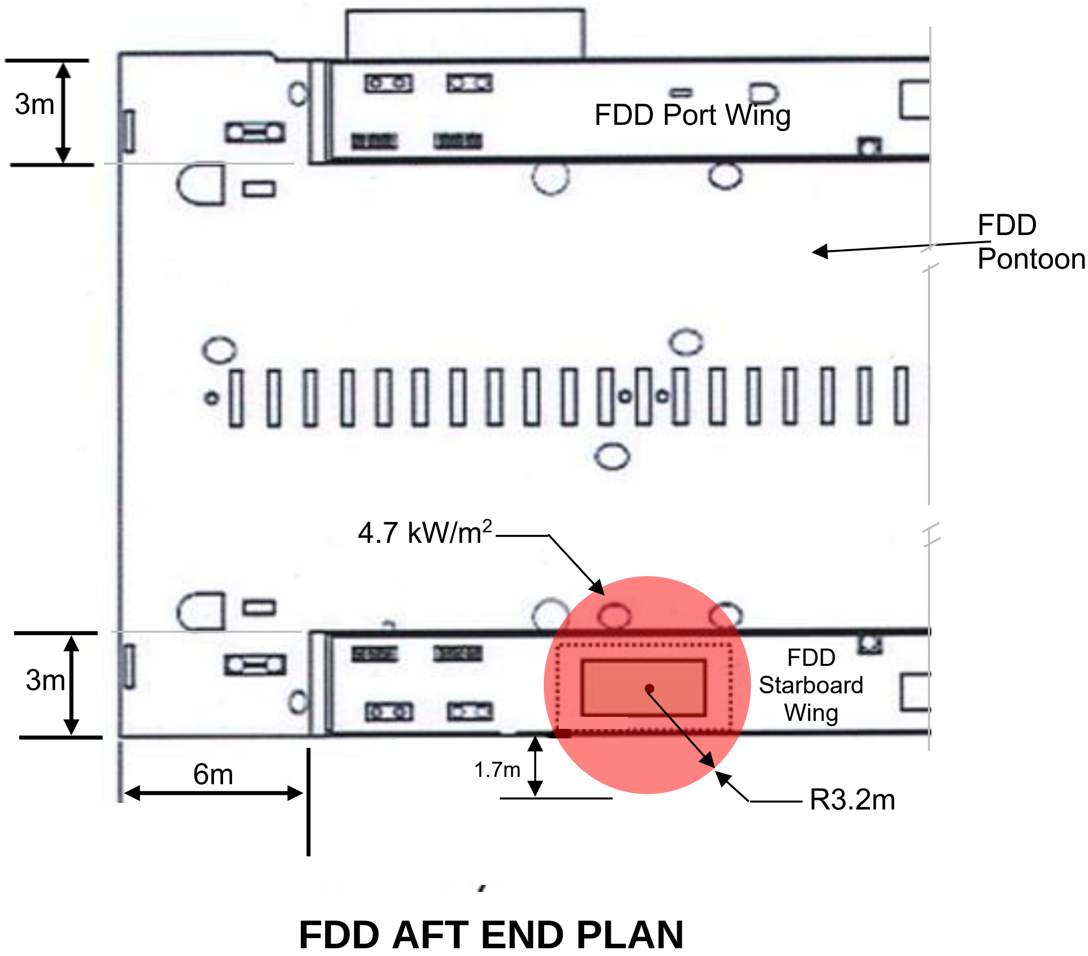


Figure 5.8: Heat Radiation Impacts - Diesel Engine Fire (Fuel Leak , ignition and wind affected fire)

It can be seen from **Figure 5.8** that the 4.7 kW/m^2 heat radiation contour extends over the side of the FDD wing by a distance of around 1.7m. Noting that the closest land boundary from the edge of the FDD pontoon deck, in its docking position, is the to the north and is around 40m from the edge of the FDD pontoon and the distance from the diesel generator location to the edge of the pontoon deck, in the direction of the closest land boundary, is 18m, the total separation distance from the diesel generator location to the closest land boundary is around 58m. The closest land boundary is accessible by residents and public users.

The diesel generator is only used during the docking operation (i.e. pumping the ballast tanks) when the FDD is in the lowered position adjacent to the boatyard lease boundary in Berrys Bay. The side of the FDD is located on the dock lease boundary and, hence, the 4.7 kW/m^2 heat radiation contour extends 1.7m into the bay, beyond the lease boundary.

Based on the potential for the 4.7 kW/m^2 heat radiation contour to extend beyond the boatyard lease boundary, this incident has been carried forward for frequency and risk analysis.

5.6 Ballast Tank Valve Failure – Uncontrolled Ballast Tank Flooding

In the event of an uncontrolled ballast tank event, as a result of a ballast tank valve failure, at least two valves would be required to fail simultaneously resulting in two ballast tanks flooding. This event would result in list to port or starboard and a trim angle error, with the potential for eventual capsize of the dock. This event would result in the dock striking the harbour floor causing disturbance to the potentially contaminated sediments and impact the local; environment.

Whilst this event is unlikely, it cannot be discounted, hence, it has been carried forward for frequency and risk analysis.

5.7 Vessel (Ship/Boat) Fire – Diesel Fuel Fire/Fibre Glass Hull Fire

5.7.1 Heat Radiation Impact from Combustible Materials Fires in the FDD

In the event of a diesel fuel leak and ignition within the vessel or an external hull fire as a result of maintenance/repair work, there is a potential for an initiating fire to grow resulting in a significant section of the vessel to catch fire before the combat agency arrives.

A conservative estimate that 50% of the largest vessel in the dock catches fire has been made and modelled to determine the heat radiation impact to the surrounding areas. **Figure 5.9** shows the postulated fire in the FDD. It is noted that restrictions in vessel length, due to containment curtains, limits the fire dimensions. The fire has been modelled as a pool under the vessel with a dimension of 23m diameter. The pool has conservatively been estimated to contain "benzene" a flammable liquid with a fast burn down rate, resulting in a high intensity fire.

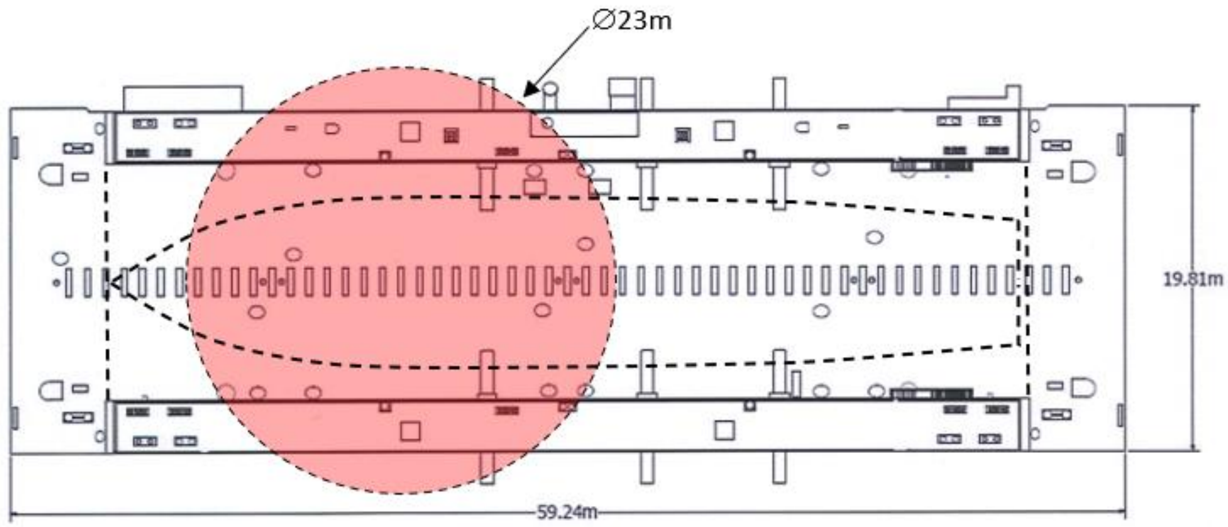


Figure 5.9: Postulated Vessel Fire in the FDD (Ship/Boat Fire in the Fibre-Glass Hull)

The fire was modelled using the "Effects" computer modelling program (see **Section 2.3**) using the following inputs:

- Fire Type – pool fire;
- Pool diameter – 23m;
- Burning Fuel – diesel;
- Flame Surface Emissive Power* – 26.7 kW/m^2 (Ref.15).

* The surface emissive power of the flame was estimated using the approach recommended in Cameron & Raman (Ref.15, Page 217).

The Effects model indicates that the heat radiation impact distances are as follows:

- 23 kW/m^2 –15m from the flame centre,
- 4.7 kW/m^2 – 32m from the flame centre.

HIPAP 4 (Ref.5) indicates that a heat radiation contour of 4.7 kW/m^2 should not extend beyond the site boundary where the sensitive land uses are located (Residential area) at a value that exceeds 50 chances in a million per year. The results of the assessment are shown in **Figure 5.10**, which includes a plot of the heat radiation impacts towards the closest residential property to the north.

Figure 5.10: Heat Radiation Impacts – Vessel (Ship/Boat) Fire in the Fibre-Glass Hull

It can be seen from **Figure 5.10** that the 4.7 kW/m^2 heat radiation contour does not extend beyond the site into the residential area to the north, east or south of the site, hence, the heat radiation impact criteria is not exceeded and no further assessment is required for this event.

5.7.2 Toxic Smoke Impacts from Fires in the FDD

Fibreglass is principally composed of hydrocarbons with a range of additives including aluminium oxides, Boric oxides, calcium oxides, and magnesium oxides. Trace elements of irons, sodium, sulphurs and fluorides are also present but are all less than 1% in total (Ref.20). The hydrocarbons in fibreglass are as a result of the organics and binders in the form of epoxy or polyester based materials. The combustion products of epoxy and polyester based materials result in the development of carbon dioxide, carbon monoxide, nitric oxides, and a range of hydrocarbon gases. Boating industry fibreglass materials tend to contain a higher content of organic materials, which generate substantial carbon monoxide emissions during the fire (Ref.20).

The mechanisms active in fire plume generation and subsequent dispersion are complex, however, the predominant mechanism is the buoyancy of the plume generated by the convective heat from combustion. In most cases the convective to radiative heat contributions from the heat of combustion exceeds a ratio of 2 to 1 (Ref.20). Hence, there is a very strong upwards lift of smoke as well as products of combustion that subsequently interacts with the ambient conditions during the plume rise.

Where strong winds are prevalent at the time of fire, the heat of combustion will initially drive the smoke vertically and the strong wind conditions will disperse the smoke, and any toxic components, resulting in dispersion of the smoke before the plume returns to ground level. However, where calm conditions occur, the smoke plume will tend to rise, driven by the heat of combustion, with little dispersion. Under these conditions, there is a potential form the smoke and toxic components in the plume to return to ground level at higher concentrations. Based on this an assessment of the products of combustion from two fibreglass fires has been conducted to determine the ground level concentrations downwind of the fires. The two fires modelled are:

- Initiating Fire – in the event of a fire commencing as a result of maintenance activities on the vessel, personnel at the boatyard would initiate first-attack fire-fighting which may extinguish the fire. During the initial fire stages, a smaller quantity of fibreglass would be involved in the fire, which has conservatively been estimated to be a 1,000 kg (1 tonne), which is equivalent to a fire area of 117.5m^2 (12 m x 9.8 m) This fire may burn for some time before it is extinguished, hence, the smoke plume has been assessed using the 1,000kg fire load.
- Extended Fire – in the event first attack fire-fighting and Combat Agency (Fire & Rescue NSW) fails to control the fire, the fire may grow consuming larger quantities of fibreglass to a point where large sections of the vessel hull are involved in the fire. A larger fire involving 10,000 kg (10 tonnes) has been modelled in this case, which would involve a fire area of 1175 m^2 (120m x 9.8 m). This fire area would cover both sides of a larger vessel from the keel to the gunwale (top edge of the hull) along the full length of the vessel.

Both fires have been modelled using the “Effects” program (see **Section 2.3**). The program requires an input consisting of the mass of fibreglass involved in the fire and the fibreglass constituents. As noted above, the predominant materials in the fibreglass are hydrocarbon based, hence, the constituents in a typical fibreglass material have been selected as shown in **Table 5.1** based on fibreglass constituents detailed in the Characterisation of Air Emissions from Simulated Open Combustion of Fibreglass (Ref.21).

Table 5.1: Composition of Fibreglass Material (Ref.20)

Material	% Constituent (Boating Industry Fibreglass with gel coat)
Carbon	81.61
Hydrogen	7.38
Oxygen	10.94
Nitrogen	0.03
Sulphur	0.05
Chlorine	0.77

(Notes: trace metals (<0.2%) are not of sufficient quantity to factor in the development of toxic products of combustion)

The "Effects" model indicates that, based on the above constituents, the main toxic gases released are Nitrogen Dioxide (NO_2), Sulphur Dioxide (SO_2) and hydrogen chloride (HCl). The two fires detailed in the dot points above have been modelled using calm conditions (F1.5 Pasquil-Gifford conditions) such that the minimum dispersion occurs and the maximum downwind concentration results.

The toxic plumes are plotted on graphs showing the plume height, the plume cross-section and the plume concentration at three selected values; PAC1, PAC2 and PAC3. PACs relate to the Protection Action Criteria (PAC), which is a hierarchy-based system of three common public exposure guideline systems, namely:

- AEGL – Acute Exposure Guideline Levels;
- ERPG – Emergency Response Planning Guidelines; and
- TEEL – Temporary Emergency Exposure Limits.

For this study, the PAC values published in the EMI SIG Data Base (Ref.21) were used and are summarised in **Table 5.2**.

Table 5.2: PAC Values used in the Study (Ref.21) & TWA (Ref.22) - Toxic Combustion Gases

Toxic Product of Combustion	PAC1	PAC2	PAC3	TWA*
Nitrous Oxide (NO_2)	0.5 ppm	12 ppm	20 ppm	3 ppm
Sulphur Dioxide (SO_2)	0.2 ppm	0.75 ppm	30 ppm	2 ppm
Hydrogen Chloride (HCl)	1.8 ppm	22 ppm	100 ppm	5 ppm

* Time Weighted Average (TWA) – maximum permissible airborne concentration of a substance when exposed over an eight hour working day for a 5 day working week.

5.7.2.1 Fibreglass Fire – 1 tonne Mass

The following fire parameters were input to the "Effects" Model:

- Mass of Fibreglass – 1 tonne
- Area of Fire - 117.5 m^2
- Chemicals - Carbon 81.61%
  Hydrogen 7.38%
  Oxygen 10.94%
  Nitrogen 0.03%
  Sulphur 0.05%

Chlorine 0.77%

- Pasquil-Gifford (Wind Weather Data) F 1.5

The release rate for the toxic products of combustion are shown in **Table 5.3**:

Table 5.3: Toxic Products of Combustion Release rate – 1 tonne Fibreglass Fire (Ref.23)

Chemical	Rate (kg/s)
Nitrogen dioxide	0.0011
Sulphur Dioxide	0.0079
Hydrogen chloride	0.068

The toxic plume side view for the three toxic products of combustion are shown in **Figures 5.11**, **5.12** and **5.13**. These figures include three cross sections of the McMahons Point area showing distance and height of the land to the east and north of the Noakes Boatyard. The location of the land cross sections are shown in **Appendix B**.

NITROGEN DIOXIDE (NO_2)

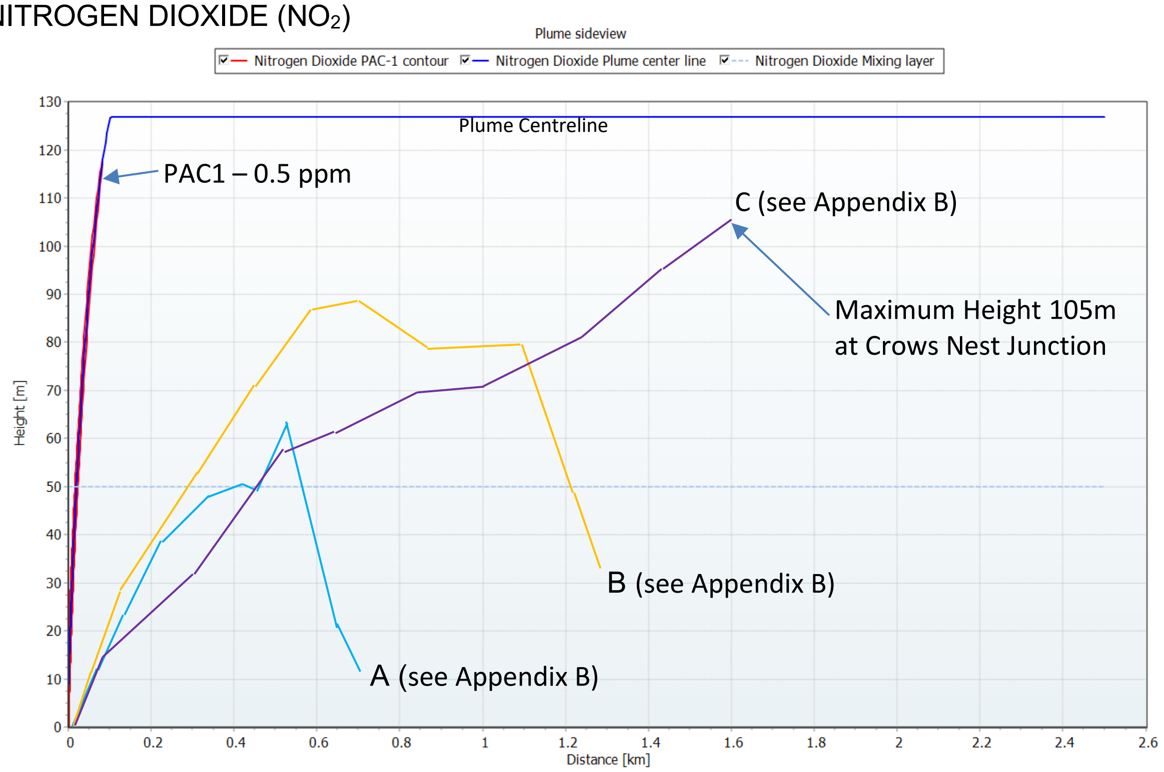


Figure 5.11: Nitrous Oxide (NO_2) Plume (Side View) – 1 tonne Fibreglass Fire

SULPHUR DIOXIDE (SO_2)

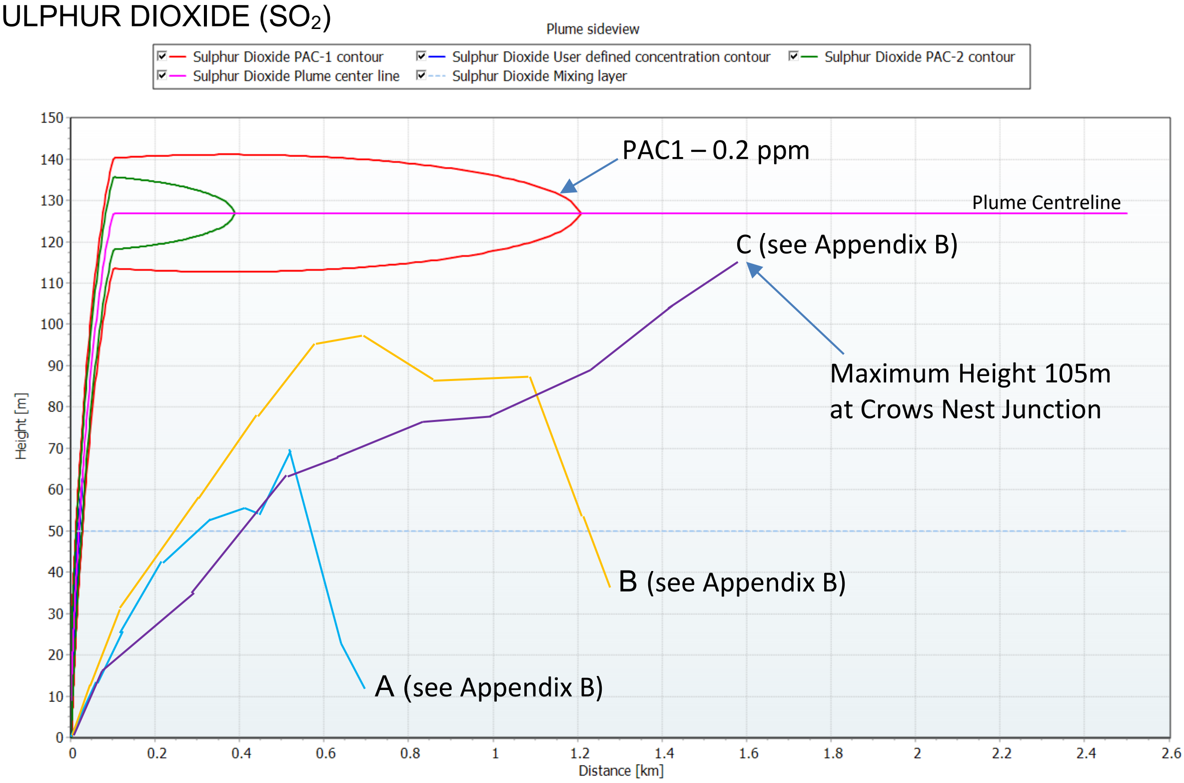


Figure 5.12: Sulphur Dioxide (SO_2) Plume (Side View) – 1 tonne Fibreglass Fire

HYDROGEN CHLORIDE (HCl)

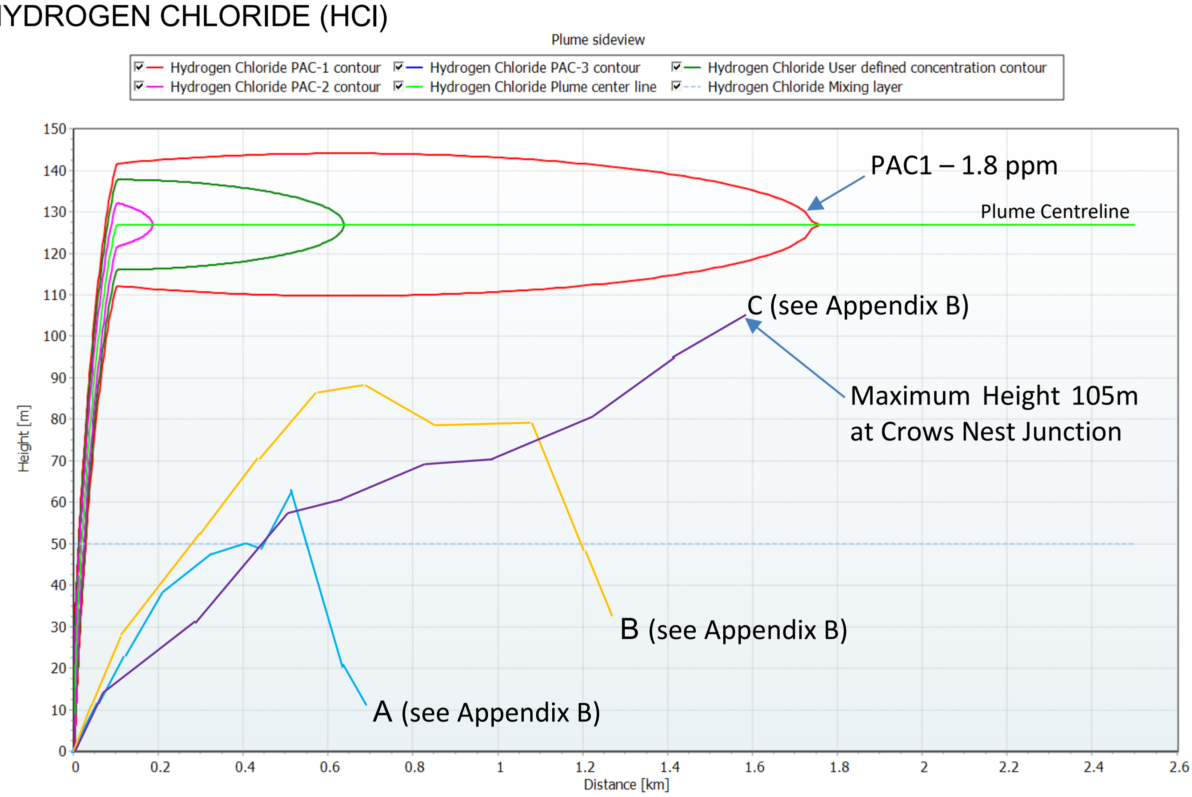


Figure 5.13: Hydrogen Chloride (HCl) Plume (Side View) – 1 tonne Fibreglass Fire

It can be seen from the NO_2, SO_2 and HCl plumes shown in **Figures 5.11**, **5.12** & **5.13** that there is no impact to the adjacent land uses from these toxic gases as a result of a 1 tonne fibreglass fire on a vessel within the FDD.

5.7.2.2 Fibreglass Fire – 10 tonne Mass

The following fire parameters were input to the "Effects" Model:

- Mass of Fibreglass – 10 tonne
- Area of Fire - 1175 m^2
- Chemicals - Carbon 81.61%
  Hydrogen 7.38%
  Oxygen 10.94%
  Nitrogen 0.03%
  Sulphur 0.05%
  Chlorine 0.77%
- Pasquil-Gifford (Wind Weather Data) F 1.5

The release rate for the toxic products of combustion are shown in **Table 5.4**:

Table 5.4: Toxic Products of Combustion Release Rate – 10 tonne Fibreglass Fire (Ref.23)

Chemical	Rate (kg/s)
Nitrogen dioxide	0.011
Sulphur Dioxide	0.079
Hydrogen chloride	0.68

The toxic plume side view for the three toxic products of combustion are shown in **Figures 5.14**, **5.15** and **5.16**. These figures include three cross sections of the McMahons Point area showing distance and height of the land to the east and north of the Noakes Boatyard. The location of the land cross sections are shown in **Appendix B**.

NITROGEN DIOXIDE (NO_2)

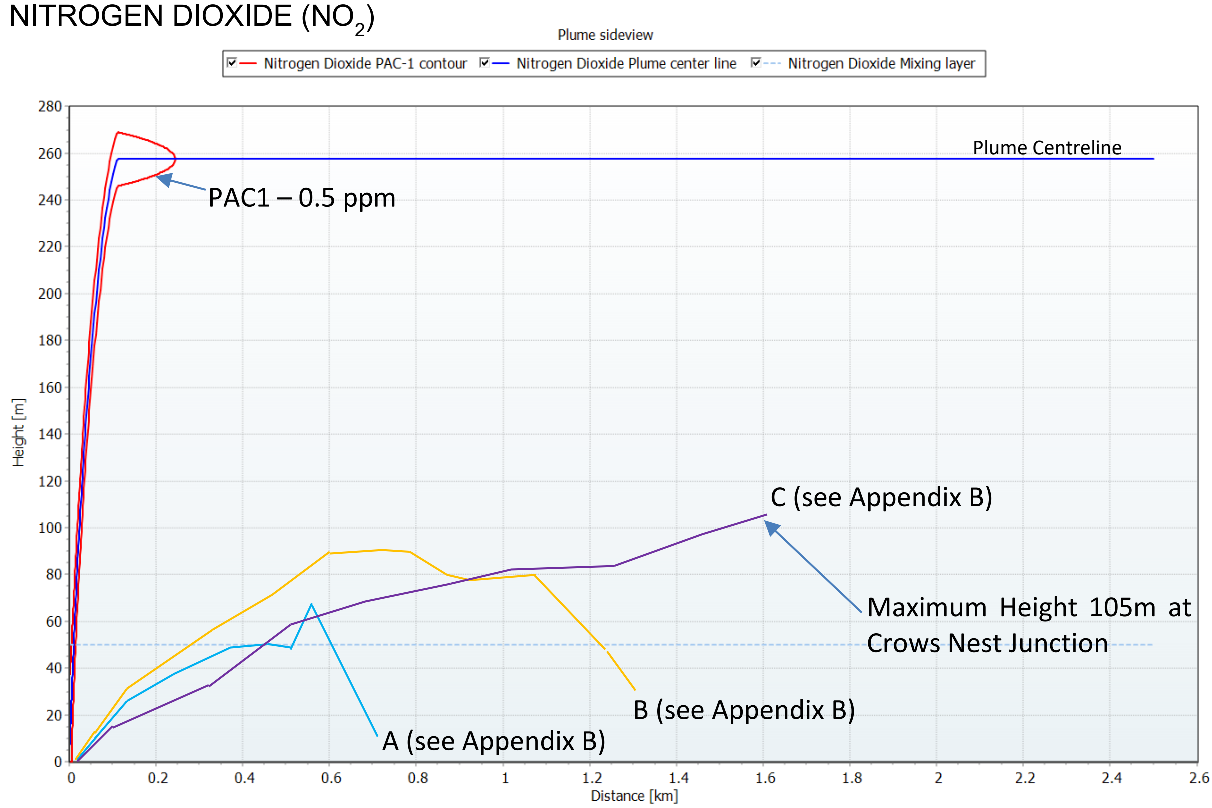


Figure 5.14: Nitrous Oxide (NO_2) Plume (Side View) – 10 tonne Fibreglass Fire

SULPHUR DIOXIDE (SO_2)

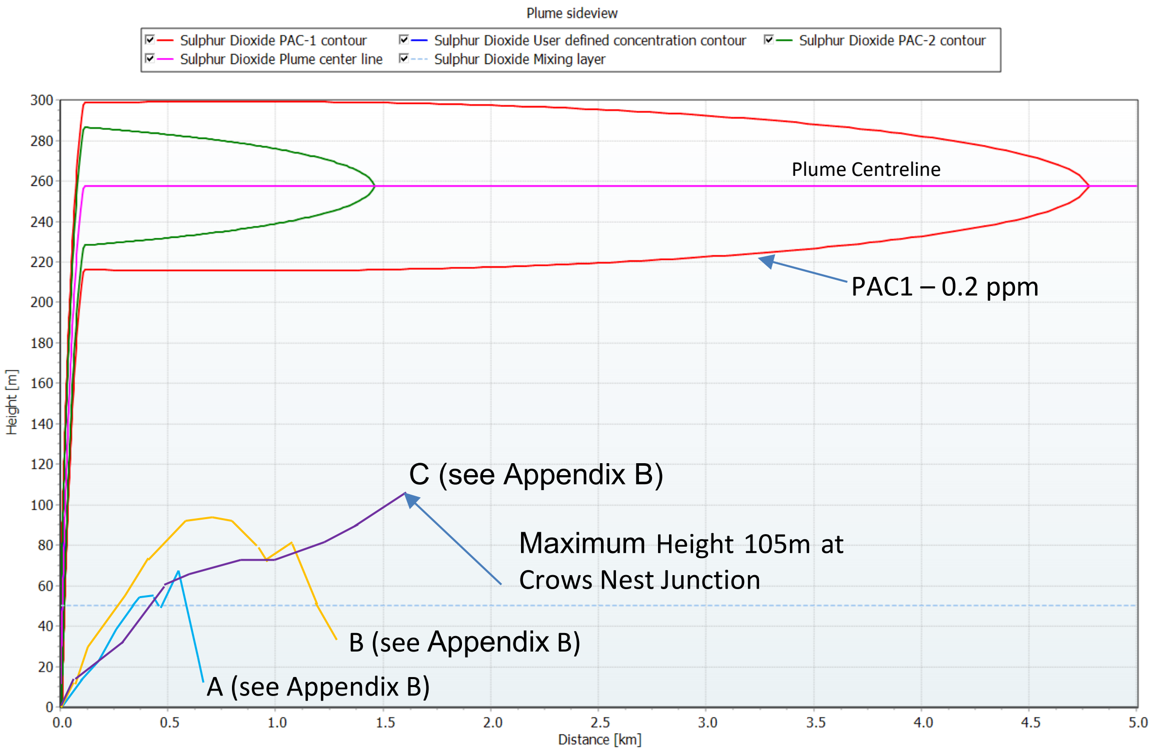


Figure 5.15: Sulphur Dioxide (SO_2) Plume (Side View) – 10 tonne Fibreglass Fire

HYDROGEN CHLORIDE (HCl)

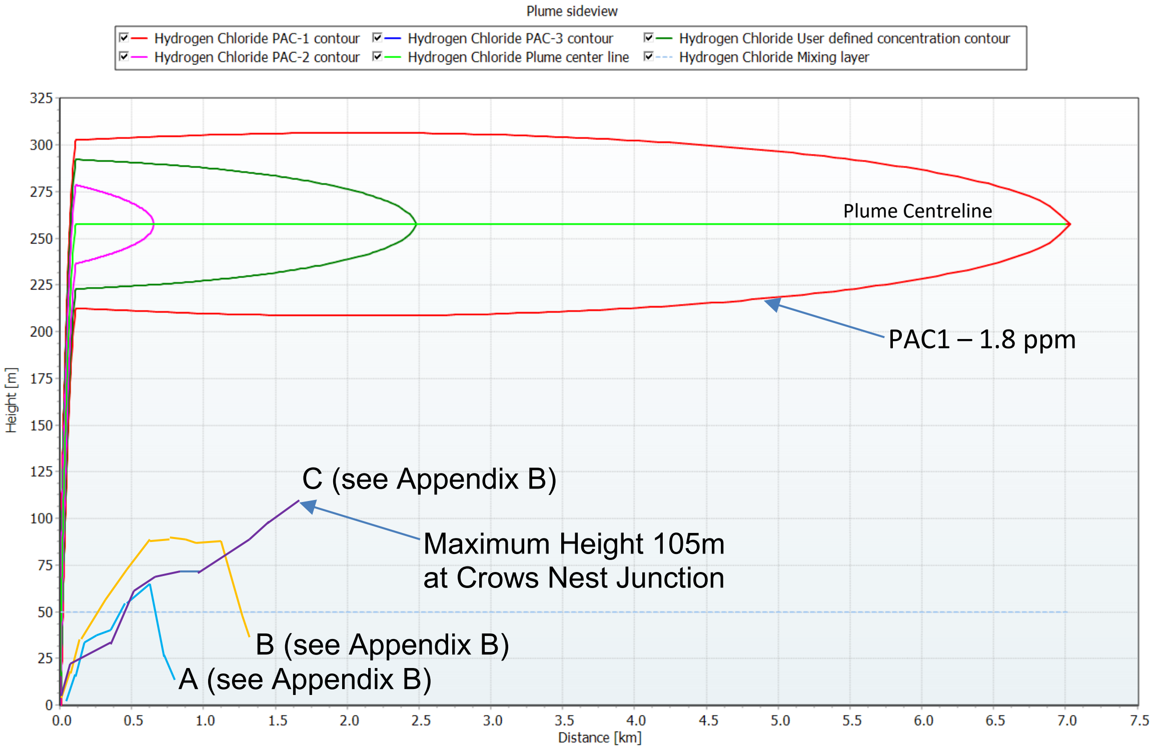


Figure 5.16: Hydrogen Chloride (HCl) Plume (Side View) – 10 tonne Fibreglass Fire

It can be seen from the analysis of toxic plume rise in **Figures 5.11** to **5.16** that the resultant plumes from 1 & 10 tonnes fibreglass fires do not impact the McMahons Point and Crows Nest Area at toxic material levels above acceptable concentrations.

The plume isopleths shown in the figures are for PAC values (1, 2 & 3), noting that the PAC1 value in each toxic material case is well below the Time Weighted Average (TWA), the maximum permissible eight (8) hour exposure concentration (Ref.22). Hence, there are considerable safety margins within the analysis. Based on the toxic plume rise assessment results indicating the toxic consequence criteria is not exceeded, no further assessment is conducted for fibreglass fires.

6.0 FREQUENCY AND RISK ANALYSIS

6.1 Incidents Carried forward for Frequency & Risk Analysis

A detailed consequence analysis was conducted to determine whether any incidents carried over from the hazard analysis had the potential to impact offsite at consequence levels that exceeded the criteria in HIPAP4 (Ref.5). Only one incident was identified to have the potential to result in heat radiation beyond the site boundary at levels exceeding the minimum consequence criteria in HIPAP4 (Ref.5), this incident was:

- Diesel Engine Fuel Fire - engine fuel system pipework failure resulting in fuel spray onto the diesel engine, ignition and fire; and
- Ballast valve failure – uncontrolled ingress of sea water into ballast tanks resulting in potential capsize.

6.2 Diesel Engine Fire - Failure Frequency and Risk Assessment

The diesel engine on the FDD is used for back-up power in the event of failure of shore power. The de-ballasting operation is normally conducted using shore power, however, in the event of shore power failure during ballasting/de-ballasting, this operation can be continued using the emergency diesel generator. This de-ballasting operation is explained in detail in **Section 3.3.3**, a summary has been provided in this section to assist in developing the fire frequency for the diesel engine operation.

The following docking operation summary is provided:

- The FDD is moved to the lowering position on the edge of the boatyard lease area and the ballasting valves are opened.
- The docking controller manages the ballasting operation, ensuring the dock remains level and in trim during the ballasting.
- Once the required dock draft is reached, the ballasting valves are closed and the vessel is brought into the dock and aligned with the keel blocks.
- The de-ballasting operations commence by pumping water from the ballast tanks using shore power to operate the pumps (back-up diesel power is available if required);
- The de-ballasting operation continued for around 2 hours after which time the diesel engine is shut-down and the dock relocated against the boatyard wharf.

The total number of docking operations per annum is anticipated to be 12, however, as the de-ballasting uses shore power, the diesel engine is not anticipated to be used during any of the normal de-ballasting functions. However, to ensure a conservative assessment it is assumed the diesel engine would be operated in stand-by mode during the de-ballasting operation. Based on a 2 hour operation and 12 operations per annum, the total diesel operation would be 24 hours per annum. To cater for additional docking events, engine tests, etc., this has been doubled to ensure a conservative estimate of fire frequency is made. Hence, the operational period for the diesel engine is 48 hours per annum.

6.2.1 Fuel Leak Frequency from Diesel Engine Pipework

The fire incident occurs when diesel pipework around the engine leaks, resulting in a spray of diesel onto hot components. The pressurised fuel pipework operates from the fuel tank to the fuel pump

(low pressure) and from the fuel pump to the diesel injectors (high pressure).

A fuel leak in the pipework can result from fatigue or corrosion and the failure frequency can be estimated from failure frequency data provided by the United Kingdom Health and Safety Executive failure rate data base (Ref.11). The failure rate for fixed pipework that results in a split and spray release is 1×10^{-6} failures per metre per year. The total length of fixed fuel pipework on the diesel engine, including the 6 injector lines is less than 10m, hence, a conservative value of 10m is used. The pipework failure frequency, resulting in a spray within the diesel engine compartment, is estimated as:

Diesel Spray Frequency = Diesel Pipework spray failure rate x no. pipework metre

= 1×10^{-6} failures/metre/year x 10 metres

= 1×10^{-5} failures/year

In addition to the pipework failure potential, there is also a potential for joint leaks and failures, resulting in diesel fuel spray onto hot components. Pipework is connected to the diesel pump by joints (1x fuel feed line and 6xdischarge lines) and at the injectors by joints (6xinjectors). Hence, the total number of joints is 1 + 6 + 6 = 13. The HSE failure frequency data base (Ref.11) indicates that for a fixed pipe flange (joint) the failure rate is 5×10^{-6} per joint per year. Hence, the total joint failure rate is estimated as:

Pipework Joint Failure Rate = Pipework joint failure rate x no. joints

= 5×10^{-6} failures/metre/year x 13 metres

= 6.5×10^{-5} failures/year

The total diesel system failure rate that may result in a leak and spray onto the hot engine components is the summation of the pipework and joint failure rates:

Diesel Spray Frequency (total) = Pipework failure rate + Joint failure rate

= 1×10^{-5} failures/year + 6.5×10^{-5} failures/year

= 7.5×10^{-5} failures/year

6.2.2 Injury/Fatality Risk

*A*s the fuel spray within the engine compartment may be close to hot engine components, it is conservatively assumed that all releases will ignite resulting in fire.

Hence, the fire frequency equals the release frequency = 7.5×10^{-5} fires/year

Noting that the diesel engine is used for 48 hours per annum, the probability that a person is located within the impact envelope at the time of the fire (i.er. within the heat radiation contour) is estimated by:

Probability of a person in the fire zone (exposure)= No. hours operation/ No. hours per year

= 48/8760

= 0.0055

A very conservative estimate for individual injury/fatality is that a person within the fire zone is impacted by the fire and cannot escape the fire in sufficient time such that an injury or fatality occurs. This is very conservative as the fire only extends 1.7m beyond the boatyard lease boundary, hence, in the event a person is directly adjacent to the FDD at the time the fire occurs, it would be relatively easy to move 1.7m away from the fire and be within the low impact area. Further, it is noted that the lease boundary is located in the open water area of Berrys Bay and a tender boat is used to assist with docking operations. The tender boat would ensure other water-craft do not approach the FDD during the docking operations, eliminating the chance of a person being adjacent to the FDD during the docking operation.

Additional incident response is also provided by the diesel engine operator, who has access to first attack fire-fighting equipment in the form of dry chemical powder extinguishers. All operations personnel associated with the FDD operations are trained in first-attack fire-fighting equipment use, hence, there is a high probability that the diesel engine fire would be extinguished before impact beyond the lease boundary could occur. Notwithstanding this, to ensure a conservative result, factors reducing the potential for fire impact and injury have not been considered in the assessment and it is assumed that an injury or fatality would result in the event of a fire at the diesel generator in the docking position.

Based on this, the risk of individual fatality is estimated by:

Injury/Fatality Risk = Fire Frequency x exposure probability x /fatality probability

= 7.5×10^{-5} p.a. x 0.0055 x 1

= 0.413×10^{-6} chances per annum or 0.413 chances per million per year.

Based on the assessment conducted above, the risk of individual fatality is 0.413 chances in a million per year or 0.413 pmpy.

A review of the heat radiation impact levels at residential areas surrounding the Boatyard indicates that a heat flux level of 4.7 kW/m^2 does not impact any residential areas.

6.2.3 Risk Criteria and Risk Review

The acceptable fatality risk criteria at adjacent properties and land uses to an industrial facility is published in HIPAP4 (Ref.5). The acceptable injury & fatality risk criteria is listed in **Table 6.1**, which is extracted from HIPAP4 (Ref.5).

Table 6.1: Acceptable Individual Injury and Fatality Risk Criteria (Ref.5)

Land Use	**Individual Fatality Risk Criteria** **(chances in a million per year or pmpy)**
Hospital, schools, child-care facilities, old age housing	0.5 pmpy
Residential, hotels, motels, tourist resorts	1 pmpy
Commercial developments, including retails centres, offices and entertainment centres	0.5 pmpy
Sporting complex and active open space	10 pmpy
Industrial	50 pmpy
Land Use	**Injury Risk**
Incident heat flux radiation at residential and sensitive land use area should not exceed 4.7 kW/m^2 at a frequency that does not exceed:	50 pmpy

It can be seen that the assessed chance of fatality (0.413 chances in a million per year) does not exceed any criteria listed in **Table 6.1** and no further risk reduction measures are required with regards to fatality risk. Injury risk is related to the impact of heat radiation at residential areas that exceed heat flux levels of 4.7 kW/m^2. Heat flux levels of 4.7 kW/m2 do not impact any residential areas surrounding the Boatyard of FDD facility.

6.3 Ballast Tank Valve Failure – Uncontrolled Ingress of Seawater

The ballast tanks are fitted with sea water control valves, which are opened or closed to control the ingress of seawater into the tanks. Once the vessel has been docked (aligned with the keel blocks), the water inlet valves on the ballast tanks are closed and the tanks are de-ballasted (sea water is pumped from the tanks). The water inlet valves remain closed during the full docking cycle and are not opened until the vessel is de-docked.

In the event a valve leaks, water will flow into the ballast tank to a point where the FDD reaches equilibrium, with the additional water in the tank. This will create a “heel” or “list” on the FDD, but the stability criteria is not exceeded and the vessel remains in a safe state. However, in the event a second sea water inlet valve fails (valve leak allowing uncontrolled water ingress simultaneously to the first valve failure), the leak will result in water flooding two tanks, which exceeds the stability criteria.

A review of the ballast tank design indicates that each tank is fitted with a level switch inside the tank, which alarms in the event of uncontrolled water ingress to the tank. Hence, in the event of a valve failure and water ingress, an alarm will sound and notify the site operations personnel of an uncontrolled water ingress to the ballast tank. In the event the level switches and alarms fail, the ballast tanks will fill and the stability criteria will be exceeded.

An assessment has been conducted to determine the risk of valve/switch/alarm failure and potential environmental impact. Failure to meet the stability criteria can only occur whereby two valves fail simultaneously, two level switches fail simultaneously or the alarm system fails to notify the operations staff. A fault tree (see **Figure 6.1**) has been developed to mathematically model the failure scenario, data for input to the Fault Tree is shown in **Table 6.2**.

Table 6.2: Failure Data for Ballast Tank Safety Systems Components.

Component	Failure Rate (λ)	Failure Probability	Notes
Globe Valve	0.34x10^6 failures/hour 0.003 failures per annum (OREDA, Taxonomy 4.3.6, Internal Leakage, Ref.17)	PFD*= ½ λ t# PFD = 0.5x0.003x1/1 PFD = 1. 5x10^{-3} p.a.	Note: valves are operated and functionally tested once per month, full inspection is conducted annually
Level Switch	3.6x10^6 failures/hour 0.032 failures per annum (Exida, Item 1.5.1, Ref.18)	PFD*= ½ λ t# PFD = 0.5x0.032x1/1 PFD = 1.6x10^{-2} p.a.	Note: level switches are operated and functionally tested once per month, full inspection conducted annually
Alarm Annunciator	2.1x10^6 failures/hour 0.037 failures per annum	PFD*= ½ λ t# PFD = 0.5x0.037x1/12	Note: level alarms are operated and

Component	Failure Rate (λ)	Failure Probability	Notes
	(Exida, Item 3.7.2, Ref.18)	PFD = 1.5×10^{-3} p.a.	functionally tested once per month.
Alarm Beacon	1.0×10^{6} failures/hour 0.0088 failures per annum (Exida, Item 3.7.3, Ref.18)	PFD*= ½ λ t# PFD = 0.5x0.0088x1/12 PFD = 3.7×10^{-4} p.a.	Note: level alarms are operated and functionally tested once per month.
Transponder (radio signal to mobile phones)	2.2×10^{-5} failures/hr 0.2 failures per annum (RCE Failure Data, Radio Transmitter, Ref.19)	PFD*= ½ λ t# PFD = 0.5x0.2x1/52 PFD = 2×10^{-3} p.a.	Note: alarm messages are tested weekly.

* PFD = probability of fail on demand
# PFD=½ λ t, where λ = failure rate per annum, t = 1/ no. component tests per annum

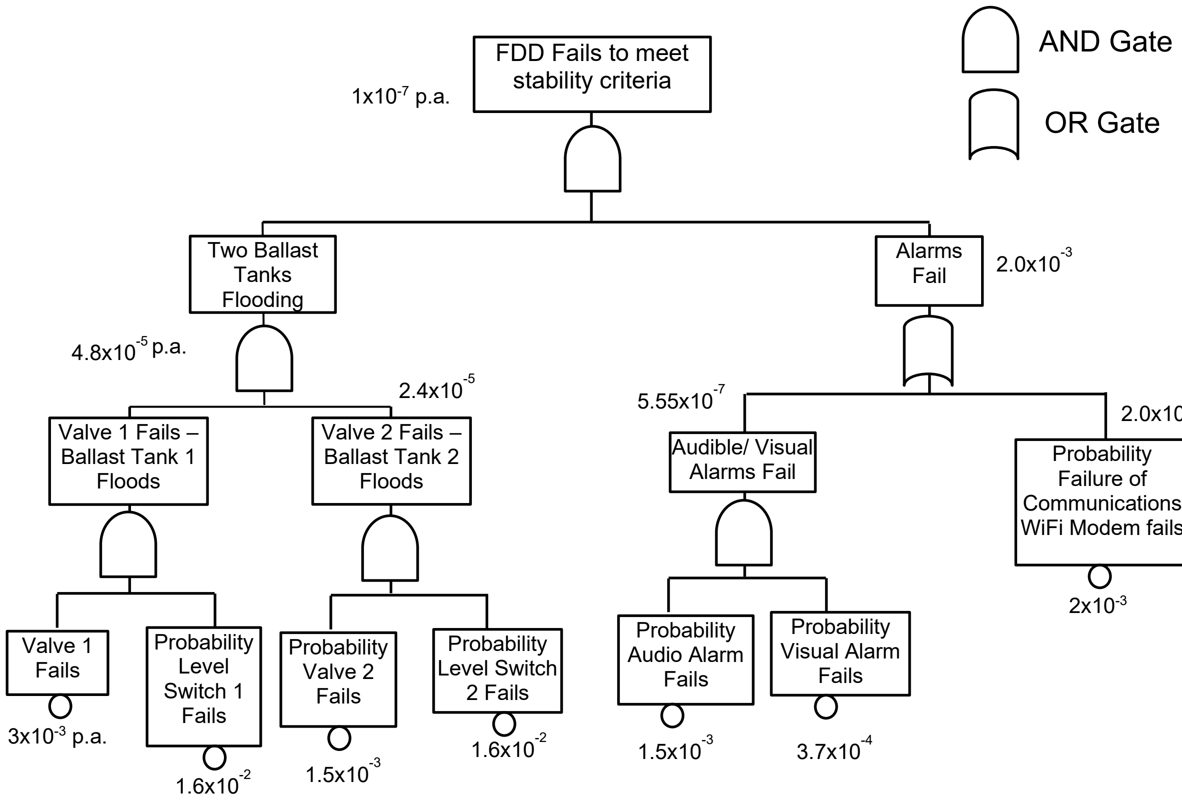


Figure 6.1: Fault Tree – Ballast tank Valve Failure and Tank Flooding Scenario

The results of the Fault Tree analysis indicates the risk of failure to meet the stability criteria as a result of ballast tank valve failure is 1×10^{-7} p.a. In review of the risk criteria detailed in HIPAP 4 (Ref.5), fatality risk criteria is provided for impacts to adjacent land uses, however, no criteria is provided for environmental impact or onsite personnel. Notwithstanding this, risks below 1×10^{-6}p.a. would be considered acceptable and below 1×10^{-7} p.a. would be approaching the negligible level (Ref.1, Figure 11). Hence, as the assessed risk associated with a potential capsize event is estimated to be 1×10^{-7} p.a. or 0.1 pmpy, which is within the ALARP range, no further assessment is conducted for this scenario.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

An assessment of the hazards and risks to the land uses surrounding the Noakes Boatyard (the Boatyard) at Berrys Bay, Sydney Harbour, NSW, was conducted in relation to operations associated with a proposed floating dry dock (FDD) to be operated at the Boatyard.

The assessment was required as part of the site Development application to North Sydney Council under the provisions of State Environmental Planning Policy No.33 - Hazardous and Offensive Developments (SEPP33). It was identified that SEPP33 applies to the site under the potentially "Offensive" component of the policy and therefore a Preliminary Hazard Analysis is required and was the subject of this report.

The methodology used for the study was the approach recommended in Hazardous Industry Planning Advisory Paper No.6 - Hazard Analysis Guidelines (HIPAP6, Ref.4).

The PHA identified a number of hazards that had the potential to impact offsite, however, existing safeguards or safeguards proposed for implementation resulted in effective control of hazards and only five potential incidents were identified to result in offsite impact, these were:

- Paint Container (5 L) on FDD - Paint Release, Ignition and Fire;
- Paint Container (20 L) on FDD - Paint Release, Ignition and Fire;
- Diesel Tank Refuelling - Fuel Spill, Ignition and Fire;
- Diesel Fuel System Leak - Fuel Spray, Ignition and Fire; and
- Fibreglass vessel hull fire (docked vessel in the FDD).

The consequence analysis identified that all incidents, with the exception of the diesel engine fuel system fire, did not result in an offsite impact that exceeded the risk criteria published in HIPAP4 (Ref.5). Hence, no further analysis was necessary for these incidents and only the diesel engine fuel system fire was carried forward for frequency & risk assessment.

The results of the frequency and risk assessment for the diesel engine fire identified that the individual fatality risk, at the closest Boatyard lease boundary was 0.413 chances in a million per year, the risk at boundary points further away are less than this value. The acceptable individual fatality risk criteria at the land use in Berrys Bay is 10 chances in a million per year (i.e. active open space, Ref.5). The heat radiation contours from potential fires at the FDD do not impact any residential areas, hence, the injury risk criteria is not exceeded.

As the acceptable individual fatality risk criteria and the injury risk criteria are not exceeded for both current and future land uses, as a result of the operation of the FDD, it is concluded that the FDD is suitable in the land use, on which the Boatyard is located, under the provisions of SEPP33.

7.2 Recommendations

Notwithstanding the conclusion reached in **Section 7.2**, that the FDD is suitable in the proposed land use, under SEPP33, a number of recommendations are made to ensure the risks are controlled to as low as reasonably practicable.

The following recommendations are made:

1. This PHA report has relied upon the assessment results of a number of expert reports associated with the operation of the FDD. The three reports on which this PHA has relied upon are:

   - Noise and Vibration Assessment, prepared by Day Design*;
   - Air Quality, prepared by Astute Environmental*; and
   - Structural and Stability Assessment, Shearforce - 16 November 2016 (Ref.9).

   Each report contains a number of recommendations, which are made so that the report conclusions remain valid. It is therefore recommended that those recommendation made in the Noise, Air Quality and Stress/Stability reports are implemented.

2. It was identified that as part of the diesel fuel refuelling operation, spill containment would be established around the diesel fuel IBC and generator. It is recommended that the methodology for establishing the spill control be incorporated into the FDD diesel generator refuelling procedure.

3. During the analysis conducted in this document, it was identified that regular maintenance and inspection is important in maintaining ballast tank integrity (i.e. prevention of corrosion and leaks). It was noted that the FDD has been moored and not in use since its refit in November 2018. Hence, to ensure the FDD is fit for purpose, prior to commencement of operations, it is recommended that a detailed independent survey be conducted including confirmation of the ballast tank condition and its suitability for the proposed operations.

4. It was identified that solid materials combustible fires (e.g. fibreglass) may occur within the vessels (ships/boats) in the FDD. The heat radiation and toxic products of combustion impacts were identified not to exceed acceptable risk criteria at surrounding land uses. In order to minimise the likelihood of large combustible materials fires, a fire main system has been installed on the FDD. To ensure the fire main system is effective in providing adequate fire water within the FDD, it is recommended that a Fire Safety Study (FSS) in accordance with HIPAP2 (Ref.24) for the proposed FDD facility be conducted.

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Appendix A

HAZARD IDENTIFICATION WORD DIAGRAM

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
Paint Storage and Handling			
Paint container on the FDD- paint spill or leak from paint container.	Leaking paint containers, dropped container during handling.	Potential release of paint onto the FDD pontoon deck and release overboard resulting in environmental impact.	- Paint is not stored on the FDD, only required paint is taken onto the FFD for the painting task (max. quantity - 40 L in 2 x 20 L containers) - All paints are held in a bunded area on the FDD to contain spills and releases (no escape of liquid beyond the bund). - Maximum containers size is 20 L, spill is localised and does not extend beyond the immediate spill area. - Spill Kits provided on the FDD pontoon deck, Noakes employees trained in spill kit use. - Spill Emergency Procedure incorporated as part of the operational Safety Management System. Hazard has the potential to impact offsite and is carried forward for further review in the Hazard Analysis.
Paint container on the FDD - paint spill or leak from paint container	Leaking paint containers, dropped container during handling.	Personnel contact paint during the spill of clean-up operation - chemical impact to skin, localised impact to operation personnel	- Spill kits contain personal protective equipment (PPE), protecting personnel from contact. - Personnel handling paint wear PPE, minimal contact in the event of a spill. - SDS for paint indicates potential low impact if removed from skin immediately, washing facilities provided on the FDD. Incident has no offsite impact, not carried forward for further analysis.
Paint container on	Leaking paint containers, dropped container during	Potential heat radiation impact beyond the FDD, exceeding	- Paint is located in bunded area, only paint required for the painting task is taken on to the FDD (Max. quantity- L)

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
the FDD - paint spill or leak from paint container	handling - ignition and fire.	impact criteria at the site boundary.	- Spill occurs from small containers only (low volume < 20 L), spill area is small, heat impact is close to the spill. - Dry chemical powder fire extinguishers located on the FDD pontoon deck and used to extinguish the fire. - Operations staff are present at all times when paint is handled, staff can respond immediately to leaks/spills. - FDD operations staff trained in fire-fighting using first-attack fire-fighting equipment. - Fire Emergency Procedure incorporated as part of the operational Safety Management System. Incident has the potential to impact offsite and is carried forward for further analysis.
Diesel Fuel Storage and Handling – Emergency Generator and Diesel in the fuel tanks of vessels in the dock			
Emergency Generator Diesel Fuel Tank - leaking tank	Release of diesel fuel from the main diesel tank under the generator	Potential diesel fuel leak to the environment - environmental impact.	- Diesel fuel tank is integrally bunded and releases from the main tank are contained by the external tank (no impact offsite). - Regular inspection and maintenance of the diesel system (including inspection of the main and integral tank). - Spill Emergency Procedure incorporated as part of the operational Safety Management System. No impact offsite, incident not carried forward for further analysis.
Emergency Generator - Diesel Fuel Tank –	Spill of fuel during the transfer process.	Potential release to the deck of the FDD wing and impact to the environment.	- Refuelling is infrequent (maximum once per month). - Spill kits available adjacent to the transfer operation. - Diesel fuel transfer operator is in attendance during the full transfer operation, spill response available at all times.

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
replenishing fuel (transfer of fuel to the diesel tank)			- Deck scuppers are covered during fuel transfer to prevent release beyond the deck of the FDD. - Fuel transfer procedures including transfer checklist and Job Safety and Environmental Analysis (JSEA). - Spill Emergency Procedure incorporated as part of the operational Safety Management System. Hazard has the potential to impact offsite and is carried forward for further review in the Hazard Analysis.
Emergency Generator - Diesel Fuel Tank - replenishing fuel (transfer of fuel to the diesel tank)	Spill of fuel during the transfer process - ignition and fire	Potential heat radiation impact beyond the FDD, exceeding impact criteria at the site boundary.	- Spill occurs from small transfer volume only (operator in attendance to stop transfer in the event of a release) - Diesel is a combustible liquid with a flash point >60°C, low potential ignition and fire. - Dry chemical powder fire extinguishers located on the FDD wing deck and used to extinguish the fire. - FDD operations staff trained in fire-fighting using first attack fire-fighting equipment. - Fire Emergency Procedure incorporated as part of the operational Safety Management System. Incident has the potential to impact offsite and is carried forward for further analysis.
Emergency Generator - Diesel generator - fuel leak on the generator engine.	Hot engine components ignite the diesel leak resulting in an engine fire	Potential heat radiation impact beyond the FDD, exceeding impact criteria at the site boundary.	- Engine operation is infrequent (test once per week for 1 hour, dock operation once per month for 2 hours). - Regular engine inspection and maintenance (weekly). - Engine fuel system is on the opposite side of the engine to the exhaust system (hot components). - Engine is only used when the FDD is staffed (personnel available to apply first-attack fire-fighting).

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
			- All personnel are trained in the use of first-attack fire-fighting equipment. - Fire Emergency Procedure incorporated as part of the operational Safety Management System. Incident has the potential to impact offsite and is carried forward for further analysis.
Vessels in the Dock – diesel in the fuel tanks	Release of diesel fuel from the diesel tank in the vessel in the dock	Potential diesel fuel leak to the environment - environmental impact.	- Diesel fuel tank is within the confines of the vessel hull, any leaks are contained within the bilge of the vessel, no release to the environment - Vessels are inspected on arrival in the dock to confirm the integrity of equipment on the vessel (i.e. fuel systems are inspected to confirm no leaks). - Spill Emergency Procedure incorporated as part of the operational Safety Management System associated with the docking operations. No impact offsite, incident not carried forward for further analysis.
Vessels in the Dock – diesel in the fuel tanks	Release of diesel fuel from the diesel tank in the vessel in the dock, ignition of diesel fuel	Fire in the vessel (internally within the vessel hull), no initial impact beyond the vessel due to the confinement of the fire internally. Fire impact beyond the vessel only occurs where the fire grows beyond the vessel internal areas.	- Diesel is a combustible liquid and does not vaporise when released at ambient temperature - Limited ignition sources when the vessel is in the dock (ships power is isolated) - No work is conducted in the vessels when docked, all work is conducted externally to the vessel (external hull work only), low ignition potential - Regular inspections of the vessel (daily) to confirm systems integrity within the vessel Incident has the potential to impact offsite and is carried forward for further analysis.

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
Operations (Offensive Hazards)			
Surface preparation (abrasive blasting), Spray painting, welding cutting, grinding, etc. on the vessel on the FDD	Noise generation as a result of the operations associated with repair/maintenance to vessel docked on the FDD	Potential noise impact above acceptable noise emissions criteria - impact to surrounding land uses	- Noise abatement curtains used at the ends of the FDD to reduce noise discharge from FDD operations. - Noise from similar existing operations conducted at the Noakes Boatyard is managed using the same approach. - Regular noise surveys conducted to confirm noise is effectively controlled. The potential for noise generation and impacts offsite relates to the offensive component of SEPP33 and therefore this potential event has been carried forward for further review on the Hazard Analysis.
Surface preparation (abrasive blasting), Spray painting, welding cutting, grinding, etc. on the vessel on the FDD	Dust, particulates and fumes generated during operations associated with the FDD	Potential air pollution emissions exceeding acceptable emissions criteria - impact to surrounding land uses	- Dust, particulates and fume containment curtains installed on the FDD to prevent release of pollutants. - Localised enclosures around specific operations (i.e. abrasive blasting, spray painting, welding) to prevent release into the surrounding areas. - Extraction ventilation on the localised enclosures with dedicated extraction treatment system located on the FDD - Ventilation treatment systems on the main FDD enclosure reporting to the existing carbon filters and wet scrubbers - Regular inspections and maintenance of containment and extraction/treatment systems to conform optimum operation The potential for release of pollutants relates to the offensive component of SEPP33 and therefore this potential event has been carried forward for further review on the Hazard Analysis.

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
Water enters ballast tanks whilst FDD in raised position at the Noakes Boatyard wharf.	Ballast tank structural leak (water ingress), ballast tank valve leaks.	Potential for FDD to capsize, with a ship inside, whilst alongside the Noakes Boatyard wharf resulting in damage to infrastructure and environmental impact.	- Single ballast tank leak does not result in FDD instability, multiple ballast tanks required to fail simultaneously. - Ballast tanks are fitted with level alarms, water ingress into a ballast tank will activate a high level switch and alarm. - FDD operations regular monitor ballast tank levels and equipment condition. - Water ingress would be slow and pumps can be operated to maintain ballast tank water levels (power supply can be from shore power or back-up diesel generator) - Emergency response procedure for ballast tank flooding. - Sufficient time to de-dock the vessel and implement repairs - All operations conducted under the control of a competent ships master, who has completed the FDD operations competency training. Hazard has the potential for environmental impact and is carried forward for further review in the Hazard Analysis.
Docking of the ship in the FDD	Incorrect alignment of ship on the keel blocks	Ship capsizes in the dock, potential for imbalance and dock capsize resulting in damage to infrastructure and environmental impact.	- Keel blocks are aligned and established for specific vessels, blocks are wider than the keel providing adequate support - Bow and stern centre lines are aligned with centre line measuring ropes to ensure the ships keel aligns with the blocks - Diver is used for all docking operations to ensure keel and blocks align when the FDD rises. - Side support beams are implemented to prevent ship movement once alignment has been achieved.

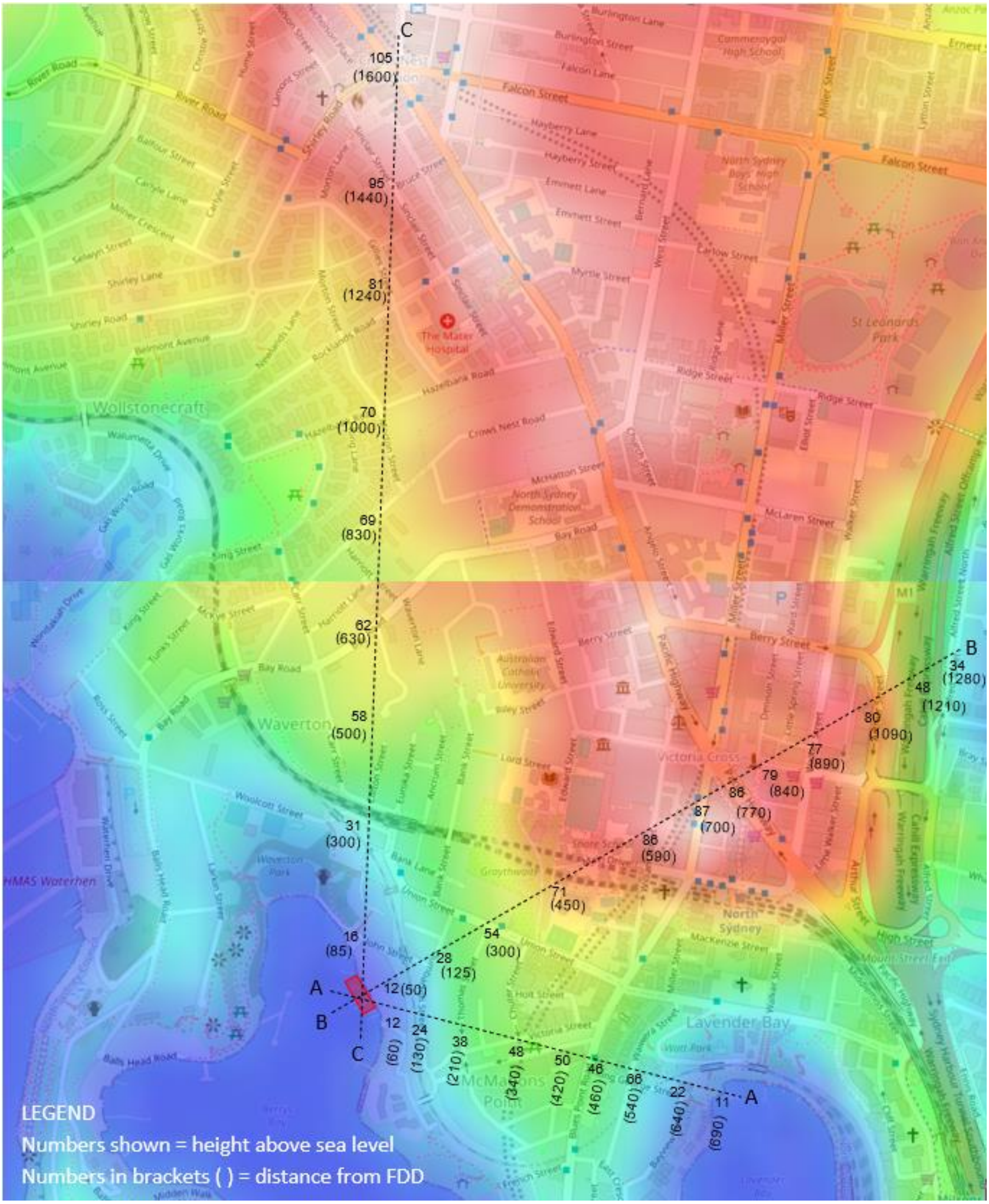
Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
			- All operations conducted under the control of a competent ships master, who has completed the FDD operations competency training. Hazard has the potential for environmental impact and is carried forward for further review in the Hazard Analysis.
Docking of the ship in the FDD, de-ballasting and raising the FDD using ballast pumps	Overload of the FDD, structural failure of FDD	Ballast tanks fail, multiple FDD tanks fill with seawater, FDD becomes unstable and capsizes, resulting in damage to infrastructure and environmental impact.	- FDD has been designed to dock ships up to 1,000 tonnes, noise and environmental requirements limits ship mass to a maximum of 600 tonnes. - Design calculations checked by Naval Architects to confirm FDD docking capacity is 1,000 tonnes. - Structural survey of FDD hull and structural members confirms calculations by Naval Architects are valid. - Refit and refurbishment of FDD completed in 2018 and confirmed to maintain structural members and ballast tank wall thickness within design parameters. - Pumping plan developed for each docking to raise the FDD without a list (eliminating additional stress on the FDD structure). - Pumping operation is controlled by a Ship's Master, visual measurement of FDD "trim" is provided at the pump control station. - Ships Master in control of the FDD operations has completed the FDD competency training course. - Back-up diesel generator provided in the event of shore power failure. Hazard has the potential for environmental impact and is carried forward for further review in the Hazard Analysis.

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
Docking of the ship in the FDD, de-ballasting (opening the ballast valves and filling ballast tanks with seawater)	Potential to over-fill ballast tanks with seawater resulting in FDD sinking.	FDD strike the bottom of the harbour resulting in sediment disturbance and environmental impact (i.e. contaminated sediments)	- De-ballasting operation is controlled by a Ship's Master, visual measurement of FDD "trim" and draught is provided at the de-ballasting control station. - Four main ballast tanks designed to eliminate potential for FDD sinking (fail-safe design). - FDD does not require full depth de-ballasting for all vessels (i.e. most ships can enter with only partial de-ballasting); - Emergency Response procedure for flooding/listing incidents included in the Safety Management System. - All operations conducted under the control of a competent ships master, who has completed the FDD operations competency training. Hazard has the potential for environmental impact and is carried forward for further review in the Hazard Analysis.
Vessel entering/leaving the FDD	Collision with the dock and damage to the dock/vessel	Potential breach of the dock hull or vessel hull resulting in sinking of the dock/vessel and impact to the harbour floor – agitation of contaminated sediments.	- Vessels entering the dock travel at very low speed, under the direct control of the dock master - Fenders are used on all vessels entering and leaving the dock (no impact to the dock or vessel in the event of collision) - FDD is constructed of 12mm thick steel hull, impact damage is minimal in the event of collision (breach of the FDD hull is minimal) - Damage to the vessel may result in the vessel sinking, however, collision would occur with the vessel inside the dock envelope and the vessel would not strike the bottom of the harbour. The likelihood of environmental impact as a result of docking incident is considered to be low and risks are controlled to

Facility/Event	Hazard Cause	Hazard Consequence	Safeguards (Prevention, Detection, Protection, Mitigation)
			ALARP. No further assessment is conducted for this potential incident.
External fire – hull of vessels in the dock (i.e. combustible materials, fibre-glass)	External work on the vessel fittings (shafts, hull valves, rudders, etc.) involving welding, cutting, grinding, etc.	Fire growth and potential for engulfment of the vessel hull in the dock: - Heat radiation impact to surrounding land uses; - Toxic smoke generation and impact to surrounding land uses	- Vessel hulls constructed of combustible material require significant heat impact to initiate fire - Combustible materials do not burn with the intensity of flammable liquids, impacts distances are less - Fire would only occur as a result of maintenance/repair activities when personnel are present to initiate first attack fire-fighting measures - First attack fire-fighting measures installed on the FDD (fire extinguishers and hose reels) - Fire hydrants and fire main installed on the FDD for F&RNSW use when attending the site. Hazard has the potential for impact offsite and is carried forward for further review in the Hazard Analysis.

Appendix B

LOCATION OF SELECTED LAND CROSS SECTIONS – McMAHONS POINT



Ref. https://en-au.topographic-map.com/maps/sob1/McMahons-Point/

Appendix C

CURRICULAM VITAE – STEVEN SYLVESTER

Steve Sylvester
Technical Director
Risk Engineering Services

Areas of Expertise

- Process Safety Engineering
- Hazardous area classification and engineering
- Safety Instrumented Systems and Safety Integrity Analysis (Functional Safety Engineering)
- Dangerous Goods and Hazardous Chemicals Safety Management
- Qualitative and Quantitative Risk Assessments
- Emergency Response Planning and Management
- Process Hazard Analysis (PHA) studies including HAZID, HAZOP, FMEA, LOPA and RAMBO.
- Safety Case development

Steve.sylvester@riskcon-eng.com
+61 411 659 309
www.riskcon-eng.com

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Riskcon engineering

Steve Sylvester

Technical Director

Risk Engineering Services

Steve Sylvester is a Mechanical Engineer with over 50 years' experience in operations and risk engineering in the mining and mineral processing, marine, solar, aerospace, nuclear, up/downstream oil and gas industries, chemical and petrochemical facilities, Defence, institutional and commercial sectors.

Expertise:

- Safety/Risk Engineering Management - Responsible for providing safety and risk engineering management and engineering management consulting services to clients in private industry and government departments.
- Hazard and Operability (HAZOP) study leader with over 25 years experience in leading HAZOP studies, completed the ICI HAZOP course in 1989 and has since completed over 200 HAZOP studies for a range of facilities.
- Accredited Safety in Design (SIL) ISA84-SIS Fundamentals Specialist accredited by International Society of Automation (ISA) and Functional Safety Engineer accredited by TÜV Rhineland (2203/10) [IEC61508].
- Accredited Hazard, Risk, Safety & Compliance Auditor and HAZOP leader with various regulatory authorities (including Department of Planning & Environment and SafeWork, NSW).
- Accredited Hazardous Area Auditor and Certifier [AS4761] (CT05984a&b, CR16285) – AS60079 series of standards
- Founding Member of the Australasian Institute of Dangerous Goods Consultants and has extensive expertise in the design and operation of the full range of DGs (i.e. Class 1 to Class 9)

Education and Training

- Post Graduate Diploma Business Management, Deakin University (1992);
- Post Graduate Scholarship (1987-1988), Risk and Reliability Engineering, United Kingdom Atomic Energy Authority & Confederation of British Industry. (1988);
- BEng (Mech. Hons) – NSW Institute of Technology (1984);
- Marine Engineering Technology Certificate, Sydney Technical College (1979);
- Fitting Machining and General Engineering (Trade), Sydney technical College (1973);
- Nationally Recognised Training (Competency Training – provider No. 31299: – Classify Hazardous Areas, Hazardous Area Component design, Hazardous Area component inspection and reporting (CT05984a&b, CR16285) (Gas and Dust) – Completed IEC60079 & AS4761 training requirements (2012, 2014 & 2015);
- Accredited Dangerous Goods and Hazardous Chemical Consultant (www.AIDGC.org.au);
- Functional Safety Engineer (FSE), TÜV Rhineland (2203/10) (2010).

Professional Memberships and Registrations

- Fellow of the Institution of Engineers, Australia [FIE(Aust)];
- Chartered Professional Engineer (CPEng.)
- Listed on the National Engineering Register (NER)
- Registered Professional Engineer Queensland (RPEQ)
- Founding member of the Australasian Institution of Dangerous Goods Consultants (MAIDGC) - Accredited across all DG Classes 2 to 9 and HAC.

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Professional Experience

Steve commenced his career with the Royal Australian Navy, serving 7 years from 1970 to 1977 as an apprentice diesel fitter (1970-1973) and Engine Room Artificer (1974-1977). He then worked at Garden Island Dockyard in various roles, including Technical Officer (QA), Design Engineer and Superintendent Project Services, completing his Bachelor of Engineering (Part Time study during this time). In 1987, he won a Confederation of British Industry scholarship to study with Atomic Energy Authority (UK) in the areas of Safety in Design, Risk and reliability and Safety Integrity. During this time he worked on a number of risk and reliability engineering projects in the UK, including Nuclear Reactor Safety Design, Marine and Offshore Oil and Gas Projects and Nuclear Research Projects (Prototype Fast Reactor at Dounreay, Scotland). On his return to Australia in 1989, he worked with ICI Chemicals as a plant engineer, gaining further experience in the petrochemical industry. During this period Steve managed a staff of 12 to 15 engineers and trades persons at the Rhodes Specialty Chemicals Plant.

In 1991 he worked at the Australian Centre for Advanced Risk and Reliability Engineering, Sydney University, School of Chemical Engineering. During this time he assisted the Ansto Professor of Risk Engineering in the development of risk in industrial applications and consulted to industry on specific projects.

In 1994 he moved into risk engineering consultancy and worked in a number of organisation further developing his experience in the risk engineering field, consultancies included:

- BHP Engineering (1994-1996)
- Granherne/Haliburton (1996-2002)
- HLA Envirosciences/ENSR (2002-2004)
- Sinclair Knight Merz or SKM (2004-2008)
- AECOM (2008-2013); and
- RAWRISK/Core Engineering (2013-2017).

In 2017 he commenced his own consultancy with other engineers, which has since morphed into RiskCon Engineering Pty Ltd. He currently operates as Technical Director at RiskCon Engineering.

In his 20 years in Marine and Chemical plant engineering organisation, he gained valuable experience both at trade level and as a design engineer, working in heavy industrial applications. Since moving into the engineering consultancy field he has completed over 500 risk and safety engineering studies including HAZOP, HAZAN, Safety Integrity, Hazardous Areas, Qualitative and Quantitative Risk Assessment, Fire Safety Studies for Chemical facilities, Layer of Protection Analysis (LOPA), Dangerous Goods Assessments (storage design, audits, compliance assessments) and Major Hazard Facility - Safety Case Development.

Example Projects List (Note: Steve has conducted over 500 studies during 30 years in risk engineering, examples only shown below)

- Safety Case Study preparation for MMP Industrial, Mulgrave, NSW, LPG storage and aerosol manufacturing facility (current project)
- QRA of an LNG plant at Kooragang Island, Newcastle, NSW under the SEPP33 requirements. Note: QRA Project was completed but cancelled after company takeover by other LNG interests]
- Safety Case studies for Ichthys LNG Project, Darwin, NT – Bow Tie assessments, ALARP/SFAIRP studies, HAZOP & HAZID studies.
- Quantitative Risk Assessment for the Channel Islands LPG storage facility, Darwin, NT.
- MHF Safety Case for the Solvay Interox Hydrogen Peroxide manufacturing facility, Banksmeadow, NSW (2012 and update in 2018).

Steve Sylvester
Technical Director
Risk Engineering Services

Steve.sylvester@riskcon-eng.com
+61 411 659 309
www.riskcon-eng.com

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- MHF Safety Case for the United Initiators Organic Peroxide manufacturing facility, Banksmeadow, NSW (2012 and update in 2018).
- MHF Safety Case for the Reckitt Benckiser Aerosol Dangerous Goods storage warehouse, Eastern Creek, NSW (2017).
- Safety Case – studies for the School of Survivability and Ship Safety (RAN-SSSS), HMAS Cerberus, Vic. (assessment of systems Safety Integrity, Hazardous Areas and HAZOP/CHAIR studies) (2016-2018);
- Safety Case(s) for the Auburn Rail Maintenance Centre (NSW) and the Packenham Train Maintenance Facility (Victoria) (2016-2019).
- Safety Case for the Defence (Navy) Mine Hunter Coastal Project, Canberra, ACT (Minehunter Construction in Newcastle, NSW) (1998-2000);
- Major Hazard Facility AQR Assessment (DG) - Bayswater Power Station, assist with the DG design to prevent application of MHF to the power station (2011);
- Safety Case Preparation for a Lead and Silver mining operation, including toxic substances and explosives, Macarthur River Mine, NT. (current project)
- Expert witness for various projects including; Land Use Safety Study for Shepperton Council - assessment of a land fill development on adjacent defence facilities including attendance at VCAT, Aluminium Waste Recycling Facility in the Hunter Region NSW, Coode Island Buffer Zone Land Use Encroachment Victoria (VCAT).
- Atherton Tableland Mill Air Heater Fire - Accident Investigation & Report, Thyssenkrupp, Queensland.
- Colongra Power Station Hazard Audit - conducted for NSW Department of Planning and Environment, including DG assessment and compliance review.
- Hazard Audits conducted for various facilities in accordance with the NSW Hazard Audit guidelines (example audits - Weston Aluminium, Tomago/Hydro Aluminium Smelters, Nuplex/Allnex Resins Plant, Solvay Interox Hydrogen Peroxide Plant, Colongra Power Station)
- Fire Safety Studies – example fire safety assessment include Shell Oil Refinery (Clyde), Afren Offshore Oil Platform (Gulf of Guinea), Aerosol Storage Warehouse (Reckitt & Benckiser), Aerosol Manufacturing Facility (MMP Industrial), Mainfreight Warehouse – Flammable Liquids, Waste to Energy Project (Eastern Creek), Dulux Flammable Liquids (Paints) Warehouse;
- ANSTO Nuclear Reactor Facility – Fire Safety Study and fire systems audit and compliance review.
- Dangerous Goods audit and review - Liddell Power Station, performed for Macquarie Generation (including Fire Safety Systems for Station Transformers);
- Sydney Airports Corporation - dangerous goods review and assessment for transport of DGs on aircraft and throughout the airport complex, with particular emphasis on maximum quantities and IATA compliance;
- Sydney Airports Corporation – Fire Risk Assessment of Apron Areas in front of Terminal GSE Dock between Terminals 2 & 3 at Sydney Airport.
- HAZOP and CHAIR studies for the Battlefield Airlifter Project, Amberley RAAF Base, Air Combat Capability Project, Williamtown, AIR7000 Project, Edinburgh RAAF Base and AIR5428 Project, East Sale/Pearce RAAF Bases.
- Safety in Design Studies for HMAS Albatross Stage 3 expansion project including CHAIR studies for a range of buildings and facilities (hangars,

Steve.sylvester@riskcon-eng.com
+61 411 659 309
www.riskcon-eng.com

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operations facilities, workshops, administration offices, etc.) at the Royal Australian Naval Air Station, Nowra.

- Safety Impacts Review - Educational Development within the Coode Island Planning Advisory Area, including attendance at VCAT.
- Mine winder Risk Studies including X41 Winder SIL Studies (Mt. Isa, Qld), Emergency Winder SIL Studies (Kulthor, QLD), HAZOP/FMECA Study (Ernest Henry, Qld), Winder Drive FMECA (Tahmoor, NSW).
- Software Verification Assessment (AS61508) – Metropolitan Colliery Winder System (conducted for Siemag Techberg, Sydney)
- Coal Loader Safety Integrity Studies for a range of facilities (truck and train loading) at Narrabri Coal Operations, Gunnedah Coal Loader, Tarrawonga & Rockglen Mines – studies conducted for Mine Regulation Compliance.
- Dangerous Goods Designs (including flammable liquids and fire safety assessments) for a range of university laboratories including UNSW, Monash University and Sydney University.
- HAZOP, ALARP and Hazardous Area Classification and Audit studies for the Ichthys Project Power Generation Facilities (Ichthys is a $48bN LNG plant in Darwin, NT)
- HAZOP Studies for the Koniambo Nickel Project and Goro Nickel Project, New Caledonia.
- Hazardous Area Classification, design and inspection of flammable liquids and explosives storage facilities at Holsworthy Army Base, Sydney, NSW
- Hazardous Area Classification assessment and equipment inspection review for Nuplex Industries Chemical resins plant, Botany, NSW.
- HAZOP and Safety Integrity Studies for a range of mines including Kestrel Coal Mine, Ernest Henry Hard Rock Mine, Narrabri Coal Mine and Chain Valley Colliery, Xstrata/Whitehaven Coal/LD Operations.
- Hazardous Area audit and equipment certification for Verve Kwinana Gas Turbine Facility, WA,
- Quantitative Risk Assessment for Valspar Surface Coatings Plant , Tuas Area, Singapore. Study conducted to meet the requirements of the Singapore Civil Defence guidelines & Criteria.
- Hazardous Area Classification study for RAAF Williamstown – assessment of all potentially hazardous areas on site, Transfield Services Northern Region;
- Risk assessment and safety management options for the National Radioactive Waste Repository at Woomera, SA (Department of Defence-Property Management Services);
- Risk Assessment of a Chemical Munitions Destruction Process at Columboola, Qld, assessment conducted as part of mustard gas shell destruction, Department of Defence.
- Assessment of Dangerous Goods stored at Ashton Coal Mine, Hunter Valley. Study included assessment and location of explosives stored (Dets and Chords) plus ammonium nitrate prill towers and diesel storages (ANFO).
- Conformity Assessment Documents (CADs) for Hazardous Area equipment – ITS Solvent Extraction equipment (Modena, Italy);
- Hazardous Area Classification for fuelling facilities at RAAF Williamtown (NSW) and Campbell Barracks (WA), including inspection of Ex equipment installed within Hazardous Areas.

Steve.sylvester@riskcon-eng.com
+61 411 659 309
www.riskcon-eng.com

Steve Sylvester
Technical Director
Risk Engineering Services

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- Hazardous Area Classification assessment and Hazardous Area Verification Dossier development for Super Retail Group Dangerous Goods storage warehouses in Qld, NSW, Vic., WA and New Zealand.
- Ammonia refrigeration system gas dispersion analysis and risk assessment, New Sydney Fish Markets, NSW.

Referees

Specific industry referees available upon request

Publications

Sylvester, S. (1988), "Some Experiences with Asbestos Removal in the Royal Australian Navy"' United Kingdom Health and Safety Executive Area Conference, Newcastle Under Lyme, UK. April, 1988.

Cameron, R.F., Sylvester, S.S., Teoh, S.C. (1992), "Assessing Environmental Risks from Electricity Generation"' EECON '92, Institution of Engineers Electric Energy Conference, Brisbane, October 1992. (Presented by S.Sylvester)

Tweeddale H.M., Sylvester, S.S. (1992), "Assessment of Risks to the Public from Gas Transmission Pipelines" Asia-Pacific Conference on Gas Transmission Pipelines, Kuala Lumpur, November 1992. (Presented by S.Sylvester)

Tweeddale, H.M., Cameron R.F. and Sylvester, S.S. (1992), "Some Experiences in Hazard Identification and Risk Shortlisting", J. Loss Prev. Process Ind., 1992, Vol. 5, No. 5, pp 279-288.

Raymond, G., and Sylvester, S.S., (1994), The Application of Risk Tools, Interdata Risk Handbook, I.D.P. Interdata Pty. Ltd. North Sydney.

Raman, R, and Sylvester, S (2001), "Computer Hazard and Operability Study or CHAZOP, Applications and Benefits", AIChemE, Spring National Meeting, Houston, Texas, April 2001.

Sylvester, S, and Thomas, D (2002), "Towards a Qualitative Screening Risk Assessment of Unexploded Ordnance Sites in Australia", Defence Unexploded Ordnance Panel annual conference, Canberra, ACT.

Sylvester. S (2003), "Some Experiences with the Application of State Environmental Planning Policy No.33", Australian Institute of Dangerous Goods Consultants (AIDGC) Annual Conference, Darling Harbour.

Sylvester.S (2011), "Flash Bang Wallop – major accident experiences in Australia", IChemE Risk Society seminar, University of Sydney

Sylvester.S (2012), "Experiences with Safety Management Failures in Australian Hazardous Facilities", Australian Insurance Council Seminar,

Sylvester.S (2012), "Use of Safety Integrity Level Analysis as a Risk Assessment Approach in Hazardous Area Application ", Hazardex 2012 Conference, Harrogate, Yorkshire, UK

Steve.sylvester@riskcon-eng.com
+61 411 659 309
www.riskcon-eng.com

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Geosyntec consultants

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STANNARDS MARINE PTY LTD vs NORTH SYDNEY COUNCIL L&E 63136/2021

Responses to Contamination Issues

03 December 2021

1 Request for Expert Opinion

1. I have been retained by Noakes Group Ltd. to provide an opinion on matters concerning possible sediment contamination issues in relation to an appeal in the Land and Environment Court relating to the refusal by North Sydney Council (NSC) for the Stannards Marine Pty Ltd (Stannards) Development Application to use a floating dry dock (FDD) in Berrys Bay as part of Noakes Boat Repair Yard. Specifically, I have been asked to address the Contamination Aspects of Contention (SOFACs) Contention 11 as well as additional contamination aspects raised by the respondent.

2. I have been provided with an electronic file that contains the Class 1 application with DA and reports, the Council Assessment Report, the NSC Statement of Facts and Contentions (SOFACs), the SOFAC in reply and SOFAC filed by the Objector parties.

2 Qualifications

3. My name is David Andrew Reynolds, I am a Senior Principal and Director of Geosyntec Consultants Australia Pty. Ltd. (Geosyntec). The address of Geosyntec Consultants is 189 Kent St., Sydney, NSW, 2000.

4. I have approximately 28 years of experience in contaminant hydrogeology and geological engineering. I was the leader of the Hydrogeology Research Group at the University of Western Australia and the Research Director of the Centre for Groundwater Studies. I am a contaminated sites auditor in Western Australia and Queensland. I was a member of the National Academies of Science, Engineering and Medicine Committee on Subsurface Characterization, Modeling, Monitoring, and Remediation of Fractured Rocks and author of the publication of the same name. I have more than 30 technical publications in peer reviewed journals. I am currently Project Director for more than 50 projects within Geosyntec. My CV is included as Appendix A.

3 Responses to Contamination Issues

5. In regard to Contention 11(a) that *inadequate information has been provided to allow adequate consideration of contamination status of the site (land and Berrys Bay)*, I note the following:

   a) A preliminary contamination assessment (PCA) completed by Jacobs Australia Pty Ltd (Jacobs, 2018a) indicates that the site (land and Berrys Bay) is potentially contaminated due to the historic commercial industrial and maritime landuse activities at and in the vicinity of the site. Jacobs noted that the exposure pathway to the impacted soil and groundwater beneath the site is incomplete. The key issue with respect to the proposed floating dry dock (FDD) development is the potential for resuspension/mobilisation of sediments during construction and operation of FDD, and if the proposed development will worsen the contamination status of Berrys Bay.
   b) Jacobs (2018b) completed a targeted sediment sampling program on 29 November 2017. Ten sediment samples collected from nine locations were analysed for contaminants of potential concern (COPC). The concentrations of heavy metals (copper- Cu, lead- Pb, mercury-Hg and zinc-Zn), tributyltin (TBT) and polycyclic aromatic hydrocarbons -PAH) were reported above the ANZG (2018) sediment assessment criteria at most sampling locations, including exceedance of total recoverable hydrocarbons (TRH) at some locations, indicating sediments within Berrys Bay are generally contaminated.
   c) Marine Pollution Research Pty Ltd (MPR) undertook further sediment sampling on 9 September 2021. Fifteen sediment samples collected from ten locations targeting areas near the foreshore and further west into the Bay, were anlaysed for COPCs. The analytical results generally align with Jacobs (2018b) findings that the sediment throughout Berrys Bay is contaminated with metals (Cu, Pb and Zn), TBT, PAH and TRH. The 2021 samples extended further into the Bay and showed COPCs are present throughout the Bay and not just in the vicinity of the location of the proposed FDD.
   d) It is my understanding that standard reporting of the MPR investigation data is being performed by MPR.

6. In regard to Contention 11(b) that *inadequate description of necessary land-based activities to support the FDD is provided and that the assessment of the suitability of the site for necessary land-based activities has not been undertaken*, it should be noted that Jacobs (2018a) indicated the site has historically been used for ship building, maintenance and associated maritime activities for over 150 years. Section 6.1 of the PCA states the proposed FDD development does not constitute material change in the land-based activities. The proposed development will not include any dredging of sediment, land-based excavation or interaction with groundwater. Considering the landuse history and that there are no changes to the landuse activities/zoning associated with the proposed development, a site suitability assessment for the FDD construction/operations is not required.

7. In regard to Contention 11(d) that *sediments in Berrys Bay, in particular in the FDD lifting position have been inadequately characterised to allow assessment of the impacts of likely suspension of sediments through FDD operation,* I note the following:

   a) Jacobs (2018b) collected and analysed sediment samples from nine locations (1-9) targeting the proposed FDD area in November 2017. The samples were analysed for COPCs and particle size distribution (PSD). The COPC results indicated sediment at the proposed FDD location is already impacted. The PSD results indicated sediments in general in the vicinity of the FDD constitute approximately 60% coarse grained material (sand) and approximately 40% fined grained material (silts and clays).

b) MPR collected an additional 15 sediment samples from 10 locations (11 to 20) in the vicinity of the proposed FDD and further west into the Bay in September 2021. The samples were analysed for COPC and PSD. The COPC results supports the Jacobs (2018b) findings that sediment within Berrys Bay and the foreshore area are already impacted.

8. In regard to Contention 11(e) that *inadequate information is provided to demonstrate that the operations of the FDD shall not result in resuspension of identified contaminated sediments in Berrys Bay* I note the following:

   a) If resuspension of impacted sediment occurs during operations of the FDD, any resuspension of contaminated sediment is likely to be short-term, close to the bottom (not rising to the surface) and localised as noted in Section 1.6 of Jacobs (2018b). As such, any re-suspension of sediment is unlikely to impact any new areas in the Bay.
   b) Implementation of mitigation measures such as a sediment curtain and floating turbidity boom during construction works, and implementation of an operations environmental management plan (OEMP) to monitor water quality of Berrys Bay during FDD operations will assist in minimising and monitoring resuspension/mobilisation of sediments from the bed of Berrys Bay. These measures are proposed in Section 5 of Jacobs (2018a).
   c) It is my understanding that operational aspects of the FDD and their potential for resuspension of contaminated sediment is being covered in other reports.

9. In regard to Contention 11(f) that *inadequate detail is provided to demonstrate that, with only 300mm clearance from the pontoon underside to the seabed, the disturbance of identified contaminated sediments shall not occur*, I note:
   a) I consider this to be outside my area of expertise.

10. In regard to Contention 11(g) *inadequate information has been provided to demonstrate that the proposed site activities shall not result in a change of risk in relation to the existing contamination of the land so that the contamination of the land does not become significant contamination*, I note that the site will continue to be used for the activities currently performed at the site. Section 6.1 of Jacobs (2018a) states that the proposed FDD development does not constitute a material change in the land-based activities. Whilst the water-based activities will change to accommodate FDD activities that are currently undertaken on land, the impact of such changes will likely to be minimal given that all site activities will be performed under the EPL 10893.
11. In regard to the Respondent's Feedback of Applicant's Action List item *"**Applicant** to document contamination assessment of seabed in accordance with requirements of Contaminated Land Management (CLM) Act guidelines. Assessment to document sampling program used to generated presented sediment quality data, detail QA/QC processes applied in generating data and providing analysis and interpretation of results in accordance with CLM and any other appropriate guidelines."*, I note:
    a. It is my understanding that this is being provided by MPR as part of their report.
12. In regard to the Respondent's Feedback of Applicant's Action List item *"**Applicant** to provide detailed risk assessment (detailing likelihood and consequence of events) of potential human health and environmental impacts associated with contaminant dissolution or resuspension due to 'normal' or identified 'abnormal' FDD operation."*, I note:
    a. Ecological impacts are being dealt with by MPR as part of their report
    b. In terms of human health impacts:

i. For a risk to be present a completed pathway from a source to a receptor must be present. In this case the source is well characterised by the sediment samples taken and the receptor under consideration is human.
ii. Potential pathways between the source and the human receptor are incomplete, unlikely, or managed via existing orders and actions.
iii. A potential pathway exists through consumption of fish or other seafood sourced from Berry's Bay. This potential pathway is currently managed by the Department of Primary Industries who have decreed that no fish or crustaceans caught west of the Sydney Harbour Bridge should be eaten.
iv. A potential pathway exists for recreational activities. To complete the pathway a recreational user would need to interact with suspended sediment which will be localised to a few cm from the seabed. It is considered unlikely that recreational swimmers would be present in the Bay in the vicinity of the FDD at the depth of the suspended sediments, particularly during load/unload operations which is (to my understanding) the most likely time that sediment resuspension could occur.
v. A second potential recreational pathway exists for surface recreation (boats, kayaks, etc.). To complete this pathway a recreational user would need to interact with suspended sediment. Given that suspended sediment will be localised to the seabed, such interaction is highly unlikely.

13. In summary:
    a. The sediments of Berry's Bay are impacted by a variety of contaminants
    b. Contamination was found in the sediments at all points sampled within the Bay
    c. The sampling programs conducted to date (Jacobs 2018 and MPR 2021) provide an adequate data set to draw conclusions
    d. Resuspension of the sediments presents a very low risk to human health due to low probability of completed Source – Pathway – Receptor linkages.

David A. Reynolds, Ph.D., CEnvP (SC)

Appendix A CV

Geosyntec consultants

David A. Reynolds PhD, CEnvP (SC)
Senior Principal and Director

site investigation and modelling
expert review and auditing
remediation design and regulatory guidance
applied research

CAREER SUMMARY

Dr. Reynolds career has included time as a tenured academic position, as research director of a multi-partner Centre focusing on groundwater issues, and senior technical positions at two international consulting companies. Dave has been an author of several ITRC guidance documents, as well as an author on National Academies publications. He is the co-inventor of electrokinetic oxidation approaches for remediation of heterogeneous and low permeability source zones, as well as the use of electromigration for in-situ desalination. Dr. Reynolds has extensive experience in litigation support, both as a consulting and testifying expert (Australia, Canada, and the United States). Currently a contaminated sites Auditor in Western Australia and Queensland, and the Queensland-based operations manager for Geosyntec Consultants (Australia), Dave is responsible for the oversight of all Geosyntec projects across Australasia.

EDUCATION

Ph.D., Environmental Engineering, Queen's University, Kingston, Ont.
M.Sc. (Eng.), Environmental Engineering, Queen's University, Kingston, Ont.
B.A.Sc., Geological Engineering, University of Waterloo, Waterloo, Ont.

REGISTRATIONS, CERTIFICATIONS, MEMBERSHIPS

Accredited Contaminated Sites Auditor, Western Australia and Queensland
Certified Environmental Practitioner – Site Contamination Specialist
Professional Engineer, Ontario, Canada

SELECTED PROJECTS

Environmental Auditing

HMAS Stirling, Western Australia. Provided Auditor services for PFAS site investigation, human and ecological health risk assessments, remediation assessment, and PMAP for HMAS Stirling, Garden Island, Western Australia. Challenging technical foci for the audit were the extensive groundwater modelling conducted for the risk assessment as well as the biota sampling and interpretation process conducted for the ecological risk assessment. The Audit process was very effective, streamlined, and honoured the tight schedules required for review and endorsement of a large body of reports.

Maylands Car Park, Western Australia. Provided Auditor services to the Public Transport Authority for site redevelopment of the Maylands train station including review of site investigations, remedial plans and validation and closure plans. Challenging technical foci for the audit included resolving the significant disparity in historical data collected by different consultants and understanding the impacts of various development phases (both on-site and off-site) on the CSM and the impacts on future risk and land use.

Technology Development and Demonstration

Forecasting Effective Site Characterization and Early Remediation Performance, SERDP ER-2313. Project Manager and Technical Lead. The DIVER (Data Information Value to Evaluate Remediation) project is developing technical guidance on the value of data in both the site characterization and remediation contexts based on detailed field data, empirical evidence gathered from some of the most respected and successful practitioners in the field, highly detailed virtual site investigations, and stochastic approaches to quantifying the value of additional information. The primary research objective is to develop a framework for optimizing the site characterization process, such that the total cost of investigation, the cost of achieving remedial goals, and the likelihood of failure of remedial approaches are minimized.

In-Situ Treatment of PFAS Using D-FAS Technology, ESTCP ER19-5075. Principal Investigator. D-FAS is an innovative in-situ approach to dealing with dissolved-phase PFAS contamination in source zones. Taking advantage of the surfactant properties of the individual PFAS compounds, D-FAS removes them from a water column via engineered bubbles, resulting in a concentrated PFAS foam extract for disposal and groundwater below most criteria. This project is undertaking a demonstration of the technology at a US Naval facility.

Interactive Training System for Reductions in Cost and Complexity of Remediation and Long-term Management of Contaminated Sites, ESTCP ER-201566-T2. Principal Investigator. Leveraging the results and deliverables of the DIVER project (ER-2313), the TEMPO project produced an interactive training system for contaminated site investigation and optimization of remediation performance monitoring. The training tool is being used for CE credits by RPMs, as well as in a number of university programs around the world.

Demonstration of Smoldering Combustion Treatment of PFAS-impacted Investigation-derived Waste, SERDP ER18-1593. Co-Principal Investigator. The primary research objective of the work was to demonstrate proof-of-concept for the use of smoldering combustion (SC) to treat investigation-derived waste (IDW - both liquid and solid) generated during investigation of per- and polyfluoroalkyl substance (PFAS) impacted sites. Results indicated that SC is a highly suitable remedy for PFAS-impacted soil.

Electrokinetically-delivered, Thermally-activated Persulfate Oxidation (EK-TAP) for the Remediation of Chlorinated and Recalcitrant Compounds in Heterogeneous and Low Permeability Source Zones. ESTCP ER-201626. Technical Lead. This on-going project is demonstrating the ability of a novel combined in situ remediation approach, referred to as electrokinetically-delivered, thermally-activated persulfate (EK-TAP), to remediate chlorinated solvents and recalcitrant chemicals (e.g., 1,4-dioxane) in low permeability (K) and heterogeneous geological materials.

Electrokinetic-enhanced (EK-Enhanced) Amendment Delivery for Remediation of Low Permeability and Heterogeneous Materials. ESTCP ER-201325. Technical Lead. This demonstration/validation project, performed at Naval Air Station (NAS) Jacksonville to target a tetrachloroethene (PCE) source area in clay materials, successfully validated the performance of an electrokinetic (EK) technique to promote uniform and effective distribution of lactate (as an electron donor) in low-permeability (low-K) and heterogeneous subsurface materials.

Remediation

Hydrocarbon Plume Beneath Ecological Reserve, Western Australia. Project Director. A former diesel and two-stroke engine fuel spill had migrated beneath sensitive coastal dunes located on a Heritage listed island 20 km offshore. The project involved the inception and qualification of the State's Natural Attenuation Guidelines, and has utilised a passive, renewable energy non-intrusive system for oxygen addition.

Former Waste Transfer Facility, Perth, W.A. Principal Engineer. Multi-year, multi-faceted project involving site investigation and remediation of dissolved chlorinated ethenes plume. Project included detailed site investigation, numerical modelling for remedy design, installation of dual permeable reactive barriers, and enhanced in-situ bioremediation using EVO.

Chemical Manufacturing Facility, Lake Charles, LA. Project Director. Pilot-scale demonstration of Electrokinetic remediation using EK-TAP. Project included design, stakeholder consultation, regulatory approval, installation, operation and optimization.

Former Industrial Park, Ballerup, Denmark. Technical Lead. Dipole-scale demonstration of Electrokinetic remediation using EK-TAP. Project included design, stakeholder consultation, regulatory approval and technical oversight.

Lorentz Barrel and Drum Superfund Site, San Jose, CA. Project Director. Pilot-scale demonstration of Electrokinetic remediation using EK-TAP in conjunction with USEPA. Project included design, stakeholder consultation, regulatory approval, installation, operation and optimization.

Benchmark Storage Facility, California. Technical Lead. Pilot-scale demonstration of Electrokinetic remediation using EK-TAP. Project included design, stakeholder consultation, regulatory approval, installation, operation and optimization.

Enhanced In-situ Bioremediation of Former Dry Cleaner Site, Florida. Technical Advisor and Project Manager. Designed and oversaw implementation of emulsified vegetable oil (EVO) injections and bioaugmentation for remediation of shallow groundwater downgradient of a former dry-cleaning facility.

In-situ Biological Remediation of Fractured Rock, New York. Project Director. Led the technical design and implementation of a density-assisted pilot-scale assessment of surface lactate delivery to deeper formations. High-density lactate (DAPL) additions in the shallow formations at the site have been emplaced to migrate through the higher-impacted regions deeper in the system. The approach was used to avoid drilling into or through the heavily contaminated and more porous deeper sections of the fractured rock aquifer. Reductions of COC concentrations at the downgradient boundary in the deeper targeted system have been observed.

Modelling

Former Waste Transfer Facility, Perth, W.A. Principal Engineer and reviewer for a detailed site investigation, numerical modelling program, and remediation of a former waste transfer facility contaminated with chlorinated solvents, hydrocarbons, metals and pesticides. Technical director and designer for world's first sequenced nZVI permeable reactive barrier.

Arsenic Plume Modelling, Alberta, Canada. Project Director. Historical operational practices for enhanced oil recovery have led to the release of arsenic from shallow sediments, and the development of a downgradient plume with the potential to discharge to sensitive ecological receptors. Led development of a kilometre-scale three-dimensional model of temperature-dependent flow and transport with geochemical reaction coupling for arsenic speciation.

Former Manufacturing Facility, Sao Paulo, Brazil. Lead designer and modeller for a focused pump and treat system in fractured rock. Project duties involved the design of site characterization tests to inform the numerical model, data interpretation, conceptual site model development of flow and transport in fractured rock, and overall design of the remediation concept.

Smithville Phase IV Remediation Program, Ontario, Canada. Lead Modeller. Assessment of potential remedial options at the Smithville PCB storage facility. Undertook detailed multi-component modelling in a multiple continuum framework to assess the efficacy of identified remedial options and produce optimized implementation plans. The project also included price estimation of the optimized designs.

HSSM Modelling, Multiple Locations, Australia. Project Director. Project examined the adequacy of existing bund materials at numerous fuel storage sites across Australia to provide suitable protection for groundwater under various spill scenarios (mild, moderate, catastrophic). The HSSM model was used to develop a screening matrix based on soil and fuel properties to determine which locations and under what conditions the existing bunds did not provide enough protection to meet threshold response times for intervention.

PHT3D-EK. Principal Investigator. Development of the electrokinetic (EK) version of PHT3D to serve as a design tool for bench-scale treatability studies as well as field-scale implementation of electrokinetics.

UTCEHM-EK. Project Director and Lead Modeller. Development of the electrokinetic (EK) version of UTCHEM for investigation of the potential of using EK processes to optimize tertiary oil recovery.

Complex Site Investigation

Chlorinated Solvent Plume, Bomaderry, NSW. Technical Expert. Engaged as an external expert to assist incumbent consultant with the planning, execution and interpretation of a detailed site investigation where TCE was migrating through a complex fractured sandstone sequence and potentially discharging at a local stream.

PFAS Impacts on Major Infrastructure Project, Perth, W.A. Technical Expert. Engaged as an independent expert to provide advice to site owner on PFAS matters related to soil impacts, ecological risk, laboratory reliability and quality control, remediation options, and regulatory matters.

Mineral Refining Laboratory, Belmont, W.A. Project Director. Historical waste disposal practices resulted in a small scale DNAPL source zone within a locally stratified aquifer in the midst of an industrial subdivision with the resulting plume discharging to a local drain connected to the Swan River. The site became a focus for research into site investigation and remediation sustainability within Western Australia, with intensive source zone investigation, PITTs, passive flux meter installations and MIPs (both the first in Australia), and extensive laboratory work on the possibilities for low-impact, sustainable remediation**.**

Litigation and Expert Witness

Organics

Major Infrastructure Project, Melbourne, Australia. Acted as expert witness for mediation involving PFAS impacted spoil.

PFAS Impacts, Perth, Australia. Acted as expert witness for mediation involving potential impacts on adjacent land from historical firefighting training.

Former Service Station, Perth, Australia. Acted as expert witness (Plaintiff) for litigation involving historical impacts from operation of a service station.

Active Dry-Cleaning Facility, Sydney, Australia. Acted as expert witness (Defendant) for litigation involving historical releases of dry-cleaning fluid and associated impacts on adjacent commercial and residential properties.

Former Dry-Cleaning Facility, Melbourne, Victoria. Acted as expert witness (Plaintiff) for litigation involving the contamination of a medium-density residential development by PCE.

Former Dry Cleaner Site, Ottawa, Ontario. Acted as expert witness (Plaintiff) for litigation involving historical releases of dry-cleaning products.

Fire Training Facility, Ottawa, Ontario. Expert witness (Plaintiff) for litigation involving the contamination of residential water wells with PFAS.

Former Industrial Site, Macon, Missouri. Acted as expert (Defendant) for a matter involving the timing of releases of contaminants to the subsurface.

Agricultural Land, Assumption Parish, Louisiana. Acted as expert witness (Defendant) for litigation involving petroleum hydrocarbon impacts.

Former Service Station, Maryland. Acted as expert witness (Defendant) for litigation involving historical releases of MTBE from underground tanks and impacts to surrounding community.

Inorganics

Agricultural Land, St. Martin Parish, Louisiana. Acted as expert witness (Defendant) for litigation involving alleged oil and gas exploration and production activities impacts on agricultural land.

Agricultural Land, Parish of St. Landry, Louisiana. Acted as expert witness (Defendant) for litigation involving alleged oil and gas exploration and production activities impacts on agricultural land.

Agricultural Land, Jefferson Parish, Louisiana. Acted as expert witness (Defendant) for litigation involving alleged oil and gas exploration and production activities impacts on agricultural land.

Land Impacts, LaFourche Parish, Louisiana. Acted as expert witness (Defendant) for litigation involving alleged oil and gas exploration and production activities impacts on uninhabited land.

Private Land, Cameron Parish, Louisiana. Acted as an expert witness (Defendant) on matters concerning potential exploration and production activities on private land.

Agricultural Land, Catahoula Parish, Louisiana. Acted as expert witness (Defendant) for litigation involving alleged oil and gas exploration and production activities impacts on agricultural land.

PROFESSIONAL EXPERIENCE

Geosyntec Family of Companies, 2011 – Present

Golder Associates Pty. Ltd., West, Perth, Australia, 2008 - 2011

School of Environmental Systems Engineering, University of Western Australia, Crawley, Australia, Senior Lecturer, 2006 - 2008

Flinders University, Adelaide, Australia, Research Director, Centre for Groundwater Studies, 2005 – 2007

University of Western Australia, Crawley, Australia, Tenured Lecturer, School of Environmental Systems Engineering, 2001 – 2006; tenure granted July 2004

Queen's University, Kingston, Ontario, Lecturer, Department of Civil Engineering, 2000 – 2001

REFEREED JOURNAL PUBLICATIONS

20-01 Head, N.A., Gerhard, J.I., Inglis, A.M., Garcia, A.N., Chowdhury, A.I.A., Reynolds, D.A., V. de Boer, C., Sidebottom, A., Austrins, L.M., Eimers, J., and D.M. O'Carroll. 2020. *Field Test of Electrokinetically-delivered Thermally Activated Persulfate for Remediation of Chlorinated Solvents in Clay*, Water Research, Vol. 183, pgs. 1-10.

18-01 Milley, S., Koch, I., Fortin, P., Archer, J., Reynolds, D., and K. Weber. 2018. *Estimating the Number of Airports Potentially Contaminated with Perfluoroalkyl and Polyfluoroalkyl Substances from Aqueous Film Forming Foam: A Canadian Example*, Journal of Environmental Management, 222, 122-131.

17-01 Chowdhury, A.I.A., Gerhard, J.G., Reynolds, D.A., and D.M. O'Carroll. 2017. *Low Permeability Zone Remediation via Oxidant Delivered by Electrokinetics and Activated by Electrical Resistance Heating: Proof of Concept*, Environmental Science & Technology, 51 (22), 13295-13303.

17-02 Lima, A.T., Hofmann, A., Reynolds, D., Ptacek, CJ, Van Cappellen, P., Ottosen, L.M., Pamukcu, S., Alshawabekh, A., O'Carroll, DM, Riis, C., Cox, E., Gent, D.B., Landis, R., Wang, J., Chowdhury, AIA, Secord, E.L., and A. Sanchez-Hachair. 2017. *Environmental Electrokinetics for a Sustainable Subsurface*, Chemosphere, 181, 122-133.

17-03 Chowdhury, A.I.A., Gerhard, J.I., Reynolds, D., Sleep, B.E., and D.M. O'Carroll. 2017. *Electrokinetic-enhanced Permanganate Delivery and Remediation of Contaminated Low Permeability Porous Media*, Water Research, 113, 215-222.

13-01 Hodges, D., Fourie, A., Thomas, D.G., and D.A. Reynolds. 2013. *Overcoming Permanganate Stalling During Electromigration*, ASCE Journal of Environmental Engineering, 139 (5), 677-684.

13-02 Wu, M.Z., Reynolds, D.A., Fourie, A., and D.G. Thomas. 2013. *Optimal Field Approaches for Electrokinetic In Situ Oxidation Remediation*, Ground Water Monitoring and Remediation, Vol. 33, No. 1, pgs. 62-74.

12-01 Wu, M.Z., Reynolds, D.A., Fourie, A., and D.G. Thomas. 2012. *Electrokinetic In Situ Chemical Oxidation Remediation: Assessment of Parameter Sensitivities and the Influence of Aquifer Heterogeneity on Remediation Efficiency*, J. Contaminant Hydrology, Vol. 136-137, pgs. 72-85.

12-02 Wu, M.Z., Reynolds, D.A., Prommer, H., Fourie, A., and D.G. Thomas. 2012. *Numerical Evaluation of Voltage Gradient Constraints on Electrokinetic Injection of Amendments*, Advances in Water Resources, Vol. 38, pgs. 60-69.

11-01 Hodges, D, A. Fourie, D. Reynolds, and D.G. Thomas. 2011. *Development of an Apparatus for pH-Isolated Electrokinetic In-Situ Chemical Oxidation*, ASCE Journal of Environmental Engineering, Vol. 137, No.9, pgs. 809-816.

11-02 Jones, E., D. Reynolds, L. Wood, and D. Thomas. 2011. *Use of Electrophoresis for Transporting Nano-Iron in Porous Media*. Journal of Groundwater, Vol 49, No 2, pgs 172 – 183.

09-01 Horsnell, T.K., Smettem, K.R.J., Reynolds, D.A., and E.M. Mattiske. 2009. Composition and relative health of remnant vegetation fringing lakes along a salinity and waterlogging gradient. Wetland Ecology and Management. 17; 489-502.

08-01 Reynolds, D.A., E. Jones, M. Gillen, I. Yusoff, and D.G. Thomas. 2008. *Electrokinetic Migration of Permanganate Through Low-Permeability Media*, Journal of Groundwater, Vol 46, No 4, pgs 629 - 637.

08-02 Weatherill, D., T. Graf, C. T. Simmons, P. G. Cook, R. Therrien, and D. A. Reynolds. 2008. *Discretising the fracture-matrix interface to Simulate Solute Transport*, Journal of Groundwater, Vol 46, No 4, pgs 606-615.

08-03 Kusumastuti, D, Sivapalan, M., Struthers, I., Reynolds, D., Murray, K. and B. Turlach. 2008. *Thresholds in the storm response of a catchment-lake system and the occurrence and magnitude of lake overflows: implications for flood frequency*, Water Resources Research, Vol 44, W02438, doi:10.1029/2006WR005628.

07-01 Mundle, K., Kueper, B., West, M., and D. Reynolds. 2007. *Concentration Rebound Following ISCO in Fractured Clay*, Journal of Groundwater, Vol 45, No 6, pgs 692-702.

07-02 Marimuthu, S., and D.A. Reynolds. 2007. *Deuterium composition and flow path analysis as additional calibration targets to calibrate groundwater flow simulation in a coastal wetlands system*, Hydrogeology Journal, Vol. 15, No. 3, 515 – 535.

06-01 Kusumastuti, D., Reynolds, D.A., Struthers, I. and M.S. Sivapalan. 2006. *Threshold Effects in a Catchment Storm Response and the Occurrence and Magnitude of Flood Events: Implications for Flood Frequency*, HESS, Vol 5, 3239-3277.

06-02 Putzlocher, B., D.A. Reynolds, B.H. Kueper. 2006. *Verification of Conceptual Models of Relative Rates of Aqueous and Nonaqueous Phase Contamination in Tilted Systems*, Journal of Contaminant Hydrology, Vol. 88, No. 3, pgs 321-336.

06-03 Steele, A.D., Reynolds, D.A., Kueper, B.H., and D.N. Lerner. 2006. *In-situ Determination of Fracture Aperture Through Oil Injection*, Geotechnique, Vol. 56, No. 1, pgs 27 - 38.

05-01 Marimuthu, S., Reynolds, D.A., and C. Le Gal La Salle. 2005. *A Field Study of Hydraulic, Geochecmical and Stable Isotope Relationships in a Coastal Wetlands System*, J Hydrology, Vol. 315, 93-116.

04-01 Marimuthu, S., Reynolds, D.A., and C. Le Gal La Salle. 2004. *Interaction Between Groundwater and Surface Water in a Coastal Wetlands System in Southwestern Australia*, Isotope Hydrology and Integrated Water Resources Management, 437.

03-01 Reynolds, D.A., and B.H. Kueper. 2003. *Effective constitutive properties for DNAPL migration in large fracture networks: A computational study,* Water Resources Research, Vol. 39, No. 9, SBH 6-1.

03-02 Reynolds, D.A., and B.H. Kueper. 2003. *Migration of NAPLs in Fractured Heterogeneous Porous Media*, J. Contaminant Hydrology, Vol 71, pgs 89-110.

02-01 Reynolds, D.A. and B.H. Kueper. 2002. *Numerical Examination of the Factors Controlling DNAPL Migration Through a Single Fracture*, Ground Water, Vol. 40, 368-377.

00-01 Reynolds, D.A., and B.H. Kueper. 2000. *Factors Affecting Multiphase Flow and Transport in Fractured Geologic Sequences*, J. Contaminant Hydrology, Vol. 51, 41-62.

96-01 Bizzigotti, G.O., Reynolds, D.A., and B.H. Kueper. 1996. *Enhanced Solubilization and Destruction of Tetrachloroethylene by Hydroxypropyl*-b-*cyclodextrin and Iron*, Environmental Science and Technology, Vol. 31, 472-478.

REPRESENTATIVE PRESENTATIONS (2013 ONWARDS)

16-02 Reynolds, D.A. *Characterization, Modeling, Monitoring, and Remediation of Fractured Rock: An Academies Report*, Battelle Remediation of Chlorinated and Other Recalcitrant Compounds Conference, Palm Springs, California.

16-01 Reynolds, D.A. *Electrokinetic-enhanced Remediation: Past, Present, and Future, Keynote Address*, Renew/Integrate Symposium, Toronto, Ontario.

15-04 Reynolds, D.A. *Subsurface Characterization, Modeling, Monitoring, and Remediation of Fractured Rocks*, CleanUp2015, Melbourne, Victoria.

15-03 Reynolds, D.A., Wealthall, G., and M. Kavanaugh. *Remediation of Complex Contaminated Groundwater Sites: Perspectives on Effective Decision Making to Meet Project Objectives*, CleanUp 2015, Melbourne, Victoria.

15-02 Reynolds, D.A., Cox, E., Wang, J., Riis, C., and D. Gent. *An Examination of Recent Field Results from Implementation of Electrokinetic Remediation Approaches in Low Permeability Soils*, CleanUp 2015, Melbourne, Victoria.

15-01 Reynolds, D.A., and D. Major. *Environmental Measurements as the Basis of Policy Change – A Case of the Tail Wagging the Dog?*, CleanUp2015, Melbourne, Victoria.

14-01 Reynolds, D.A., Soucy, N., Mumford, K, Cox, E., and J. Wang. 2014. A *Coupled Electrokinetic and Electrical Resistance Heating Approach for Persulfate Distribution and Activation in Low Permeability Soils*, Ninth International Conference on Remediation of Chlorinated and Recalcitrant Compounds, Monterey, California, May 19-22.

13-04 Reynolds, D.A. 2013. *Bugs, Rocket Fuel, and High Voltage!: A Short Walk Through the History of Bioremediation of Soil and Groundwater*, Robert and Joyce Jones Speaker Series, Department of Civil Engineering, Queens University, Kingston, Ontario, Canada.

13-03 Reynolds, D.A., Wang, J., and E.Cox. 2013. *Electrokinetic Enhanced Amendment Delivery: Results of the First Field Pilot*, GQ2013, Gainesville, Florida.

13-02 Reynolds, D.A., Grant, G., Scholes, G., Major, D., Dworatzek, S., Konzuk, J., and P. Dollar. 2013. *Self-sustaining Treatment for Active Remediation (STAR): In Situ Testing and Scale-up for the Smoldering Combustion Treatment of Coal Tar*, Cleanup 2013, Melbourne, Victoria, Australia

13-01 Reynolds, D.A., Wang, J., Cox, E., Gent, D., and C. Riis. 2013. *Electrokinetic-enhanced Amendment Delivery for Remediation of Low permeability and Heterogeneous materials: Results of the First Field Pilot*, Cleanup 2013, Melbourne, Victoria, Australia

We are engineers, scientists and innovators

Geosyntec consultants

BRISBANE OFFICE
PO Box 41
Indooroopilly Centre QLD 4068

SYDNEY OFFICE
Suite 1, Level 9, 189 Kent Street
Sydney NSW 2000

MELBOURNE OFFICE
Level 26, 360 Collins Street
Melbourne VIC 3000

www.geosyntec.com.au

PROPOSED FLOATING DRY DOCK (FDD)

AT

NOAKES BOATYARD
6 JOHN STREET, MCMAHONS POINT, NSW

STANNARDS MARINE PTY LIMITED
v NORTH SYDNEY COUNCIL

LAND AND ENVIRONMENT COURT OF NSW

2021/00063136

HERITAGE RESPONSE

Prepared by

John Oultram Expert to the Applicant

of John Oultram Heritage & Design

30th November 2021

1.0 INTRODUCTION

1.1 THE BRIEF

The following report has been prepared in response to the Statement of Facts and Contentions filed on 13TH May 2021 and prepared by North Sydney Council in the matter of Stannards Marine Pty Limited v North Sydney Council (Land and Environment Court of New South Wales No. 00063136 of 2021) (the SOFAC).

The response also includes further commentary in regard to issues raised by the Respondent.

1.2 DOCUMENTS

I have relied on the following documents in preparing this response:

North Sydney Local Environmental Plan 2013 (NSLEP)
North Sydney Development Control Plan 2012 (NSDCP)

1.2.1 Drawings

Drawings Nos. 2258.01 SK4000, 4001, 4002, 4003, 4004, 4005, 4006 (two sheets) dated December 2017 prepared by Altis Architecture.

1.2.2 Reports

NBRS Architecture Heritage, *Statement of Heritage Impact, Noakes Boat and Shipyard, Berry's Bay*, dated 30th July 2018 (HIS)

Richard Lamb Associates, *Proposed Floating Dry Dock, 6 John Street, McMahons Point, Visual Impact Assessment*, dated December 2017 (updated 20 February 2019 and November 2019)

Urbaine Architectural, *Visual Impact Assessment 6 John Street, McMahons Point*, dated October 2021

NSW Heritage Council, Development Application Referral – Berry's Bay Floating Dry Dock, 6 John Street, McMahons Point, North Sydney (DA3/18), dated 11th April 2018

1.3 AUTHORS AND ACKNOWLEDGMENTS

This report was prepared by:

John Oultram of John Oultram Heritage & Design, Expert to the Applicant

The site and environs were inspected by Mr Oultram in September 2021.

1.4 COURT DIRECTIONS

In preparing this Response I acknowledge that it has been prepared according to the Court's directions set out in the following procedural guidelines:

- *Class One Development Appeals – Usual Directions*;
- Division 2 of Part 31 of the *Uniform Civil Procedure Rules*;
- The *Expert Witness Code of Conduct* in Schedule 7 of the *Uniform Civil Procedure Rules;* and
- The Land and Environment Court Policies on Conference of Expert Witnesses and On Joint Reports

PART A – FACTS

I agree with the facts stated in Part A of the SOFAC – The Facts

Further information about the subject property:

The subject property is listed as a heritage item in Schedule 5 Part 1 of the NSLEP.

REF	ADDRESS	ITEM	RANKING
I0484	6 John Street and 16-18 Munro Street Boatbuilders Walk	Stannard Bros Shipyard and associated industrial buildings	Local

The subject property is not within a heritage conservation area identified in Schedule 5 Part 2 of the NSLEP.

The subject property is in the vicinity of the following heritage items identified in Schedule 5 Part 1 of the NSLEP:

REF	ADDRESS	ITEM	RANKING
I0461	3 Commodore Crescent	*Monte Christo*	Local
I0483	Munro and John Streets (behind boatyard, east side of berry's bay	Sandstone Cliff	Local
I0481	10 Munro Street	House	Local
I0521	Munro Street	Sawmiller's Reserve	Local
I0387	Commodore Crescent	Lavender Bay Railway Line	Local
I0388	John Street	John Street Railway Bridge	Local
	To the west across Berry's Bay		
I1036	3A Balls Drive Drive	BP Site	Local
I1038	1 Balls Head Drive	Woodley's Shipyard	Local
I1039	Balls Head Drive	Former Quarantine Boat Depot	Local
I1041	Balls Head Drive	Balls Head Reserve	Local

The subject property is in the vicinity of the following Heritage Conservation Area identified in Schedule 5 Part 2 of the NSLEP:

REF	ADDRESS	ITEM	RANKING
CA15		Union Bank an Thomas Streets Conservation Area	Local

PART B – CONTENTIONS

PART B - CONTENTIONS

1. NON-COMPLIANCE WITH SEARS

The Development Application should be refused because it does not adequately address the SEARS.

3. COMPATIBILITY

The Proposed Development is not compatible with the existing character of the area, and will have adverse visual and environmental impacts on the foreshore and surrounding natural and built features of the local area.

Particulars

(a) The local area comprises the adjacent boatyard which forms part of the Site and is listed as a heritage item, surrounding residential development, and natural features. There are a number of heritage items within the vicinity of the proposed FDD as listed in paragraph 9 and 10 of the facts.

I accept that this is the case.

(b) The size and scale of the FDD will be visually dominant in the context of the local area and will detract from the surrounding natural environment and the heritage items in the vicinity of the Proposed Development, in particular the sandstone cliff being heritage item I0483. The FDD will obscure views of the sandstone cliff from the foreshore of and residences adjacent to Berrys Bay as well as passive users of Berrys Bay itself.

The sandstone cliff is in part a natural formation and partly constructed with exposed, 'quarried' faces (most evident in the boatyard) and stone retaining walls (some collapsed). The natural embankment behind the boatyard is very heavily planted and only some sections of sandstone are visible.

To the south of the boatyard is a relatively modern, medium density residential apartment development that has obscured the lower parts the sandstone cliff.

The more 'naturalistic' sections of the cliff are to the north of the boatyard towards Waverton Park and here some Parts have stone retaining walls atop.

The most exposed section of 'cliff' is the quarried section behind the boat repair structures to the south of the boatyard site that are visible from the boatyard and view points to the west across the bay. Much of the lower cliff in the boatyard is obscured by foreshore structures

The proposed Dry Dock is a floating structure set into the Bay and does not abut the cliff directly in the manner of the housing development to the south. It is separated from the cliff by the current apron that extends into the bay that will be retained. The FDD is set to the north of the most exposed section of sandstone that will remain clearly visible in views from the west.

This is shown in Figure 118 of the HIS:

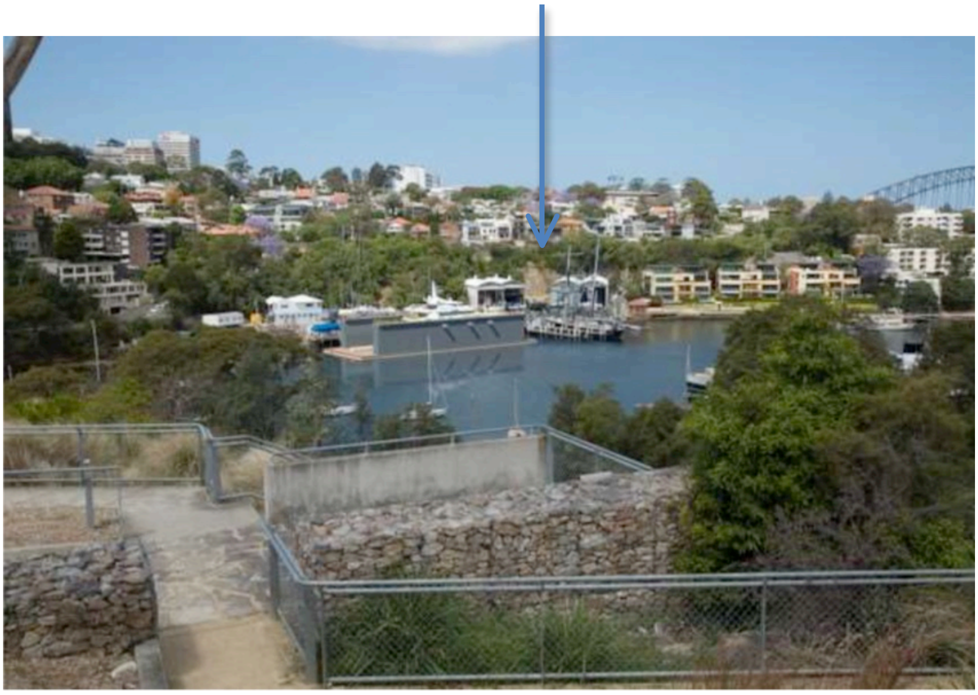

Figure 1 View to the boatyard and FDD from the northwest across Barry Bay – exposed sandstone arrowed

Depending on the viewing point, the planted and exposed sandstone elements will remain clearly visible from vantage points to the north, northwest and west and from inside of the boatyard premises.

(c) The Proposed Development is inconsistent with the SREP DCP, which provides at clause 4.1 that individual private facilities should not be visually dominant. Development should complement rather than compete with the other established elements. The bulk and scale of the Proposed Development is such that it will dominate the surrounding built form and local features in the small eastern cove of Berrys Bay.

The current boatyard development is reasonably large and has large structures on the foreshore. It also regularly services boats of some scale that provide for large elements along the aprons and wharfs.

Currently there are two large boats moored in the bay, a former ferry and a former floating restaurant with the ferry being of a larger length than the FDD.

It is clear for the historic photographs in the HIS that there has been a stream of larger vessels moored in the Bay and docked for repairs at the boatyard and boat building and repair has been a feature of the Bay since the 1870s.

HIS Figure 40, p. 48. View of the shipyard in the 1880s

HIS Figure 41, p. 52. View of Berry's Bay in 1885

HIS Figure 41, p. 48. View of Berry's Bay in 1892

HIS Figure 72, p. 65. View of Berry's Bay pre 1940

Floating elements have been a feature of the bay since the opening of the boatyard and continue to be so.

(d) The size and scale of the FDD will dominate its landscape setting in contravention of Clause 4.2 of the SREP DCP which includes as a general requirement that:

development does not dominate its landscape setting;

The FDD is of a comparable scale to other moored elements in the Bay and is not at a scale that would dominate the Bay.

4. VISUAL IMPACT / VIEW LOSS

The Development Application should be refused because the FDD will have an unacceptable visual impact on properties along the foreshore areas, waterway users, and other public land-based vantage points.

I would defer to John Aspinall, Urbaine, the visual impact expert in this matter.

5. HERITAGE IMPACTS

The Development Application should be refused because the FDD will have adverse effect upon the heritage significance of heritage items in the vicinity of the FDD as well as associated settings and views.

Particulars

(a) The proposed location of the FDD and its dimensions and working height will have an unacceptable impact on the visual qualities of the heritage-listed site, Stannard Brothers Shipyard McMahons Point, being Heritage Item I0484 in North Sydney LEP 2013.

The shipyard already has large, shore based structures and there are number of larger boats moored in the bay. Though their mooring may be temporary, it is likely that the Bay will continue to accommodate larger boats.

The current structures on the foreshore are largely modern and have been built to allow for the ongoing use of the place as a repair yard that is the primary, historic significance of the place.

By their nature, not all of these structures may be aesthetically pleasing and this can be seen in other areas such as Garden Island and Cockatoo Island, but they reflect the maritime tradition of Sydney Harbour and their rather brutal structures provide strong evidence of their workings and have an industrial charm that adds to the character of the Harbour.

The FDD will allow larger boats to be accommodated at the repair yard that cannot currently be hoisted by the lifting equipment and angled slipway. The historic use of the site has been for boatbuilding and repairs and the FDD will allow the boatyard to continue to operate in a Harbour that has seen the demise of similar operations.

(b) The immediate curtilage of the shipyard includes the sandstone cliff face, being Item I0483 pursuant to Schedule 5 of the NSLEP. The FDD will have an unacceptable adverse impact on this item as it will obscure views to it.

I would largely defer to John Aspinall, Urbaine, the visual impact expert in this matter.

I consider that the FDD will have a limited impact on views and the exposed cliff face that will remain highly visible from most view angles that tend to be high set on the cliff face to the west at Carradah Park and from the higher sections of Waverton Park.

The FDD is very much in character with the current visual setting of the boatyard.

(c) The heritage significance of the marine shipyards and support facilities to the eastern side of Berrys Bay (which includes the Site) consists of the complex visual character which is produced by the assembly of small and medium sized sheds, stocks, cranes, hardstands, slipways, and pontoons. This character, a key aspect of the heritage significance of Heritage Item I0484, has been maintained in successive phases of operation and alteration, including the most recent redevelopment of the 1990s. The FDD will visually isolate and block important vistas to and through this aspect of heritage significance from much of the related surrounds, including the waterway.

The current sheds on the foreshore are large structures and are largely modern. The FDD will allow an expansion of the size of vessels that can be accommodated at the yard and allow its continuing, historic use.

The issue of the impact on views is discussed above.

(d) The FDD will result in an unacceptable reduction in the visual significance of Heritage Item I0484, its relationship to Berrys Bay, and to the visually related fabric and setting of other heritage items as well as the Union Bank and Thomas Street Conservation Area [NCC LEP2013 CA-15]], which is in the visual curtilage of Heritage Item I0484.

The issue of the visual impact of the FDD on the yard is discussed above.

There is no visual perception of the edge of the conservation area that is strongly delineated by the Lavender Bay railway line and this is not highly visible in views from the west due to the extent of plantings along the foreshore embankment to the east side of the Bay. The residential development in the Heritage Conservation Area that is set above the boatyard can clearly be seen in views from the west side of Berry's Bay.

While one passes through the HCA to reach the yard, the HCA is not evident in views from the boatyard that is low set below the cliff face.

Figure 2 View from Carradah Park to the boatyard with the development in the HCA clearly visible above

Figure 3 View from Balls Head Reserve to the boatyard with the development in the HCA clearly visible above.

(e) The form, massing, and sheer side walls of the FDD indicated as a long-term feature of the setting do not equate to other floating vessels of comparable size likely to periodically enter the Bay or moor there, such as the former Manly Ferry South Steyne moored opposite.

The FDD is shorter in length than the South Steyne ferry though wider and will have a comparable visual impact. As discussed above, large floating structures have been a continuing element in the bay and the FDD will rise when in use but lower when not limiting its impact in the Bay.

(f) The indicated movement pattern of the FDD further limits the mooring of smaller vessels about the shipyard, further removing elements of visual significance in the related setting to the shipyard.

This is matter for the maritime experts.

(g) The fine grain of small-scale sheds and other shipyard structures provides a cohesive link with the residential forms dominating the eastern skyline above the rail embankment. This relationship will be obscured by the FDD when viewed from the opposing shore of Berrys Bay, leaving the sheer wall of the FDD and the rail embankment as the prominent aspects of the eastern shore. This will remove much of the historic pattern of fine-grained construction seen on the eastern slope of Berrys Bay.

The current structures are not fine grained. They may have been in earlier times but the current structures are relatively large and robust though their impact is mitigated by the ongoing procession of large and small vessels that come to the yard for service and repairs. These elements, along with the lifting structures, provide the fine grain to the site and this aspect will remain.

The FDD is set into the bay not on the foreshore and will have a very limited visual impact on the existing structures on the bay and views to boats under repair.

(h) The EIS has not properly considered the planning principles for heritage conservation in clauses 15(a) - (f) of the SREP.

This is a matter for the planners.

(i) The Proposed Development does not meet the following objectives in clause 5.10 of the NSLEP:

(j) For the reasons set out above, the Proposed Development is unsatisfactory when assessed pursuant to Section 4.15 (a), (b) (c) and (e) of the EPA Act.

Controls

. *· NSLEP - Clause 5.10(1)(a), (b) and (d)*
. *· NSLEP - Clause 5.10 (4)*
. *· NSDCP - Section 13.1.1*

Section 5.10 of the NSLEP contains the primary heritage provision relating to development. In regard to Clauses 5.10(1) (a), (b) and (c):

*(1) **Objectives** The objectives of this clause are as follows—*

(a) to conserve the environmental heritage of North Sydney,

(b) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,

The FDD will allow the primary historic use of the place to continue and I consider that the FDD will have a limited and acceptable impact on the setting and significance of the item, the heritage items in the vicinity and the heritage conservation area in the vicinity.

In regard to Section 13.1.1 of the NSDCP:

13.1.1 Guiding Statement

North Sydney's heritage is a tangible link between the past and present. How it is managed today will determine whether it can still be a link for present and future generations in accordance with the principles of intergenerational equity. Council's commitment to protecting North Sydney's heritage resources is expressed in the Guiding Statement.

The boatyard is a strong, tangible link to the early maritime development of the area and predates much of the development in McMahons Point. It would seem self-evident that development that allows this early historic use to continue to provide this tangible link to the past is appropriate in heritage terms

Heritage conservation does not preclude change. The challenge is to manage pressures for increased development and contemporary living standards in ways that allow the rich tapestry of the historic environment to be retained for present and future generations.

The proposal manages the change by the location of the FDD in the Bay maintaining the shore based elements while preserving views to the cliff face and beyond.

Council will work to protect North Sydney's heritage by:

(a) Ensuring Council decisions are consistent with policy as expressed in the LEP and the DCP;

(b) Acknowledging the importance Aboriginal occupation and protecting sites that are important to Aboriginal culture and history;

(c) Acknowledging and protecting North Sydney's archaeological remnants;

(d) Committing to responsible management of Council's own heritage resources and heritage in the public domain;

(e) Not supporting developments that remove or significantly reduce the heritage significance of any heritage item;

(f) Striving to achieve an appropriate balance between contemporary expectations, environmental sustainability and protecting the elements that make an item significant or important to a conservation area's character;

(g) Acknowledging and protecting the setting of heritage items;

(h) Permitting flexible yet sensitive adaptation of heritage affected sites where appropriate. Council responds to guidance from and the planning principles of the NSW Land and Environment Court

These relate to actions by Council rather than the applicant.

Burra Charter

Council acknowledges the principles of and practices recommended by the Burra Charter in the conservation of items of cultural heritage and have informed the preparation of this section of the DCP. The Burra Charter provides guidance for the conservation and management of places of cultural significance (cultural heritage places). The Charter sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians.

When preparing a development application, the principles of the Burra Charter should be applied. It advocates a cautious approach to change: ***do as much as necessary to care for the place and to make it useable but otherwise change it as little as possible so that cultural significance is retained****. In the event of any inconsistencies between the Burra Charter and the DCP, the DCP will prevail.*

(Author's bold)

The Charter is the most widely recognized, non-statutory, heritage management document and has become the 'bible' for heritage practitioners.

The proposals retain the current land based structures and their setting and the impact of the FDD has been exhaustively examined in the multiple reports on the proposal including in regard to heritage and archaeology that have followed accepted methodologies for such documents.

Article 1.2 of the Charter notes:

1.2 *Cultural significance* means aesthetic, **historic, scientific, social** or spiritual value for past, present or future generations. Cultural significance is embodied in the *place* itself, its ***fabric, setting, use, associations, meanings***, *records*, *related places* and *related objects*. Places may have a range of values for different individuals or groups.

(Author's bold)

The fabric of the place has been heavily altered and earlier structures removed and the primary significance of the place is in its *use, associations and meanings*. The FDD will ensure the ongoing conservation of these retaining the cultural significance of the place.

RESPONSE TO FURTHER ISSUES RAISED BY THE RESPONDENT

1. The visual impact of the FDD

Comment: The FDD will have an unacceptable impact on the heritage-listed boatyard, the cliff and the conservation area in the vicinity.

Response: This visual impact of the proposal is discussed above and I consider that the FDD will have a limited and acceptable impact on the elements noted above.

2. The loss of the fine grain visual appearance of the boatyard

Comment: The fine grain provided by the waterside structures and equipment will be lost.

Response: The boatyard has changed considerably since its foundation and now has relatively modern equipment and structures some of which are large. The smaller scale buildings seen in early photographs have been largely lost and only the office building to the north of the boatyard is of some age.

The boatyard will continue to service and repair smaller boats using the existing lifting and shore side structures. The fine grain is provided by the pontoons, the boats being repaired and serviced and the lifting equipment on the dock. These elements will remain and as the FDD is set into the water. The fine grain elements will remain visible from the boatyard and the higher viewing points to the north and west. Though parts of the pontoons will be removed much of the current 'fine grain' will remain.

3. Alternatives for the lifting and repair of larger boats could be considered.

Alternatives that could be considered include a sideways slip, a demountable dry dock, a sinker lift.

Response. The viability of the alternatives is largely a matter for consideration by the owners to assess if these will provide the necessary scale and lifting capacity for removing larger boats to the foreshore or servicing boats in the water.

The boatyard has both a sideways slip and a sinker lift neither of which has the capacity for lifting larger boats.

A demountable structure would presumably be of a similar scale to the FDD to suit the sizes of boats requiring repair and servicing and would be in place as long as the boats are being worked on. It would require similar noise attenuation and fume extract equipment and would only be removed when the works are complete and till another, larger scale boat requires repair.

The FDD provides a similar level of servicing space and would be lowered when not required limiting its major visual impact to its working operation that would likely be of similar duration as that of a demountable dock.

4. Height Poles

The location and height of the FDD should be marked by floats and height poles to allow a fuller appreciation of its visual impact.

Response: The height poles can be provided to illustrate the effect and mark the location of the FDD.

JOHN OULTRAM

APPENDIX B - CURRICULA VITAE

CURRICULUM VITAE	JOHN OULTRAM	October 2021

DATE OF BIRTH:	2nd October 1958
NATIONALITY:	Australian. (1997) (Born England)
TERTIARY EDUCATION:	
1977 – 1980	Sidney Sussex College, Cambridge, England
1981 – 1983	Sidney Sussex College, Cambridge, England
1992-1993	Melbourne University. Preliminary year to Masters in Landscape Architecture
QUALIFICATIONS:	
1980	Bachelor of Architecture (Part 1 R.I.B.A) Hons.
1983	Diploma of Architecture (Part 2 R.I.B.A)
2005	NSW ARB 7359
WORK EXPERIENCE:	AUSTRALIA
WORK EXPERIENCE:	AUSTRALIA
April 1993-Jan1995	Albert Genser & Associates, 381 Punt Road, Richmond, VICTORIA 3121
January 1998-	JOHN OULTRAM HERITAGE & DESIGN Private practice in Sydney
Jan. 1995 – Jan. 1998	Clive Lucas Stapleton & Partners 155 Brougham Street Kings Cross NSW 2011
1997	Appointed Associate
1998-	Private Practice John Oultram Heritage & Design
HERITAGE APPOINTMENTS/MEMBERSHIPS:	
1996-2003	Member of the National Trust (NSW) Parks and Gardens Committee
October 1999-2004	Heritage Adviser to Fairfield City Council
September 2007-2019	Heritage Advisor to Wagga Wagga City Council
November 2009-2015	Heritage Advisor to Shoalhaven City Council
November 2010-2012	External Heritage consultant to Hornsby City Council

Architectural Projects

Ardagh, 4 Ruby Street, Mosman
Large Edwardian house. Conversion of rear garage into office accommodation and additional rooms in the roof space to the main house

Bowden, 40 Toxteth Road, Glebe
Alterations and additions to a late Victorian Gothic house including an enlarged garage, rear verandahs, new bathrooms and kitchens, new conservatory

52 Shellcove Road, Neutral Bay
Edwardian Arts and Crafts house. Documentation of alterations and additions.

11 Cove Street, Watson's Bay
1860's timber wweatherboard fisherman's cottage.
Documentation of new rear extension and general repairs

Nuimburra, 16-18 Korokan Road, Lilli Pilli
Alterations to a 1920's house by the architect Glyn Gilling.
Detailed Heritage study and design documentation.

21 Marian Street, Killara. NSW
Internal refit of 1926 two storey inter war style house.
Project completed 2002
Extensive alterations and additions including garage and pool

78 Shellcove Road, Neutral Bay NSW
Alterations and additions to a late Federation house. Very good quality interiors

Selected Heritage Assessments

Crookhaven Heads Lighthouse
Conservation Management Plan for the Crookhaven Heads Lighthouse and Schedule of Emergency Protection Works for Shoalhaven City Council

Coronation Centre, Prince Alfred Park, Sydney
Conservation Study and Interpretation Strategy for the former Field House for the City of Sydney to allow the adaptive reuse of the building for a tennis centre and community building

Fitzroy Garden, Potts Point
Conservation study and assessment for the upgrading of the park and car park for the City of Sydney in association with Hill Thalis Urban Planners

Hay Thomas Street, Haymarket
Conservation study and assessment for the upgrading of the streets for the City of Sydney in association withJila landscape architects

Prince Alfred Park Pool, Sydney
Conservation Study and Interpretation Strategy for the refurbishment of the pool for the City of Sydney in association with Neeson Murcutt Architects

St. James Reserve, Glebe
Conservation Study for the park for the City of Sydney

Villa Maria Church, Hunters Hill
Conservation Plan for the church and site for Michael Fox Architects

Royal Botanic Gardens Sydney
Heritage advice and impact statement for the conversion of the former gardener's cottage to a function centre for the Botanic Gardens Trust

Rose Garden, Royal Botanic Gardens
Conservation Plan for the redesign of the Rose Garden

Enmore School, Marrickville
Conservation Plan for the proposed rezoning of the school site

War Memorial Hospital, Waverley
Conservation Management Plan for Morrison Design Partnership and the Hospital Trustees

St. Luke's Hospital, Waverley
Conservation Management Plan for Morrison Design Partnership and the Hospital Trustees

Lewisham Hospital, Lewisham
Conservation Management Plan ands Archaeological study for Morrison Design Partnership and Catholic Health Care

<u>Development Control Plans and Planning Reviews:</u>

City of Sydney Heritage Development Control Plan
Preparation of the City of Sydney Heritage Development Control Plan in association with Architectus

North Sydney Heritage Development Control Plan
Preparation of the heritage section of the North Sydney Draft Development Control Plan in association with Architectus

North Sydney Heritage Review
Reviews of the heritage items and contributory items in the North Sydney conservation areas and the redrafting of the conservation area character statements

Kareela Road Conservation Area
Assessment of the a proposed conservation area at Kareela Road, Kirribilli for North Sydney Council

Hornsby Development Control Plan
Preparation of the Heritage Development Control Plan and review of the conservation areas in the Hornsby Shire in association with Sue Haertsch Planning

North Wahroonga Heritage Conservation Area Review
Heritage review of the proposals for a conservation area at Wahroonga North for Hornsby Shire Council in association with Sue Haertsch Planning.

Wagga Wagga Development Control Plan
Preparation of the heritage section of the Wagga Wagga City Council Development Control Plan

The practice has also done numerous conservation management plans and smaller reports and heritage impact statements for alterations, additions of single dwellings and smaller buildings throughout Sydney and Mr Oultram has provide expert witness evidence for Councils in Sydney and for private clients.

Advisian
Worley Group

LAND & ENVIRONMENT COURT OF NSW

PROCEEDINGS NO. 2021/00063136

STANNARDS MARINE PTY LIMITED
-VS-
NORTH SYDNEY COUNCIL

SURFACE WATER
AND
WASTEWATER MANAGEMENT STRATEGY

Prepared by

CHRIS THOMAS BE(Hons) MEngSc MIE Aust CPEng NER
Principal Hydrologist
NSW Water Resources Practice Lead
Advisian (Worley Group)

December 2021

STANNARDS MARINE PTY LTD

STANNARDS BOAT REPAIR FACILITY, BERRYS BAY

SURFACE WATER AND
WASTEWATER MANAGEMENT STRATEGY

DECEMBER 2021

Document Amendment and Approval Record

Issue	Description of Amendment	Prepared by [date]	Verified by [date]	Approved by [date]
1	Final Report	CRT [6/12/2021]		Chris Thomas [6/12/2021]

Document Ref: **rp311015-00195crt211204-Surface & Wastewater Management.doc**
Date Printed: **6th December 2021**

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Advisian
Worley Group

STANNARDS MARINE PTY LIMITED

STANNARDS MARINE PTY LIMITED -VS- NORTH SYDNEY COUNCIL

Introduction

1. This report relates to contentions raised in a Class 1 merits appeal in the NSW Land and Environment Court (the LEC), reference number 2021/00063136. The proceedings are concerned with an appeal against the Sydney North Planning Panel's refusal of Development Application 57/19 which seeks approval for a range of activities including the demolition of existing water-based structures associated with the boat repair and maintenance facility that operates at 6 John Street, McMahons Point, and the installation and use of a new steel floating dry dock (FDD) (**the Project**)

2. This report has been prepared in response to selected issues raised in the Respondent's Statement of Facts and Contentions dated 13th May 2021.

Description of the Project

3. The project involves the following.
   (i) demolition of existing water-based structures associated with the boat repair and maintenance facility, including removal of four mooring poles located the south of an existing slipway, two jetties located to the south of the mooring poles, and approximately 8 m of the end of the jetty adjoining the two jetties.
   (ii) Installation and use of a new steel floating dry dock (FDD) 18.81 m wide by 59.24 m long which will have the capacity to accommodate vessels up to 60 m long.
   (iii) Installation of two acoustic curtains at each end of the FDD with each curtain being 7.78 m high.
   (iv) Installation of retractable "top curtains" for use in conjunction with the end curtains, with each being no higher than 7.7 m.
   (v) Installation of acoustic panels that will be submerged during dock operations and saw tooth fenders to enable the FDD to be secured.
   (vi) Provision of new on-shore infrastructure in the form of ducting and plant relating to air quality mitigation.

4. A development application was lodged as integrated development and the Department of Industry and Environment issued the Secretary's Environmental Assessment Requirements (the SEARs) for the proposed development on 31st August 2017. An Environmental Impact Statement was prepared in response to the SEARs and published in March 2019.

5. The DA was publicly notified between 22nd March and 23rd April 2019 and ultimately came before the Sydney North Planning Panel for determination on 1 September 2020 where it was refused.

Instructions

6. My instructions were relayed by Alice Spizzo Advisory and are to focus on specific contentions listed in the Respondent's Statement of Facts and Contentions dated 13th May 2021.

7. Of the specific Contentions raised in the Statement of Facts and Contentions, those which I address in this report are Contentions 10(a) to 10(f) and 12(a) to 12(c) as they concern issues associated with stormwater, estuary processes and water quality, as well as Contention 13 which relates to wastewater management.

Qualifications and Experience

8. I, Christopher Ronald Thomas, am a chartered practicing civil engineer and Fellow of the Institution of Engineers Australia. I hold a Bachelor of Engineering (Civil) degree with Honours from the University of Newcastle and a Master of Engineering Science (Water Resources) from the University of New South Wales.

9. I am currently employed as Practice Lead of the NSW Water Resources Group of Advisian (Worley Group) and serve in that role as a Principal Hydrologist.

10. I have practiced in the water engineering field for more than 35 years and have specialist skills in flood assessment, floodplain risk management, stormwater management, river and estuary processes, geomorphology and water quality management. This experience includes design and investigation of stormwater drainage systems, review and design of stormwater treatment devices, and the preparation and review of flood and estuary management studies, including numerical modelling. I have provided evidence in respect of these subjects to various courts in New South Wales and Victoria for nearly 30 years. A copy of my curriculum vitae is enclosed as **Annexure A**.

Obligations to the Court

11. In preparing this report, I have read and understood Division 2 of Part 31 of the *Uniform Civil Procedure Rules 2005* (UPCR) and the Expert Witness Code of Conduct as outlined in Schedule 7 (**Annexure B**) and agree to be bound by the Code in giving this evidence. This report has been prepared in accordance with the Code.

Material and Documents Relied Upon

12. In preparing this Statement of Evidence, I have considered and relied upon the following documents:

- *'Environmental Impact Assessment – 5 John Street, McMahons Point NSW 2060'* (March 2019) prepared by Hamptons Property Services Pty Ltd (the **EIS)**
- *'Noakes Boat and Shipyard Flooding Dry Dock - Navigation Impact Assessment'* (February 2019), prepared by Royal Haskoning DHV (the **Royal Haskoning DHV Report**).
- *Noakes Boat and Shipyard Flooding Dry Dock - Navigation Impact Assessment'* (February 2019), prepared by Royal Haskoning DHV (the **Royal Haskoning DHV Report**).
- *'Stannards Marine Pty Ltd v North Sydney Council - Navigation Issues Response'* (December 2021), prepared by Royal Haskoning DHV (the **Royal Haskoning DHV Response**).
- Hydrographic Survey Plan dated 29 November 2017, prepared by Harvey Hydrographic Services
- *'Berrys Bay EIS for Floating Dry Dock – Water Resources, Soil and Water Quality'* (December 2018), prepared by Jacobs (the **Jacobs Water Report**).
- *'Berrys Bay EIS for Floating Dry Dock – Waste Management'* (November 2018), prepared by Jacobs (the **Jacobs Waste Management Report**).
- Sealed Respondents Statement of Facts and Contentions dated 13th May 2021.
- *'Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005'*
- *Review of the Noakes Proposal to use the Floating Dry Dock in Berrys Bay'* (October 2021), prepared by Colville Marine Pty Ltd (the **Colville Marine Report**).

Contentions Considered

13. The contentions considered in this report are listed in the following table.

No.	Contention
10. Impacts on the harbour water quality	
10(a)	The assessment of benthic morphology is incomplete in that it has not covered all areas potentially affected by the Proposed Development.
10(b)	There has been no assessment of the impact of the development on flow currents, wave action, sea bed sediments, and sea bed morphology as a result of the Proposed Development.
10(c)	It has not been demonstrated that there will at all times be sufficient freeboard between the sea bed and any associated vegetation and the underside of the FDD pontoon, so as to avoid damage to the sea bed and any vegetation.
10(d)	It has not been demonstrated that adequate controls and management procedures will be in place to ensure that water quality will not be impacted during construction, including both land-based and sea-based works.
10(e)	It has not been demonstrated that harbour dredging will not be required in order to successfully operate the FDD pontoon for the full range of marine vessels considered under the Proposed Development.
10(f)	A water quality monitoring plan has not been provided to ensure that any potential impacts of the operations can be detected and appropriately rectified.
12. Stormwater management	
12(a)	Insufficient information has been provided regarding the collection, conveyance, treatment and discharge of stormwater.
12(b)	It has not been demonstrated that the development satisfies the planning principles provided under clause 14 of the SREP, in particular the protection, maintenance, and enhancement of natural assets.
12(c)	It has not been demonstrated that the Proposed Development satisfies the elements provided under clause 21 of the SREP. In particular, it has not been demonstrated that the development will have a neutral or beneficial impact on the quality of water entering the waterways, nor has it been demonstrated that indirect impacts on aquatic vegetation have been avoided by avoiding impacts on flows, currents and wave actions.
13. Wastewater Management	
13(a)	Insufficient information has been provided in relation to the location, storage, conveyance, design, capacity, maintenance, and operation of the wastewater management system
13(b)	Insufficient information has been provided on the range of chemicals that will be used as part of the proposed operations, including the storage, transport and use of any chemicals.
13(c)	Insufficient information has been provided in respect of the types and generation of pollutants and waste that will be generated during operation of the facility.
13(d)	It has not been demonstrated that the receiving sewer has sufficient capacity to receive the projected wastewater flows.

Contention 10(a) – Benthic morphology

14. Contention 10(a) states that the assessment of benthic morphology is incomplete in that it has not covered all areas potentially affected by the Proposed Development. In an e-mail dated 7 September 2021, North Sydney Council provided an explanation of the meaning of this contention, being that "*the survey data of the seabed in Berrys Bay provided by the Applicant is insufficient as to allow the consent authority to properly characterise the topography of the seabed in all areas affected by the proposed development*.

15. Water depths and the topography of the seabed in the vicinity of the proposed development are provided for the project via a Hydrographic Survey Plan dated 29 November 2017, which was prepared by Harvey Hydrographic Services. The survey was undertaken by a registered and accredited Hydrographic Surveyor.

16. An assessment of the data contained on the Harvey Hydrographic Services survey plan and other hydrographic data is documented in a report prepared by Royal HaskoningDHV titled, *'Noakes Boat and Shipyard Flooding Dry Dock - Navigation Impact Assessment'* (February 2019). This report forms an appendix to the Environmental Impact Statement and includes maps that show the available hydrographic surveys of Berrys Bay. These maps include the following.

    - Map 1, being a portion of the AUS202 Hydrographic Chart for Berrys Bay that indicates the overall shape and slope of the bed of Berrys Bay, including depths all below -10m chart datum immediately east of the old BP wharf berthing box
    - Map 2, which provides a clear diagram of *all areas affected by the proposed development*, including the FDD footprints and the swing basin for vessels accessing the FDD
    - Map 3, which provides a colour coding of the half metre depth intervals that indicate the additional detailed Harvey Hydrographic survey data that is available west of the -10m contour and for depths between -10m and -10.5m chart datum

17. Additional hydrographic survey information was collected by the Port Authority of NSW on 20th October 2021, which complies with the Ports Australia Class A Standards. General spacing of surveyed spot elevations is 5 metres or less and half metre depth contours are provided.

18. The Royal Haskoning DHV Response includes a revised assessment of the maximum allowable vessel draft required for docking in the FDD and for each phase of the FDD operation. This revised assessment relies on the more detail bathymetric data available from the October 2021 survey. Appendix B of the Royal Haskoning DHV Response contains a map of the FDD overlaid on the latest survey data and a cross-section analysis of the FDD operation.

19. Based on my review of this data, I contend that the latest hydrographic survey information provided by the Port Authority of NSW is sufficient to characterise the bathymetry of the bay for the purpose of assessing the development proposal.

Contention 10(b) – Flow currents, wave action, sea bed sediments and sea bed morphology

20. Contention 10(b) states that there has been no assessment of the impact of the proposed development on flow currents, wave action, sea bed sediments and sea bed morphology.

21. The Royal Haskoning DHV report provides assessments of tides, water depths and wave climate (refer Sections 3.4 to 3.7). It also provides a commentary on the potential for the development to impact water depth and wave climate (refer Sections 5.1.4 and 5.1.5).

22. The assessment of the impact of the proposed development on wave action acknowledges that the FDD will result in one additional inbound vessel movement and one additional outbound vessel movement per month. The report goes on to say that the anticipated increase in vessels operating in Berrys Bay is minimal and that the additional vessel movement would have no material impact on the wave climate. I agree with this conclusion.

23. The Royal Haskoning DHV assessment also acknowledges that the FDD would lead to wave reflection in the immediate vicinity of the development site but notes that the wave reflection would be similar to that of any other long vessel moored next to the wharf, such as the SS South Steyne. The wave reflection caused by the FDD is considered inconsequential due to the limited number of vessel movements past the Noakes Shipyard in any given period.

24. The Royal Haskoning DHV Response indicates that the adopted design wave height of 0.4 metres is considered conservative, given that all vessels are legally required to be travelling at speeds of 6 knots or less up to 450 metres from the site according to the extent of the mooring field in Berrys Bay. Further refinement of the design wave height would require the collection of field data, which Royal Haskoning deem to be surplus to requirements.

25. The reference to “flow currents” in this contention is unclear. If it relates to tidal currents, then this aspect is adequately described in the Royal Haskoning DHV Report which states that there is no indication that tidal currents would be impacted in any significant way by the proposal. If it relates to flows from FDD ballasting operations, this is adequately dealt with in Section 5.1.6 of the Royal Haskoning DHV Report which also concludes that there will be no impact.

Contention 10(c) - Freeboard

26. Contention 10(c) states that it has not been demonstrated that there will at all times be sufficient freeboard between the sea bed and any associated vegetation and the underside of the FDD pontoon, so as to avoid damage to the sea bed and any vegetation.

27. The Royal Haskoning DHV Report specifically addresses the potential for the FDD and/or vessels accessing and exiting the FDD, to physically impact the seabed (refer Section 4.3.2). It also outlines how the FDD can be operated to minimise and mitigate any potential impact (refer Sections 5.1.3 and 5.1.5).

28. The Royal Haskoning DHV Report does conclude at Section 5.4 that water depths in the proposed area of operation of the FDD (for loading and unloading vessels) have the potential to be insufficient for the maximum FDD draught. As a result, the FDD cannot be submerged for Phase 1 operations (refer Section 4.3) which limits the maximum draught of vessels that could be docked. The report concludes that the FDD is to be operated so that the minimum keel clearance would be 300 mm at all tides (Section 5.1.5). This would be achieved by adherence to a Safety Management System that has been prepared for the operation and slewing of the FDD in accordance with requirements outlined in the Marine Safety (Domestic Commercial Vessel) National Law Act 2012 and guidelines provided by AMSA (Royal Haskoning DHV Section 4.3.1).

29. The Harbour Master Directions (2021) supersede the Royal Haskoning DHV Report and include the requirement for an Under Keel Clearance (UKC) of 500 mm between the FDD and the seabed. Accordingly, the Royal Haskoning DHV Response includes a revised assessment of the maximum allowable vessel draft based on a FDD UKC of 500 mm (formerly 300 mm) and additional hydrographic survey information that was collected by the Port Authority of NSW on 20th October 2021.

30. The revised assessment made by Royal Haskoning DV indicates that the resultant allowable vessel draft is 1.96 metres. It is noted that this may preclude some sailing yachts with deeper draft but would still be adequate for recreational cruisers and shallow draft commercial vessels to be docked on the FDD.

31. The Royal Haskoning DHV Response also includes a revised assessment of the FDD draft in each phase of operation and has been used to determine operational procedures for the FDD addressing the timing of operation and the stability assessment.

32. Therefore, there will not be sufficient freeboard between the sea bed and the underside of the FDD pontoon at all times. However, I contend that the possibility for the occasional period of insufficient freeboard to result in an impact on the sea bed or any vegetation, can be satisfactorily managed by implementing the operational procedures outlined by Royal Haskoning DHV.

Contention 10(d) – Water quality during construction

33. Contention 10(d) states that it has not been demonstrated that adequate controls and management procedures will be in place to ensure that water quality will not be impacted during construction, including both land-based and sea-based works.

34. An assessment of the potential impact of the project on receiving water quality during the demolition phase has been considered in the Jacobs Contamination Assessment Report. The report recommends the use of silt curtains and floating booms to limit potential sediment plumes from the seabed during piling operations.

35. Further recommendations for maintaining water quality during construction including the containment of runoff, gross pollutants and sediments, are made in the Jacobs Water Report (Appendix 9 of the EIS). Recommended mitigation measures for managing water quality impacts during construction are documented Section 5.1 of the Jacobs Water Report.

36. The recommended mitigation measures are consistent with typical practices for protecting marine habitats and water quality from proposed construction and operation of marine facilities in embayments of Sydney Harbour. Notably, the Jacobs Water Report also specifies that water quality will be maintained via implementation of a construction environmental management plan (CEMP) that incorporates these mitigation measures.

Contention 10(e) – Harbour dredging

37. Contention 10(e) states that it has not been demonstrated that harbour dredging will not be required in order to successfully operate the FDD pontoon for the full range of marine vessels considered under the Proposed Development.

38. I contend that this has been considered in the Royal Haskoning DHV Report. The first paragraph of Section 5.1.5 of the Royal Haskoning DHV Report states that *No dredging is proposed for the operation of the FDD.* This is repeated again in Section 5.1.5 and in Section 5.2 of the Royal Haskoning DHV Report.

Contention 10(f) – Water quality monitoring plan

39. Contention 10(f) states that a water quality monitoring plan has not been provided to ensure that any potential impacts of the operations can be detected and appropriately rectified.

40. The EIS and Jacobs Water Report (Appendix 9 of the EIS) make reference to the need for ongoing water quality monitoring in relation to the project Operational Environmental Management Plan. It would appear that the intention is that the need for a water quality monitoring plan and the requirements for maintaining receiving water quality could be specified via a suitable condition of consent.

Contention 12(a) – Collection, conveyance, treatment and discharge of stormwater

41. Contention 12(a) states that insufficient information has been provided regarding the collection, conveyance, treatment and discharge of stormwater.

42. The proposed mechanisms for the management of stormwater at the development site is documented in a report prepared by Jacobs titled, *'Berrys Bay EIS for Floating Dry Dock – Water Resources, Soil and Water Quality'* (December 2018). In Section 1.2.2 of the Jacobs Water Report, it is noted that it is a condition of current operations at the site that no water runoff from the site may enter Berrys Bay. This requirement will be maintained post installation and operation of the FDD.

43. Currently Noakes Group manages runoff through a bunded drainage system, containment on the spillway and a hardstand sump. Water is directed to an on-site reverse osmosis (RO) treatment plant before being discharged to the Sydney Water sewer in accordance with an approved Trade Waste License.

44. Section 5.2 of the Jacobs Water Report notes that following completion of the proposed upgrade, all surface runoff from the entire operational area will be captured and drained or pumped to the on-site RO treatment plant before being discharged to the sewer. Hence, the approach taken to manage stormwater runoff from the site will not change following completion of the upgrade and installation of the FDD.

45. Rainfall that falls on the FDD or any docked vessel that is being worked on will be captured on the deck of the FDD and directed via the grade of the deck to two storage tanks located at one end of the FDD. These storage tanks have a capacity of 500 litres. Hence, the FDD includes provision for the temporary storage of runoff that may or may not be contaminated as a function of operations at the time of a rainfall event.

46. There is also potential for runoff to be stored on the deck of the FDD by virtue of the side walls of the FDD and a steel plate parapet that extends to a height of 0.3 m along each end. There are 4 locations (one near each corner) where 'holes' exist in the steel parapet and serve as 'eyelets' for mooring lines that are used to fix the FDD. These 'hole' are approximately 0.4 m wide and could easily be blocked off in the event of a rainfall event by the placement of sand bags. Therefore, the FDD deck is effectively 'bunded' to a maximum height of 0.3 m.

47. Sydney Water provides guidance for the discharge of contaminated surface water to its sewers – refer https://www.sydneywater.com.au/your-business/managing-trade-wastewater/industrial-trade-wastewater/contaminated-surface-water.html Specific discharge requirements are outlined according to the extent of the 'open area'. If the open area is greater than 50 m^2, Sydney Water requires that a first flush system be installed which has the capacity to capture the first 10 mm of rainfall.

48. The Sydney Water guidelines indicate that all rainfall beyond the first 10 mm (ie., post the first flush) can be directed to the existing stormwater drainage system. Accordingly, it follows that in the case of the FDD, rainfall in excess of the first 10 mm could, under the provisions made by Sydney Water, discharge directly to Berrys Bay. However, this is not proposed by Noakes. The intention is to direct all runoff from the FDD to the on-site surface water drainage system whereafter it will make its way via gravity feed to the on-site wastewater treatment facility referred to above.

49. An analysis has been undertaken to assess the feasibility of this approach. Applying the first flush criteria specified by Sydney Water indicates that a volume of 11,735 litres could be generated from rainfall across the deck of the FDD. This runoff will drain to the two 500 litre storage tanks located below the deck of the FDD. It is proposed that a submersible pump be installed within each tank and that the first flush volume be pumped on-shore from each tank via a 225 mm diameter lay flat pipe connected to the drainage trench located in the centre of the hardstand. Calculations show that this could be achieved for a head of 1.4 m using a 20 L/s capacity submersible pump installed in each tank.

50. The proposed mechanism for managing surface water runoff from the deck of the FDD under the first flush scenario criteria specified by Sydney Water can therefore be achieved <u>without</u> any ponding or storage on the deck of the FDD. It would also only involve the delivery of about 12,000 litres to the Sydney Water sewer.

51. It is noted that this analysis is based on adoption of a duration of 5 minutes which corresponds to a storm slightly rarer than a 63.2% annual exceedance probability (AEP) event (slightly rarer than the 1 in 1 year ARI storm). This event is typically adopted for the design of surface water treatment facilities in land management as outlined in the Landcom publication known as "The Blue Book".

52. If it continued to rain after the "first flush", the pumps would continue to operate and deliver surface water to the on-site wastewater treatment facility and thence to the Sydney Water sewer.

53. If the intensity of the rainfall is greater, it is possible that a greater volume of runoff will be generated over the area of the FDD. However, the FDD itself will provide up to 0.2 m depth of 'flood storage' before there would be any issues with regard to overtopping of the steel parapet (bunding) at each end, even under circumstances where some movement of the FDD occurred.

Contention 12(b) – Planning principles

54. Contention 12(b) states that it has not been demonstrated that the development satisfies the planning principles provided under clause 14 of the SREP, in particular part (a) of clause 14 of the SREP which relates to the protection, maintenance and enhancement of natural assets.

55. This contention is listed under "Stormwater Management"; hence it is assumed that it has been written with reference to stormwater runoff from the site.

56. As reported in paragraph 44, once the proposed upgrade is complete, stormwater runoff from the entire operational area will be captured and treated by the existing on-site RO treatment plant before being discharged to sewer. This is currently what occurs at the site.

57. Berrys Bay is the natural asset of concern that adjoins the site. As stormwater will not be entering the bay, it follows that it is protected from any adverse impacts that may result from stormwater runoff. Moreover, as stormwater from the site is to be managed and treated in the same way as it is for the existing operation, there will not be any change to the level of "protection" that is currently afforded to Berrys Bay.

58. As stormwater will not be entering Berrys Bay, it will not have the potential to contribute to the maintenance or enhancement of the bay. However, if no operation existed on the site and therefore no measures were in place to manage and treat stormwater runoff, the runoff from the undeveloped catchment would not serve to "maintain" or "enhance" the bay. It could only serve to introduce sediment and pollutants to the bay, even if that runoff was from a largely undeveloped catchment.

59. Therefore, it follows that stormwater associated with the proposed development will not impact on the protection, maintenance and/or enhancement of Berrys Bay because it will not be allowed to enter the bay.

Contention 12(c) – Neutral or beneficial impact on water quality and aquatic vegetation

60. Contention 12(c) states that it has not been demonstrated that the Proposed Development satisfies the elements provided under clause 21 of the SREP. In particular, the contention argues that it has not been demonstrated that the development will have a neutral or beneficial impact on the quality of water entering the waterways. Nor has it been demonstrated that any indirect impacts on aquatic vegetation *have been avoided by avoiding impacts on flows, currents, wave actions and water quality*.

61. As reported in paragraph 44, once the proposed upgrade is complete, stormwater runoff from the entire operational area will be captured and treated by the existing on-site RO treatment plant before being discharged to the Sydney Water sewer. This is currently what occurs at the site. Therefore, stormwater runoff will not enter the waterway (i.e., Berrys Bay). Hence, the proposed upgrade will not impact on the quality of water entering the waterway.

62. This contention is listed under "Stormwater Management". Hence, it is assumed that the indirect impacts on aquatic vegetation referred to under Contention 12(c) relate to those that could manifest from stormwater runoff.

63. As noted in paragraph 47, stormwater from the developed site will not enter Berrys Bay. Hence, there will not be any potential for stormwater from the site to impact on aquatic vegetation.

64. The reference in Contention 12(c) to there being no demonstration that *any indirect impacts on aquatic vegetation have been avoided by avoiding impacts on flows, currents, wave actions and water quality*, is addressed in my commentary in paragraphs 19 to 22, inclusive. In addition to that commentary, if the reference in Contention 12(c) to "impacts on flows" relates stormwater flow currents, then it should be acknowledged that the main stormwater flows to Berrys Bay are discharged from two large stormwater drains located at the head of the bay in Waverton Park. Stormwater flows from these drains is directed due south alongside the proposal and therefore would not be impacted by the proposal.

65. For the smaller local scale catchment upslope from the Noakes site there is a small outlet located immediately north of the Noakes property slipway and boundary that discharges west from John Street. There is another outlet located immediately south of the property boundary which discharges west from Munro Street. Neither of these two drains are obstructed by the proposed FDD. Therefore, local stormwater flows would not be impacted by the development proposal.

Contention 13 – Proposed Wastewater Management System

66. Contention 13(a) states that insufficient information has been provided in relation to the location, storage, conveyance, design, capacity, maintenance and operation of the wastewater management system. However, this is addressed to the extent necessary in the Jacobs Water Report (2018) and the Jacobs Waste Management Report (2018).

67. In that regard, it should be noted that the operation of the existing waste management system that allows discharge to the Sydney Water sewer is administered by Sydney Water and must comply with the requirements of the current environmental protection licence (EPL). The proposed installation and operation of the FDD will result in very minimal change to this license and the ongoing arrangement with Sydney Water and EPA.

68. Contention13(b) states that insufficient information has been provided on the range of chemicals that will be used as part of the proposed operations, including the storage, transport and use of any chemicals. Contention 13(c) states that insufficient information has been provided about the types of pollutants and waste that will be generated during operation of the facility.

69. All of the issues raised by Contentions 13(b) and 13(c) are clearly addressed in Sections 4.1 to 4.3 of the Jacobs Waste Management Report (2018). This includes details of the quantity and type of liquid and non-liquid waste that will be generated, handled and processed on-site as part of the project. The discussion presented in Table 1 of the Jacobs Waste Management Report also lists the current volume or weight of typical waste generated at the site. While it does not specify the exact nature of some of the waste items such as the types of chemicals, it is my opinion that this is something that sits in the domain of those responsible for licensing waste management and or discharge, namely EPA and Sydney Water.

70. The condition of operations for Noakes Group is that no water runoff from the site may enter the Bay. Noakes Group captures water on site through a drainage system which is directed to an on-site reverse osmosis (RO) treatment plant and discharged to the sewer. The Trade Waste Agreement between Sydney Water and Noakes Group outlines the agreed limits for discharge of certain substances including suspended solids, grease, copper, zinc and hydrocarbons.

71. Contention 13(d) states that it has not been demonstrated that the receiving sewer has sufficient capacity to receive the projected wastewater flows. This is considered to fall within the domain of those responsible for licensing discharge from the site to the sewer, namely Sydney Water. Discharge to the Sydney Water sewer currently occurs according to the Trade Waste Agreement between Sydney Water and Noakes Group.

72. As noted in Table 1 of the Jacobs Waste Management Report, the current volume of contaminated bilge water that is generated at the site is estimated to be 1,440 <u>kilolitres</u> per month. The future estimated additional volume of contaminated bilge water is estimated to be 6,500 <u>litres</u> per month, including an allowance for 5,000 litres per month of contaminated water from the activities on the FDD that will require treatment via the onsite RO plant. This additional volume constitutes an increase in the volume of the contaminated bilge water discharged to the Sydney Water sewer under the Trade Waste Agreement of less than 0.5%. Accordingly, the wastewater flows that are projected to be discharged to the Sydney Water sewer post installation and operation of the FDD will be only marginally greater than existing and will have no material impact on its capacity.

C R Thomas
BE (Civil) MEngSc FIE Aust CPEng NER RPEQ

ANNEXURE A

Curriculum Vitae
of
Christopher Ronald Thomas

Advisian
Worley Group

Chris Thomas

Principal Consultant and NSW Practice Lead, Water Resources

Overview

Chris has over 30 years' experience in Australia and overseas in environmental assessment and water resources management having developed specialist skills in the fields of hydrology, floodplain management, stormwater management, estuary management, environmental impact assessment and risk assessment. He holds a Bachelors Degree in Civil Engineering from the University of Newcastle (Honours) and a Masters of Engineering Science (Water Resources) from the University of NSW. Project experience has included the preparation of environmental impact statements in accordance with the NSW EP&A Act 1979, floodplain management studies in accordance with the provisions of the NSW Floodplain Development Manual, and the concept and detail design of civil infrastructure projects including small dams, roads and port facilities.

Chris has acted as Project Director and author responsible for the preparation of over 40 government funded Flood Studies and Floodplain Management Studies for numerous rivers and streams in NSW. This work has involved the preparation of business cases and cost-benefit analyses for a range of flood mitigation works and water management projects. These studies have typically involved hydrologic and hydrodynamic modelling using a range of software packages including XP-RAFTS, WBNM, HEC-RAS, DRAINS, MIKE 11, RMA-2 and TUFLOW. It has also involved presentations to Council sponsored flood risk management committees, presentations at public meetings and consultation with community groups on flood management issues.

Chris was the Project Director responsible for the Environmental Impact Assessment and preparation of the Environmental Impact Statement for the safety upgrade and augmentation of Chaffey Dam near Tamworth. He was also the Project Director working with a team of engineers providing expert advice to the Roads & Maritime Services in relation to the construction of the 40 km upgrade of the Pacific Highway between Port Macquarie and Kempsey. Chris has had a longstanding role on this project from its inception during preparation of the EIS through to tender evaluation and construction, including the provision of advice on the functionality of the cross-drainage and bridge structures along the highway embankment.

He has also completed numerous advisory roles for government and the private sector including the Penrith Lakes Development in Western Sydney, redevelopment of the Lower Hunter Port Lands for the NSW Premiers Department and peer reviews of water and environmental investigations for coal mining projects in the Hunter Valley of NSW. This includes the South Creek Flood Study which has involved the analysis of flood characteristics and the assessment of impacts associated with major infrastructure projects in western Sydney such as the Erskine Park Link Road, Penrith Lakes and the Riverstone West Precinct.

In the aftermath of the January 2011 floods in South East Queensland, Chris was selected as one of three hydrologists engaged by the Insurance Council of Australia (ICA) to form the ICA's Hydrologist Panel which reported on the floods that occurred in Toowoomba and Brisbane. He was subsequently responsible for preparation of "overarching" valley-wide assessments of the December 2010 and January 2011 Weather Events, which served as pre-cursors to over 1,000 individual property reports that were undertaken for a range of insurers.

Chris has also served as an expert witness in the NSW Land & Environment Court, the NSW Supreme Court, the Victorian Court of Appeals Tribunal (VCAT), the Victorian Supreme Court and in the NSW Planning Assessment Commission (PAC), providing expert evidence on hydrologic, stormwater drainage design, flooding and river engineering matters associated with infrastructure projects of all scale and size.

Areas of Expertise

- Hydrology
- Floodplain Risk Management
- Flood Impact Assessment
- Stormwater Management
- Flood Hydraulics
- Hydraulic Structure Design
- River and Estuary Processes
- Water Quality
- Environmental Impact Assessment
- Business Case / Cost-Benefit Analysis
- Strategic Planning
- Community / Stakeholder Consultation

Relevant Experience

Environmental Assessment / Business Case

CSR Advanced Manufacturing Hub Environmental Impact Statement, Badgerys Creek, NSW

Project Director responsible for preparation of supporting water engineering studies for the modification of CSR's 200 ha Brick Making Facility at Badgerys Creek. Involved preparation of Surface Water Assessment, including water quality analysis for South and Badgerys Creeks which adjoin the site, staged Water Balance Modelling using GoldSim, Flood Impact Assessment using Council's RMA-2 flood model, and development of a Dewatering Strategy for the decommissioning of quarry pits and ultimate filling with VENM.

Chaffey Dam Upgrade Environmental Impact Assessment, Tamworth NSW

Project Director responsible for the Environmental Impact Assessment and EPBC Referral for the safety upgrade and augmentation of Chaffey Dam near Tamworth. Project involved raising the existing dam wall by 8.4 m to almost double the permanent storage capacity to 100GL. Responsible for multidisciplinary environmental impact assessment and preparation of the EIS that addressed threatened species and endangered ecological communities, Aboriginal and European heritage, air quality, water quality and property impacts, and which required extensive consideration of offsetting opportunities.

Hawkesbury River Dredging Business Case, NSW

Project Director and Project Manager responsible for the preparation of the Business Case for dredging of 30 kms of the Hawkesbury River to improve navigability. Involved the identification and assessment of a range of dredging options and methodologies, including consideration of fairway width and vessel draft requirements, potential environmental and social impacts, and economic feasibility. Environmental, social and financial benefits and disadvantages of dredging were determined for each option. Financial opportunities and market demand for dredged materials were assessed and combined with the estimated costs associated with dredging to determine benefit-cost for each option.

Penrith Lakes Development Masterplan, NSW

Provision of specialist advice on infrastructure constraints for evacuation of residents of western Sydney during the onset of major flooding of the Hawkesbury-Nepean River due to overtopping of Warragamba Dam. Involved an assessment of the at risk population and road network capacities north from the M4, as well as the costing of upgrades that would be required to Andrews, Castlereagh and The Northern Road to improve evacuation travel times and justify approvals for additional residential development.

Pacific Highway Upgrade EIS – Port Macquarie to Kempsey

Project Director and Principal Hydrologist responsible for the Hydrology and Hydraulics component of the EIS for the proposed upgrade of a 37 km length of the Pacific Highway between Port Macquarie and Kempsey. The project involves the construction of 37 kms of dual carriageway and will require the construction of bridges across the Hastings and Wilson Rivers, and crossings of 6 kilometres of floodplain.

Stoney Creek 2 Water Storage Dam EIS, Bodalla, NSW

Project Director responsible for Environmental Impact Assessment for 5000 GL off-stream storage (dam) proposed for a self-contained valley that forms a minor catchment of the Tuross River near Bodalla. Involved preparation of Environmental Impact Statement incorporating specialist reports addressing air quality, construction noise, flora and fauna impacts, transport (construction), archaeology and socio economic considerations. The assessment triggered the need for a Species Impact Statement in accordance with the requirements of the Threatened Species Conservation Act 1995 and associated consultation with State government departments.

Moolarben Coal Project (Stage 2) Environmental Assessment, Ulan NSW

Project Director responsible for a variety of studies completed as part of an environmental assessment for a 12M tonne ROM coal project proposed for the Upper Hunter Valley at Ulan. This included preparation of specialist studies for surface water management, creek diversion, flooding, water balance and environmental management. Also involved preparation of concept designs for the proposed diversion of Murragamba and 'Eastern' Creeks to allow open cut coal extraction along the valley floor.

Moolarben Coal Project (Stage 1) Environmental Assessment, Ulan, NSW

Project Manager responsible for specialist surface water management investigations for the EIA prepared for Stage 1 of the Moolarben open-cut and underground coal mine at Ulan in the Upper Hunter Valley. This included water balance analysis for the 20 year mine life, flood investigations for Moolarben Creek, development of a water quality management strategy for receiving water discharge and the preparation of surface and groundwater related EMPs.

Vickery Extension Project EIS, Gunnedah, NSW

Project Director responsible for preparation of Surface Water Assessment for proposed extension of open cut mining operations to increase production from 4.5 Mtpa for the Approved Mine, to 10 Mtpa. Involved development of a water management system for the proposed mine, Water Balance Modelling using GoldSim to establish requirements for water security under a range of climate scenarios, assessment of water quality of nearby streams and determination of measures including a water quality monitoring program aimed at mitigating any potential impacts. Subsequently presented the Surface Water Assessment Report to the NSW Independent Planning & Assessment Commission.

Bayswater & Liddell Power Station Water Management Study Due Diligence, NSW

Project Director responsible for five separate investigations aimed at improving site water management and which formed part of due diligence undertaken to support the proposed sale of the power stations by NSW Treasury. The project identified various risks and limitations of the existing site water management system which was subsequently provided to potential vendors to meet statutory environmental requirements and inform forward capital works expenditure estimates.

Mount Arthur Coal Mine Dam Break Assessments, Muswellbrook, NSW

Project Director responsible for a dam break assessment of the 'Main Dam' and the 'Environmental Dam' at the Mt Arthur Coal Mine to confirm compliance with the NSW Dams Safety Committee's requirements. Involved hydrologic modelling using XP-RAFTS and hydraulic modelling using MIKE 11 to assess the impact of a range of different dam failure mechanisms. Also involved assessment of options for increasing the storage capacity of the West Cut Void Tailings Storage Facility, including an assessment of dam break scenarios using a detailed TUFLOW model which was used to determine the Population At Risk and Potential Loss of Life, and provide inundation mapping for downstream areas.

Macleay River Sand and Gravel Extraction Study, NSW

Geomorphic assessment of the upper Macleay River system including the provision of advice on the viability of continued sand and gravel extraction from in-channel point bars in terms of both river bed and bank stability and sediment transport potential.

River and Estuary Management

Lower Hunter River Geomorphology Study, Maitland NSW

Geomorphic evaluation of the Hunter, Paterson and Williams Rivers incorporating numerical and conceptual modelling of hydrodynamic and sediment transport processes to determine the primary causes of two decades of bank erosion. Involved an assessment of the signature of in-channel sediments, interpretation of 4 decades of hydrographic survey and the assessment of scour potential at key locations such as Maitland and Morpeth. Investigation of the potential for continued stream bank erosion and/or channel avulsions, and the identification of potential mitigation measures incl strategic sand extraction.

Farquhar Inlet Entrance Opening Management Plan, NSW

Preparation of an Entrance Opening Management Planfor Farquhar Inlet on the Manning River (NSW). Involved the development of protocols for the managed opening of the coastal entrance berm to achieve improved estuary water quality. These protocols were developed considering catchment rainfall, streamflow, water level and water quality data, and the relationship between the Southern Oscillation Index and favourable entrance opening conditions.

Wallis & Fishery Creek Total Catchment Management Study, NSW

Preparation of the Wallis & Fishery Creeks TCM Study which addressed water quality, land-use planning and ecological issues, and provided the basis for identification & recommendation of strategies to improve catchment management. The Study was used to develop a TCM Strategy incorporating a detailed implementation schedule.

Seaham Weir Pool Water Quality Investigation, NSW

Assessment of the impacts of riverine corridor land-use on water quality, bank stability and the ecology of the Williams River in the Lower Hunter Valley. Involved water quality and sediment sampling to determine primary causes of blue green algal blooms and assessment of boat wake and wind wave action on stream banks to identify primary causes of erosion, which led to the development of management protocols for recreational usage of the weir pool.

Teluk Intan Erosion Control Study, Malaysia

River engineer seconded to Ranhill Sdn Bhd, Kuala Lumpur, to investigate measures for erosion control and flood alleviation for the town of Teluk Intan. Involved hydrodynamic modelling of the Perak River using MIKE 11 to determine design flood levels and flow velocities and the application of the MIKE 11 morphologic module to establish the impact of bank stabilisation options including rock berm, river reclamation and longitudinal revetment construction. Seconded to Danish Hydraulics Institute (*Denmark*) to investigate long and short term morphologic impacts of bank protection designs.

Lower Shoalhaven River Foreshore Definition Study, Nowra NSW

Assessment of the causes of erosion and potential options for rehabilitation of the banks of the river from the tidal limit at Burrier to Shoalhaven Heads. Involved detailed field observations, feedback from the community consultation, wind wave and boat wake wave energy analyses, and assessment of bank morphology survey data. A range of suitable bank management measures were identified for degraded reaches of the river.

Maitland Levee Rehabilitation Project, NSW

Project manager and chief design engineer for the investigation, concept and detail design of the realignment of the Hunter River at Maitland, including the design of 1.5 kms of bank stabilisation works for the protection of Maitland CBD. Involved hydraulic and environmental assessment to support the realignment of the Hunter River downstream from Belmore Bridge, including sand extraction of the inside bend point bar, as well as design of a rock toe berm and an upgraded flood protection levee which incorporated replacement of a deteriorated crib wall with an attractive Loc-a-Bloc retaining wall along the upper river bank adjacent to the Maitland CBD.

Estuary Processes Studies & Management Plans (various)

Estuary processes studies for the Camden Haven River and lakes system (Port Macquarie), Bonville Creek (Coffs Harbour) Tuckean Swamp (Ballina) and the Lane Cove River (Sydney Harbour). These studies involved characterisation of the primary tidal, fluvial, water quality, sedimentary and biological processes for each estuary, and the conceptualisation of the critical processes that would need to be protected to maintain or improve estuary condition.

Preparation of River Management Plans for the Camden Haven (Port Macquarie), Lane Cove, Moruya, Manning and Brunswick Rivers. Involved community consultation and the determination of strategies for managing recreational needs and facilities, bank erosion and navigation issues, and water quality.

Flooding & Floodplain Management

High River Floodplain Management Master Plan, Alberta, Canada

Project Director responsible for the 2D flood modelling for the town of High River in the eastern foothills of the Rocky Mountains, including the assessment of flood mitigation measures to address the damage and evacuation issues that arose due to the disastrous flooding of central Alberta and Calgary during June 2013. The model was used to inform the development of a Floodplain Management Master Plan for the town and to assist the design and impact assessment process for over 10 kilometres of levees and flood protection works. The work also included application of the flood model to assess the hydraulic benefits of a number of floodway enhancement measures including options for improving the distribution of flows between the Highwood River and the Little Bow River.

South Creek Flood Study (Western Sydney), NSW

Project Director and Principal Hydrologist responsible for preparation of the Updated South Creek Flood Study which involved characterisation of flooding for the western Sydney catchment that extends through Liverpool, Fairfield, Blacktown and Penrith LGAs. Involved hydrologic analysis, 2D flood modelling, hazard and hydraulic category assessment and the provision of flood emergency response management advice over an 8 year period culminating in publication of the updated flood study report.

Hastings River Flood Study and Floodplain Risk Management Study, NSW

Project Director responsible for the provision of flood advice in the Hastings Valley over a 10 year period, including the preparation of Port Macquarie-Hastings Council's Flood Study, Floodplain Management Study and Floodplain Management Plan. Involved 2D flood modelling using RMA-2 to define flood characteristics for the lower valley, application of this tool to assess potential options for reducing flood damages including detailed benefit-cost and triple bottom line assessments, identification of emergency response management issues and solutions for implementation by SES, and the preparation of a revised flood policy (DCP).

Camden Haven River & Lakes System Flood Study, NSW

Project director and manager responsible for the preparation of new government funded flood study for the valley that considered the floods that have occurred since 1990 and which involved the development of a fully two-dimensional flood model to define flood characteristics including level, velocity, hazard and hydraulic category (floodway). Application of this tool to assess the potential impacts of climate change due both to increased rainfall intensity and volume, and sea level rise.

Upper Nepean River Flood Study (Camden), NSW

Project Director responsible for the preparation of Updated Flood Study for the section of the Nepean River extending downstream from Menangle to Bents Basin. Involved hydrologic modelling incorporating all of the major water supply dams in the Upper Nepean system, and two-dimensional flood modelling using TUFLOW to determine revised design flood levels and extents for a range of floods up to and including the Probable Maximum Flood. The analysis incorporated an assessment of climate change impacts due to projected increases in storm rainfall intensity.

Picton Flood Study (Stonequarry Creek), NSW

Project Director and Principal Hydrologist responsible for preparation of updated flood study for the Stonequarry, Racecourse and Crawfords Creeks catchments draining to the NSW regional town of Picton. Involved detailed hydrologic analysis including calibration of an XP-RAFTS model to the June 2016 storm which led to major flooding of the central business district and residential areas of Picton. The study also involved detailed 2D flood modelling of the creek system and associated floodplains using RMA-2, including validation of the model to more than 75 high water marks recorded during the June 2016 event. The flood study generated peak flood levels, flood extents, flow velocities and hazard and hydraulic category mapping for the design 1%, 2%, 5% and 20% AEP events and the Probable Maximum Flood.

Hibbard Precinct Flood Study, (Port Macquarie) NSW

Project Director responsible for local scale flood study of the area between the Pacific Highway bridge crossing of the Hastings River and the Port Macquarie CBD which was targeted at confirming the extent of the floodway identified in earlier studies that links the extensive flood storage to the west of Port Macquarie Aerodrome to the Hastings River. Involved extensive 2D flood modelling of multiple partial encroachment scenarios and local scale refinement of the previously determined floodway extent through Hibbard. The investigation involved application of procedures previously developed for the broader Hastings River and which have been detailed in published papers.

Brownhill & Keswick Creeks SWMP, Adelaide, Sth Australia

Project Director and Principal Hydrologist responsible for preparation of a Stormwater Management Plan for urbanised catchments of Brown Hill and Keswick Creeks which drain through 5 LGAs in Adelaide. Involved a detailed benefit-cost assessment of two previously proposed flood detention dams in the upper Brown Hill Creek catchment, the identification and assessment of alternative flood mitigation options including a range of alternative flood detention systems and the construction of a system to intercept overland flow downstream of critical "breakout" points from the channel. Preferred options were assessed and modelled to establish potential reductions in flood damages.

Swamp Creek (Abermain) Floodplain Risk Management Study and Plan

Chris led the team engaged to prepare the Floodplain Risk Management Study and Plan for Swamp Creek. This investigation expanded on previous work completed as part of a preliminary assessment of potential flood mitigation options for the townships of Abermain and Weston. A number of mitigations options were assessed using hydraulic modelling and GIS interrogation to determine flood damages in order to compare benefits and costs. Flood emergency management measures were also assessed for various parts of Abermain and Weston. Chris presented the project outcomes to Council, and provided assistance to Council in preparing applications for grant funding for the proposed flood mitigation works.

Flood & Floodplain Risk Management Studies

Project Director and author responsible for the preparation of over 40 government funded Flood Studies and Floodplain Management Studies for numerous rivers and streams in NSW, including the Hunter, Williams, Hastings, Manning, Camden Haven, Shoalhaven and Richmond Rivers, Vineyard and South Creeks (western Sydney), Wallis, Fishery, Lavender and Bellbird Creeks, and Wollombi Brook (Lower Hunter), as well for the western NSW towns of Griffith, Bombala, Lockhart, Bungendore, The Rock and Wentworth/Mildura (Murray/Darling Junction). This work has involved hydrodynamic modelling using a range of software packages including HEC-RAS, MIKE 11, RMA-2 and TUFLOW, as well as presentations to Council sponsored flood management committees, presentations at public meetings and consultation with community groups via structured drop-in centres.

Flood Impact Assessments

Preparation of over 60 flood impact studies for residential, industrial and commercial development throughout NSW and QLD, including consideration of impacts of fill proposals for development on flood characteristics, the assessment of flood risk and the development of measures to manage residual flood hazard, including site specific flood evacuation plans.

Pacific Highway Upgrade Project – Port Macquarie to Kundabung (OH2Ku)

Technical Director and Project Manager responsible for all investigations related to the hydrology, flood impact assessment and scour analysis for the 37 km of dual carriageway that was constructed across the Hastings, Maria and Wilson Rivers floodplains, firstly as a consultant supporting the EIS and Concept Design, and then client-side as the NSW RMS Subject Matter Expert during the Design & Construct phase of the project. These responsibilities included:

- Technical Director responsible for delivery of the Hydrology and Hydraulics Assessment for the EIS and Flood Modelling Report for the Concept Design
- Review of Construction Tenders and provision of technical advice on modelling methodology, afflux, impacts and scour assessments
- SME acting on behalf of RMS during detail design and construction phases including review of Contractor's alternate designs and evaluation of associated afflux impact assessment and scour analysis
- SME acting on behalf of RMS during community consultation with landholders potentially impacted by the works including preparation of independent flood impact assessments

Riverstone West Precinct Development, NSW, Western Sydney

Project Director and Principal Engineer responsible for a variety of studies prepared in support of the DA for a 105 ha industrial land development located in the North-west Growth Sector of metropolitan Sydney at Riverstone. Involved environmental investigations associated with the placement of 3.6M m3 of fill within the floodplain of Eastern Creek including the preparation of a detailed floodplain management strategy, assessment of rail infrastructure upgrade requirements, and investigation of environmental constraints including flora and fauna, stream classification and stormwater.

Hunter Expressway Extension, Buchannan NSW

Project Director responsible for the detailed flood modelling of the proposed bridge crossings of Wallis and Surveyors Creek, near Buchanan in the lower Hunter Valley. This involved interaction with bridge and road designers to provide design advice for the design of two major highway bridge crossings. The proposed works, including construction of roadway embankments, bridge/culvert upgrades and a new twin bridge crossing of both Wallis and Surveyors Creeks, were modelled. The findings were used to reconfigure the bridge design and develop an optimal solution that balanced cost against potential upstream flood impact.

Mamre West Precinct Development Peer Review, Luddenham, NSW, Western Sydney

Technical review of two-dimensional flood modelling completed for a large scale residential development proposed for western Sydney. Involved a detailed review of a TUFLOW model including adopted parameters, boundary conditions and model outputs, as well as advice on potential impacts on flood characteristics along South Creek and associated floodway constraints.

New England Highway Upgrade – Scone Bypass

Peer review of the hydrology and flood hydraulics associated with the roadway embankments for the proposed bypass of the Upper Hunter Valley township of Scone. Involved review of the concept design for the highway upgrade including related cross-drainage structures and the flood modelling and impact assessment that was undertaken by GHD to support the EIS. Preparation of detailed peer review report which was included tabled with RMS for consideration in the detail design phase.

Civil Infrastructure

Moody Creek Flood Mitigation Dam Design (Cairns), QLD

Project Director responsible for the concept and detailed design of a 10 m high flood detention basin located on Moody Creek at Kanimbla near Cairns. Involved oversight of TUFLOW flood modelling to assess the benefits afforded by the flood detention basin to downstream urban areas of Cairns, including a dam break assessment, preparation of Failure Impact Assessment and a draft Emergency Action Plan. Scope expanded to include the detailed design and documentation of an earth fill dam with reinforced concrete spillway.

Shell Cove Residential Development, NSW

Project Director responsible for delivery of concept and detailed designs for the stormwater management network for a new town on the South Coast of NSW. The project involved mixed residential and commercial development across a 200 ha site that includes a new boat harbour. The drainage network and water quality management measures (WSUD) were developed using a combination of XP-RAFTS, DRAINS and MUSIC modelling. The final design incorporated a combination of wetlands, bio-retention systems and gross pollutant traps, as well as water reuse.

62 Lot Subdivision at Thirlmere, NSW

Project Director responsible for the concept and detailed design of civil works for a 62 lot subdivision at Thirlmere. Involved the concept development for roads, trunk drainage and surface water quality management, including provision of expert advice in the NSW Land & Environment Court, leading to securing of Development Consent. Subsequently managed the detailed design of the subdivision including bulk earthworks, road and drainage design, along with the provision of planning advice to facilitate the client's receipt of a Construction Certificate.

North Penrith Residential Development, NSW

Project Director responsible for delivery of detailed design documentation for Stage 1 of the North Penrith Residential Subdivision (near Penrith CBD). Involved preparation of engineering documentation to support the Concept Plan Application for the entirety of the 40 hectare development site and a Project Application for the first stage of the development which covered approximately 12 hectares. Design incorporated WSUD elements and stormwater management features aimed at achieving best practice for water quality control in urban environments.

Pacific Lakes Estate Development, Wyong, NSW

Concept and detail design of urban stormwater management systems for 400 lot Pacific Lakes Estate Development at Wyong, NSW, including the design, construction supervision and monitoring of 3 three constructed wetlands located upstream of a State Recreation Reserve. Involved the design and documentation of all features of the stormwater system including pool and riffle creek system linking wetlands, and all road and drainage infrastructure.

Coastal Waters Retirement Village Stormwater Design, Huskisson, NSW, Australia

Preparation of concept and detail design for stormwater management system for Henry Kendall Group's 300 unit Coastal Waters Retirement Village at Huskisson, NSW. Involved the design and documentation of six constructed wetlands to manage stormwater flows and treat runoff before discharge to sensitive receiving waters of Sussex Inlet.

Salamander Town Centre Development, NSW,Australia

Application of ARR (1987) and RAFTS in design of trunk drainage network for 400 lot subdivision. Conceptual and detail design of 3 hydraulically linked detention/retention basins connected to urban drainage network, and maintaining pre-development flood discharges at site boundaries. Preliminary assessment of water quality at catchment outflow to wetlands and erosion protection measures.

Qualification & Affiliations

- Bachelor of Engineering (Civil) (Hons), University of Newcastle
- Master of Engineering Science (Water Engineering), University of New South Wales
- Fellow, Engineers Australia, CPEng NER
- Member, Engineers Australia Water Panel (Sydney Division immediate past Chair)
- Registered Professional Engineer Queensland (RPEQ No. 26278)

Awards

- **Sternbeck Medalist 2010** for best paper and presentation at the 50th Annual Floodplain Management Authorities Conference, Gosford, February 2010

Publications

- **Thomas C R** (2019), '*Shelter-in-Place – Are we in a Policy Vacuum?*'. Proceedings of the National Floodplain Management Authorities Conference, Canberra, 14th – 17th May 2019.
- **Thomas C R**, Golaszewski R & Cox R (2018), '*Methodology for Determining Floodway / Flow Conveyance Extent in Australian Floodplains*', Proceedings of 38th Hydrology and Water Resources Symposium, Melbourne, December 2018.
- Phillips BC, **Thomas CR**, Pinto M (2016), '*Comparing Design Storm Burst and Embedded Design Storm Approaches in the Narellan Creek Catchment, NSW*'. Proceedings 37th Hydrology and Water Resources Symposium, Queenstown, December 2016.
- **Thomas C R**, Golaszewski R, Giron E (2014) '*Application of 2D Flood Modelling in the Design of Flood Protection for the Town of High River*'. Proceedings of Annual Canadian Water Resources Association Conference, Calgary, Alberta, March 2014.
- **Thomas CR**, Golaszewski R (2012), '*Refinement of Procedures for Floodway Delineation*'. Proceedings 52nd NSW Floodplain Management Authorities Conference, Batemans Bay, February 2012.
- Druery C, McConnell D, **Thomas CR** (2012), '*Responding to the Brisbane Flood – An Insurance Perspective*'. Proceedings 52nd NSW Floodplain Management Authorities Conference, Batemans Bay, February 2012.
- **Thomas C R**, Honour W, Golaszewski R (2010), "*Procedures for Floodway Definition – Is there a Uniform Approach*". Proceedings 50th NSW Floodplain Management Authorities Conference, Gosford, February 2010.
- Druery B, **Thomas CR**, Ross C, Moorhouse W (2002); "*Making Flood Data Accessible*". Proceedings 42nd NSW Flood Mitigation Authorities Conference, Kempsey, 2002.
- **Thomas CR**, Horton P (2001) "*Wentworth Floodplain Management Study – Application of 2D Modelling to a Leveed River System*", Proceedings of 41st NSW Floodplain Management Authorities Conference, Wentworth, 2001.
- **Thomas CR**, McConnell D (1998) "*Application of GIS to Hazard Definition & Floodplain Management, Lower Hunter Valley Floodplain Management Study*"; Proceedings of 41st NSW Floodplain Management Authorities Annual Conference, Moama, 1998.

- **Thomas CR**, Druery B (1996) "*Geomorphology of the Lower Hunter River, NSW – Managing the Legacy of the Past*"; 23rd Hydrology and Water Resources Symposium, Hobart, Australia, 21-24 May 1996.
- Druery BM, **Thomas CR**, Blumberg G (1993); "*The Role of Trees in Streambank Protection*"; Proceedings of the 33rd Annual Flood Mitigation Conference, Taree, May 1993.
- **Thomas CR**, Druery BM, Frankel E, Furner I & Roy PS (1993); "*Geomorphology of the Lower Hunter River - Implications for Floodplain Development*"; Proceedings of the 33rd Annual Flood Mitigation Conference, Taree, May 1993.

Work History

2018 - Present	Principal Consultant & NSW Practice Lead – Water Resources, Advisian (Worley Group)
2015 – 2018	Principal Engineer & Practice Lead, Water & Environment NSW, Advisian (Worley)
2013 - 2015	Principal Engineer & Manager, Water & Environment NSW, WorleyParsons
2007 – 2013	Principal Engineer & Manager, Environment & Water Resources NSW, WorleyParsons
1991 – 2007	Principal & Manager, Rivers & Estuary Group Patterson Britton & Partners
1988 – 1991	Senior Engineer, Water Group / Project Engineer, Maritime Group Sinclair Knight & Partners
1982 – 1988	Junior Engineer – Special Projects Engineer, Port Stephens Council, NSW

ANNEXURE B

Uniform Civil Procedure Rules 2005
Expert Witness Code of Conduct

Schedule 7 Expert witness code of conduct

(Rule 31.23)

1 Application of code

This code of conduct applies to any expert witness engaged or appointed:

(a) to provide an expert's report for use as evidence in proceedings or proposed proceedings, or

(b) to give opinion evidence in proceedings or proposed proceedings.

2 General duties to the Court

An expert witness is not an advocate for a party and has a paramount duty, overriding any duty to the party to the proceedings or other person retaining the expert witness, to assist the court impartially on matters relevant to the area of expertise of the witness.

3 Content of report

Every report prepared by an expert witness for use in court must clearly state the opinion or opinions of the expert and must state, specify or provide:

(a) the name and address of the expert, and

(b) an acknowledgement that the expert has read this code and agrees to be bound by it, and

(c) the qualifications of the expert to prepare the report, and

(d) the assumptions and material facts on which each opinion expressed in the report is based (a letter of instructions may be annexed), and

(e) the reasons for and any literature or other materials utilised in support of each such opinion, and

(f) (if applicable) that a particular question, issue or matter falls outside the expert's field of expertise, and

(g) any examinations, tests or other investigations on which the expert has relied, identifying the person who carried them out and that person's qualifications, and

(h) the extent to which any opinion which the expert has expressed involves the acceptance of another person's opinion, the identification of that other person and the opinion expressed by that other person, and

(i) a declaration that the expert has made all the inquiries which the expert believes are desirable and appropriate (save for any matters identified explicitly in the report), and that no matters of significance which the expert regards as relevant have, to the knowledge of the expert, been withheld from the court, and

(j) any qualification of an opinion expressed in the report without which the report is or may be incomplete or inaccurate, and

(k) whether any opinion expressed in the report is not a concluded opinion because of insufficient research or insufficient data or for any other reason, and

(l) where the report is lengthy or complex, a brief summary of the report at the beginning of the report.

4 Supplementary report following change of opinion

(1) Where an expert witness has provided to a party (or that party's legal representative) a report for use in court, and the expert thereafter changes his or her opinion on a material matter, the expert must forthwith provide to the party (or that party's legal representative) a supplementary report which must state, specify or provide the information referred to in clause 3 (a), (d), (e), (g), (h), (i), (j), (k) and (l), and if applicable, clause 3 (f).

(2) In any subsequent report (whether prepared in accordance with subclause (1) or not), the expert may refer to material contained in the earlier report without repeating it.

5 Duty to comply with the court's directions

If directed to do so by the court, an expert witness must:

(a) confer with any other expert witness, and

(b) provide the court with a joint report specifying (as the case requires) matters agreed and matters not agreed and the reasons for the experts not agreeing, and

(c) abide in a timely way by any direction of the court.

6 Conferences of experts

Each expert witness must:

(a) exercise his or her independent judgment in relation to every conference in which the expert participates pursuant to a direction of the court and in relation to each report thereafter provided, and must not act on any instruction or request to withhold or avoid agreement, and

(b) endeavour to reach agreement with the other expert witness (or witnesses) on any issue in dispute between them, or failing agreement, endeavour to identify and clarify the basis of disagreement on the issues which are in dispute.

Town Planning Report

NSW LEC 63136/2021

Stannards Marine Pty Ltd v North Sydney Council

PREPARED BY

HAMPTONS PROPERTY SERVICES Pty Ltd

Head Office: Suite 404 | Level 4 | 203-233 New South Head Road | Edgecliff NSW 2027

Tel (02) 9386 7000 | Fax (02) 9386 7001

www.hamptonspropertyservices.com.au

PROJECT PARTICULARS

Project No.	2017047
Client	Noakes Group Pty Ltd
Site Address	6 John Street, McMahons Point
Document Name	Statement of Environmental Effects

Prepared by

Date	Document Name	Authorisation	
		Name/Position	Signature
8 October 2021	Town Planning Report _V1	Kristy Hodgkinson *Director*	
11 October 2021	Town Planning Report _V2	Kristy Hodgkinson *Director*	
6 December 2021	Town Planning Report_V3	Kristy Hodgkinson *Director*	

In the event that this document is not signed, this is not representative of a final version of the document, suitable for assessment purposes.

RELIANCE ON CONSULTANT INFORMATION

As part of undertaking this project, Hamptons has relied on the professional advice provided by third party consultants. No responsibility is taken for the accuracy of the information relied upon by these consultants assisting the project. It is assumed that each of the consultants has made their own enquiries in relation to technical matters forming part of their expertise.

CONTENTS

1. INTRODUCTION

1. Hamptons Property Services has been engaged by Alice Spizzo Advisory, on behalf of Stannards Marine Pty Ltd, to provide a town planning report to assist in resolving the town planning issues that have been raised in an appeal to the NSW Land & Environment Court (LEC) in the matter of Stannards Marine Pty Ltd v North Sydney Council (63136/2021).
2. I, Kristy Hodgkinson, am a Director of Hamptons Property Services and a qualified town planner. I have a Bachelor of Town Planning from the University of New South Wales (Hons, Class 1). I am also a Certified Practicing Planner of the Planning Institute of Australia (Curriculum Vitae, Annexure 1).
3. My address is Suite 404, 233-233 New South Head Road, Edgecliff NSW 2027.
4. This report provides my responses to the Statement of Facts and Contentions of the Respondent (SOFAC), dated 13 May 2021, specifically with reference to the following contentions:
   a. Contention 1(a)
   b. Contention 6
   c. Contention 14
   d. Contention 15
   e. Contention 16
   f. Contention 17.
5. This report also addresses the following contentions raised in the Statement of Facts and Contentions of the Residents (Resident SOFAC), specifically with reference to the following contentions:
   a. Contention 2
   b. Contention 3
   c. Contention 4
   d. Contention 5
   e. Contention 8.
6. The property the subject of these proceedings is located at 6 John Street, McMahons Point, which is located on the eastern side of Berrys Bay.
7. I have attended the site on more than twenty (20) occasions over the past five years.
8. I am the author of the Environmental Impact Statement (EIS) which was lodged with the development application.
9. I have read Division 2, Part 31 of the Uniform Civil Procedures Rules 2005 and the Expert Witness Code of Conduct at Schedule 7. My report has been prepared in accordance with this documentation and I agree to be bound by these terms at all times.
10. My evidence is in relation to my area of expertise only, being town planning. Where I have relied upon the expertise of others, I have identified that accordingly.

2. THE SITE

11. The site is located at 6 John Street, McMahons Point and comprises both land and water elements; its principal use, as approved, is as a boat repair and maintenance facility.
12. There are a number of structures on the site, including four sheds where boat maintenance and repair is undertaken therein, a relocatable shed which is moved around the site to assist with repair and maintenance of boats, a two-storey office building, which houses the administrative uses for the site, car parking and various other ancillary aspects. There are also two travel lifts which are used to move vessels into and out of the water across the hardstand.
13. The waterside of the site has various water-based structures, including piles and pontoons, which boats are moored adjacent to.
14. There is also a slipway located at the northern end of the site.
15. The landward side of the site operates in accordance with development consent 1164/90, as amended on 24 June 1992 and 13 September 1993.
16. The then, Maritime Services Board, granted consent for activities over the water, which included the concrete hardstand, adjacent berths and jetties over Berrys Bay on 15 November 1990.
17. The site also operates under an Environmental Protection Licence 10893, which was most recently amended by the NSW Environmental Protection Authority (EPA) on 29 October 2021.
18. Noakes Shipyard (Noakes), who are the operator of the site, have recently completed detailed noise testing at the site and have embarked upon a Pollution Reduction Program to reduce noise impacts associated with the existing operation. This is to be completed by 30 June 2022 and mitigation works have commenced.
19. Noakes has agreed to undertake a similar approach to pollution reduction in relation to air quality. This report was submitted to the NSW EPA on 19 November 2021 and is currently being assessed (Annexure 2). The likely outcome will be a Pollution Reduction Program in relation to matters of air quality for the existing operations.

3. THE PROPOSED DEVELOPMENT

20. The proposed development is for a floating dry dock (FDD) to be moored at the site which will enable boats to be repaired and maintained.
21. To enable the FDD to be moored at the site, a series of existing piles will need to be removed to enable the FDD to be positioned adjacent the hardstand area of the site.
22. The FDD is 18.8m wide and 59.2m long.
23. The FDD is constructed of steel.
24. The FDD has a maximum height of 11.5m. Of this height, approximately 2m of the vessel is below the waterline, having a visible height of 9.5m. As the waterline is approximately 1.5m below ground level, the height above ground level is approximately 7m (having regard to tide conditions).

25. The FDD is operated by lowering it into the water by pumping water into both the hull and sides of the vessel. A boat is then moved into the FDD. The water is then pumped out of the FDD to create buoyancy.
26. The FDD will be fitted with a carbon filtration system to capture Volatile Organic Compounds (VOCs), which is a bespoke system that has been designed by Fowlerex Technologies.
27. The FDD will also be fitted with acoustic curtains at each end and across the top of the FDD to enable the FDD to be enclosed when noise-generating boat repair or maintenance work is carried out.
28. Sound absorption panels will also be installed on the inside walls of the FDD.

4. RESPONSE TO CONTENTIONS

29. This section of the report sets out my response to each of the relevant contentions as set out at Section 1.

4.1 Contention 1(a) – Non-Compliance with SEARs

The Development Application should be refused because it does not adequately address the SEARs.

Particulars

(a) The SEARS required the Applicant during the preparation of the EIS to consult with the relevant local, State, and Commonwealth government authorities, service providers, and community groups, and address any issues that they may raise in the EIS. It appears that consultation during the preparation of the EIS was not carried out and that the Applicant seeks to rely upon responses received from the relevant agencies and local residents during assessment and notification of a previous development application. If consultation has been carried out with the appropriate agencies and community groups, details of such are not adequately addressed in the EIS as required by the SEARS.

Response

30. The development application was lodged after an earlier application for the same purpose was withdrawn from assessment by the Respondent Council.
31. The earlier application was considered by the relevant local, State and Commonwealth government authorities and referral comments were provided by those relevant agencies on the suitability, or otherwise, of that application.
32. Those referral comments were relied upon for the purpose of preparing the development application the subject of these proceedings, with amendments made to the development application to respond to matters of concern that had been raised.
33. The comments that had been provided by the Respondent Council during the course of assessing the earlier application were also relied upon as a basis to inform the development application the subject of these proceedings.

34. That aside, the following agencies has been contacted to determine if they have any further comments over and above that provided to the NSW Department of Planning, Industry & Environment (DPIE) as part of the SEARs request:
    a. NSW Environment Protection Authority (EPA)
    b. NSW DPIE – Primary Industries
    c. Heritage Council of NSW
    d. Transport for NSW.
35. The only response received to date was from the NSW EPA who recommended that the matter be clarified with NSW DPIE.
36. I have subsequently written to NSW DPIE seeking their clarification on the SEARs who have confirmed by letter dated 8 November 2021 that no further requirements in relation to the content of the EIS or consultation are required. Specific feedback was sought from the NSW EPA as part of the NSW DPIE response who also confirmed that there were no additional requirements (Annexure 3).
37. In my experience of preparing Environmental Impact Statements (EIS), it is rare that additional requirements are provided by the agencies after the SEARs have been issued.
38. There are no Federal agencies relevant to this application.

4.2 Contention 6: Alternative Locations – Site Unsuitability

The Development Application fails to give adequate consideration of alternative locations within the Sydney Region and/or for a smaller sized dry dock on the subject site to enable an assessment of the appropriateness and suitability of the development.

Particulars

(a) Clause 7(1)(c) of Part 2 of Schedule 2 of the EPA Regulation requires an environmental impact statement to analyse any feasible alternatives to the carrying out of a development.

(b) The EIS for the Proposed Development purports to comply with this requirement at Page 53. It states that *"There are two matters to consider in relation to the consideration of alternatives. The first is whether there is a position that is more suited within the site for the proposed structure. The second is whether there is an alternative location within the nearby waterways."*

(c) This EIS is inadequate in that it does not also analyse whether more appropriately (smaller) sized alternatives could be operated from the Site, being more compatible with the size of the bay and its mix of surrounding uses, including residential.

(d) The EIS is inadequate in that it does not involve a more detailed and holistic feasibility analysis of alternatives within the Sydney regional context, assessing the options for larger vessels to be maintained in other more suitable locations and smaller vessels on the subject site.

(e) At page 54, the EIS states that the Proposed Development provides *"far greater alternative to the market place and improves the servicing capacity within the NSW region, than is otherwise currently available"* and refers to the only alternative, Sydney City Marine only having a capacity of 600T compared to the Proposed Development's 1000T. However, the EIS states (at page 49) that the capacity of the Proposed Development is "more in the order of 600T" because of the boat length limitation. The Proposed Development therefore provides limited if any additional capacity compared to other dry dock facilities already available within the Region.

(f) The EIS provides no economic feasibility analysis to support its conclusion that this is the only or preferred location for a facility of this scale and nature.

(g) The EIS fails in its consideration of the requirement under Part 4.2 of the *Sydney Harbour Foreshore and Waterways Area Development Control Plan 2005*, that: "the demand for the development has been established."

(h) Given the lack of adequate consideration of alternatives to the Proposed Development, the consent authority is unable to consider feasible alternatives to the carrying out of the Proposed Development in order for the consent authority to properly consider the matters required to be taken into consideration under SEPP 33.

(i) The principles in Clause 2 of the SREP demonstrate that the harbour should be viewed as a holistic water system and that, whilst a working harbour is an important consideration, if there are better alternatives to locate an industrial use, they should be utilised so as to promote the public interest and achieve the aims of the plan.

(j) The Proposed Development is unsatisfactory when assessed pursuant to Section 4.15 (b), (c), and (d) of the EPA Act.

Controls

- Section 4.15(b), (c) and (d) of the EPA Act
- Clause 13 of SEPP 33

Response

39. I do not agree that the EIS does not consider feasible alternatives.
40. The positioning of the FDD adjacent the landward side of the site is suitable as:
    a. it does not compromise localised flora and fauna conditions
    b. it has the most limited impact when viewed from the public and private domain
    c. it ensures that the view of the stone cliff face, which forms the back drop to the site, is not compromised

d. it is confined to the existing lease line and therefore does not intrude upon public use of the waterway, thus retaining the existing status quo.

41. A smaller sized FDD would not provide for a 1000T vessel to be serviced within the Region as there are no other facilities, to my knowledge, that provide vessels up to this weight.
42. While there will always be a balance between height and weight of a vessel, the ability to provide a 1000T service vessel within the Region is an opportunity that is not currently available.
43. Matters of SEPP 33 are addressed by others in these proceedings.
44. I believe that Clause 2 of the SREP is achieved and the proposal maintains the importance of a working harbour by providing a boat repair and maintenance facility that is not otherwise provided in the Region for vessels up to 1000T.
45. Matters of public interest are addressed at Section 4.6.

4.3 Contention 14 – Public Access

The Development Application should be refused because it consolidates the water-based element of the use and reduces the likelihood of obtaining foreshore access in the foreseeable future.

Particulars

(a) Condition D51 of Development Consent 1164/90 requires the provision of a public jetty in the vicinity of the Proposed Development. The Development Application has provided insufficient information to confirm that the Proposed Development could be carried out, and the FDD be fully operational, without obstruction to the public jetty if it were to be built.

(b) The Proposed Development is inconsistent with the following planning principles in clause 14 of the SREP:

14 The planning principles for land within the Foreshores and Waterways Area are as follows—

(b) public access to and along the foreshore should be increased, maintained and improved, while minimising its impact on watercourses, wetlands, riparian lands and remnant vegetation,

(c) access to and from the waterways should be increased, maintained and improved for public recreational purposes (such as swimming, fishing and boating), while minimising its impact on watercourses, wetlands, riparian lands and remnant vegetation,

(f) public access along foreshore land should be provided on land used for industrial or commercial maritime purposes where such access does not interfere with the use of the land for those purposes

(c) The Proposed Development does not maintain or improve public access along the foreshore, and does not provide appropriate management mechanisms to safeguard public access to foreshore land.

The Proposed Development is therefore unacceptable having regard to the following matters required to be taken into consideration under the clause 22(a), (c) and 23(d) of the SREP.

(d) The SREP DCP sets out the General Requirements for water-based and land/water interface developments. It provides that public access to waterways and public land is maintained and enhanced.

(e) Clause 4.3 of the SREP DCP provides:

Foreshore access is to be encouraged and promoted. Wherever possible, public access to and along the foreshore including the inter-tidal zone should be secured or improved. Foreshore links joining public open spaces or access points are most desirable. These can be obtained by right of way or dedicated or acquired strips of land and may link with tracks across beaches and rock platforms. Where foreshore links are not available, a link through adjacent streets is usually possible. The maps accompanying this DCP indicate existing and potential pedestrian and bicycle access around the foreshore. When designing and assessing a development, consideration should be given to providing these access routes.

Response

46. I agree that Condition D51 of Development Consent 1164/90 requires the installation of a public jetty.
47. I have attended meetings between the operator of the site and the Respondent Council with a view to this jetty being installed by the Applicant.
48. The outcomes of meetings that I attended on this point were that the Respondent Council was to provide additional information to the Applicant for these works to be undertaken at the Applicant's expense, based on what the Council deems suitable having regard to current best practice standards for a public jetty, given the age of the original condition.
49. To my knowledge this discussion has never been advanced by the Respondent Council.
50. My understanding was that the intended use of the jetty would be for small craft only (such as kayaks etc).
51. I am not a navigation expert such as to advise whether the FDD would adversely impact on use of the public jetty. I do, however, note that this was considered in the Navigation Impact Assessment, prepared by Royal Haskoning DHV, dated 21 February 2019, lodged with the development application and could not be assessed as the location, width and length of the jetty had not been provided by the Respondent Council. Further, an assessment could not be undertaken as the intended use had not been identified.
52. In the event that the Respondent Council seek that the public jetty is installed, such information is required to enable a full assessment. In the alternate, it is open to the Applicant to lodge a modification application in accordance with s.4.55 of the Environmental Planning & Assessment Act 1979 (EP & A Act) to delete this condition, should there no longer be a need for a jetty to be installed.

53. In relation to clause 14 of the SREP, (f) is the most relevant as public access through the site cannot be facilitated for occupational health and safety reasons, due to the site being used as an industrial shipyard.
54. The positioning of the FDD adjacent the foreshore does not, in any way, further restrict public access along foreshore land, over and above the restrictions pertaining to the existing use of the site.
55. Further, in relation to (c), the FDD does not prevent access to the waterway for public recreational purposes as public access is not available through the site in its current form.
56. I do not agree that (b) has any relevance to this application.
57. I do not believe that the FDD further restricts public access along the foreshore adjacent to the site as, regardless of the FDD, public access cannot be provided through the site for occupational health and safety reasons.
58. The FDD does not provide any further impediment to waterways or public land over the existing situation.
59. The FDD does not restrict access to other public areas within the vicinity of the site and is contained within the lease area.

4.4 Contention 15 – Suitability of the Site

The Development Application should be refused as the Site is not suitable for the Proposed Development.

Particulars

(a) Having regard to section 4.15(c) of the EPA Act, for the reasons set out in these contentions, the Site is unsuitable for the Proposed Development.

Response

60. The site is entirely suitable for the FDD to be moored in this location.
61. The function of the FDD, which is to assist in the repair and maintenance of boats, is entirely consistent with the zoning of the waterway, which is W1 Maritime Waters, pursuant to the Sydney Regional Environmental Plan (Sydney Harbour Catchment) (SREP Sydney Harbour Catchment).
62. The FDD is also consistent with the zone objectives for the W1 Maritime Waters zone as it:
    a. enables use of the waterway for maritime industrial operations, the nature of which is the repair and maintenance of boats
    b. allows the FDD to be used in a location that is compatible with the intention of a working waterfront and does not affect the effective and efficient movement of commercial shipping, public water transport and maritime industry operations
    c. does not compromise the equitable use of the waterway by passive recreation craft.
63. I note on the latter point that Section 5.1.1 Navigation Widths and Section 5.1.2 Swing Basin, addressed in the Navigation Impact Assessment, prepared by Royal Haskoning DHV, dated 21 February 2019, states

that the use of the FDD will not compromise the use of the waterway as there is sufficient width in the channel and the swing basin is of sufficient size to enable a vessel to be loaded onto, and unloaded off, the FDD.

64. The use of the FDD is also complementary to the landward side of the site, which is zoned IN4 – Working Waterfront in accordance with the North Sydney Local Environmental Plan 2013. Given that the land and water use operate in tandem, this is a relevant.

65. The FDD will enable certain activities generally undertaken on the land, to instead be undertaken on the FDD, in a more efficient manner that reduces potential environmental impacts. While boats will continue to be repaired and maintained on the land, collectively, the FDD will ensure that the objectives of the IN4 zone are retained, by:
    a. enabling the continued use of the site for waterfront industrial and maritime activities, undertaken in a safer environmental manner
    b. enabling the FDD to be located where it requires direct waterfront access to ensure the greatest level of environmental protection (refer to the carbon filtration system details prepared by others)
    c. ensuring that, with the use of the FDD for the repair and maintenance of boats, reduced environmental impacts, particularly by reducing the activities that may be otherwise potentially harmful on the northern slipway, where the risk of spill is high
    d. ensuring that employment opportunities that keep pace with modern technologies are increased, while maintaining consistency with the existing development consent
    e. ensuring that the adverse effect of the use of the site is mitigated, through improvements to on-site activities with enhanced performance, particularly in relation to air and noise quality (refer to reports by others).

66. I also refer to the Report on Heritage prepared by John Oultram, which provides clear evidence of the site having been suitable for use by larger vessels since the 1870's, which were docked for repairs, along with boat building activities. This has continued since inception and the FDD is of a size and scale that is consistent with the historical use of the land and with vessels that are moored in the Bay, including South Steyne.

67. The boatyard itself and the mooring of the FDD at the site will ensure that the tangible, historical use of the site is maintained, while utilising the FDD, which has had a continued life in Sydney Harbour over time and is complementary to the use of the site as an industrial working waterfront.

68. The adaptation of the FDD to keep pace with more modern technology to enhance the operational and environmental safety aspects of this does not mean that it is not suited to the site. Instead, it allows for the continued use of the site, in a suitable location, that being one that is determined as entirely suitable for maritime waterfront activity.

4.5 Contention 16 – Public Interest

The Development Application is not in the public interest for the reasons set out above, and should be refused having regard to those matters and/or any other matters the Court finds determinative of the application, including the submissions received to the Development Application to the extent those submissions are consistent with these Contentions or otherwise found to be determinative.

Particulars

(a) The Proposed Development is not in the public interest, as it has not adequately demonstrated that the potential visual impacts, air quality impacts, acoustic impacts, and impacts from hazardous materials can be suitably mitigated.

(b) The Proposed Development is inconsistent with the aims in clause 2(2) of the SREP as set out below:

> (2) For the purpose of enabling these aims to be achieved in relation to the Foreshores and Waterways Area, this plan adopts the following principles—
>
> > 1. Sydney Harbour is to be recognised as a public resource, owned by the public, to be protected for the public good,
> >
> > 2. the public good has precedence over the private good whenever and whatever change is proposed for Sydney Harbour or its foreshores,
> >
> > 3. protection of the natural assets of Sydney Harbour has precedence over all other interests.

(c) The Development Application has not adequately demonstrated that the proposed private development protects the harbour and prioritises the public good over the private interests of the developer.

(d) The cumulative adverse impacts described in B1 of the Contentions, on balance, outweigh any public or private benefits associated with the Proposed Development.

(e) The Proposed Development is unacceptable when the cumulative impacts are considered against the aims in clause 2(2) of the SREP, which require the public good to take precedence over the private good whenever and whatever change is proposed for Sydney Harbour.

(f) The Development Application is unsatisfactory when assessed pursuant to Section 4.15 (e) of the Act.

Controls

- SREP - Clause 2(2)
- EPA Act - s 4.15(e)

<u>Response</u>

69. I leave the matters of visual impact, air quality impacts, acoustic impacts and impacts from hazardous materials to others in these proceedings.
70. In relation to clause 2(2) of the SREP, the FDD will be positioned within the existing lease line and therefore will not compromise public use of the waterway, nor will it compromise the public good.
71. I have reviewed the expert reports in these proceedings, prepared for the Applicant and believe that the natural assets of Sydney Harbour will not be compromised by the FDD and that the cumulative impacts of the development are acceptable and do not place private good before public interest.
72. I have reviewed the Navigation Impact Assessment, prepared by Royal Haskoning DHV, dated 21 February 2019 and note that the swing basin required for the FDD does not require any private moorings to be relinquished or relocated that are currently used by members of the public, such that they would be disadvantaged by the location of the FDD.
73. The Navigation Impact Assessment nominates that there would need to be some cooperation between private vessels and Noakes when a vessel is being manoeuvred in the swing basis; however, the COLREGS provide this as a standard requirement for both proper look-out and maintenance of speed. To my knowledge, the FDD is not subject to any benefit from a navigational perspective over any other vessel in the waterway, such that the public would be disadvantaged.

4.6 Contention 17 – Clause 5.7 NSLEP

The Proposed Development should be refused because it does not meet the objective in clause 5.7 of the NSLEP.

Particulars

(a) Clause 5.7 of the NSLEP states:

(1) The objective of this clause is to ensure appropriate environmental assessment for development carried out on land covered by tidal waters.

(b) For the reasons set out above and in Contention B2, the Proposed Development should be refused because the environmental assessment carried out by the Applicant is inadequate, and therefore the Proposed Development does not meet the objective in clause 5.7 of the NSLEP.

<u>Response</u>

74. I do not agree with this contention.

4.7 Resident SOFAC Contention 2 – Public Jetty

In addition to the matters raised at paragraph B2, the Development Application fails to meet the requirements of SEPP 33 at clause 13(e) as it does not consider future use of nearby land, in particular the public Jetty identified in condition D51 of DA 1164/90.

75. This matter is addressed at paragraphs 46-59.

4.8 Resident SOFAC Contention 3 – Use of the FDD

The statement at page 54 of the EIS, which is conveniently set out at paragraph B6(e) of the Council's SOFAC is not correct as the Noakes Group are already able to use the FDD 'within the NSW region' which they proposed to do by using the FDD in Newcastle.

76. Based on the contracts that the operator has, the FDD would be most efficiently used at the proposed location. This is from both a time and financial perspective for both the operator and the vessel owners.

4.9 Resident SOFAC Contention 4 – Vessel Lifting Capacity at Sydney City Marine

A further inaccuracy introduced by the EIS is in relation to the vessel lifting capacity of Sydney City Marine which is 800T not as stated there in 600T.

77. I have made independent enquires and confirm that Sydney City Marine has the capacity to lift vessels up to 800T in weight.

4.10 Resident SOFAC Contention 5 – Additional Capacity

In light of matters raised in paragraphs 3 and 4 immediately above the Proposed Development provides no additional capacity compared to other dry dock facilities already in the Region. This is particularly so if the assertion made in the EIS at Page 49 that the capacity of the Proposed Development is 'more in the order of 600T' were to be accepted.

78. The maximum capacity of the FDD is 1000T.
79. To my knowledge, there is no other FDD in the Region that accommodates a vessel up to this weight.
80. Regardless of whether the likely use of the FDD would be for vessels 600T in weight, the FDD provides the opportunity for vessels up to 1000T in weight to be repaired and maintained.
81. Therefore, the proposed development does provide additional capacity compared to other dry dock facilities in the in Region.

4.11 Resident SOFAC Contention 8 – Site Suitability

We adopt and support the contention of North Sydney Council (at 11) that the development should be refused. In addition, it has not been demonstrated that the Site is suitable for the intended purpose and shall not lead to unacceptable contamination risks to human health and the environment as required by SEPP 55, the Contaminated Land Management Act 1997 (NSW) and the SREP. Moreover, the Navigation Assessment does not assess the risk of a stability incident or other risk occurring that would block the channel, give rise to contamination or endanger the public to precent the disturbance of the contaminated sediment on the seabed giving rise to risk of contamination.

82. Matters of site suitability as it relates to town planning matters has been addressed at Section 4.4.

ANNEUXRE 1: CURRICULUM VITAE

KRISTY HODGKINSON
Director
Hamptons Property Services

Kristy has more than 20 years' experience in the field of town planning. Having held a diverse range of town planning positions and gained a wealth of knowledge from a diverse range of projects, Kristy is the chief planning advisor and Director of Hamptons Property Services.

During her career, Kristy has been involved in projects across Australia and New Zealand, providing high-level strategic advice and engaging in community consultation on a number of local and state government projects. Her current involvement in projects spans a diversity of land uses, including residential land subdivision; mixed use development projects; retail shopping centres; marinas, alterations and additions to existing hotels; and residential redevelopment projects. Kristy's project experience involves detailed liaison with both local and state government authorities, coordination and mediation of a range of expert project consultants, and various advisory services for her clients.

<u>Relevant Education</u>
Bachelor of Town Planning (Hon. Class 1), University of New South Wales 2001
Certified Practicing Planner, Planning Institute of Australia

<u>Professional Experience</u>
Hamptons Property Services, Director (2010 – Current)
Hamptons Development Group, Director - Planning (2006 – 2010)
Planning Workshop Australia, Senior Associate (2005-2006)
Planning Workshop Australia, Associate (2002 – 2005)
Whelans Land Information Consultants, Town Planner (2001 – 2002)
Planning Workshop Australia, Student Town Planner (1999-2001)

<u>Professional Skill Set</u>
Kristy's philosophy for the delivery of projects is to start with first principles and work with local and state authorities in the delivery of a project. This involves upfront and detailed working groups being established to ensure that key client outcomes are achieved. Kristy's key skill sets are in the following areas:

- High level strategic advice on delivery and execution of projects from inception to completion;
- Interpretation of complex planning provisions and navigating ways to deal with these;
- Ability to deal with protracted projects, including liaison/negotiations with government authorities;
- Extensive community consultation experience with local community stakeholders/government agencies;
- Sound report writing skills, with strong attention to detail.

ANNEXURE 2: ENVIRONMENT PROTECTION LICENCE, 29 OCTOBER 2021

Licence Variation

NOAKES GROUP PTY LIMITED
ABN 36 002 057 294 ACN 002 057 294
PO BOX 1644
NORTH SYDNEY NSW 2059

Attention: Sean Langman

Notice Number	1613818
File Number	EF13/3370
Date	29-Oct-2021

NOTICE OF VARIATION OF LICENCE NO. 10893

BACKGROUND

A. NOAKES GROUP PTY LIMITED ("the licensee") is the holder of Environment Protection Licence No. 10893 ("the licence") issued under the *Protection of the Environment Operations Act 1997* ("the Act"). The licence authorises the carrying out of activities at 6 JOHN STREET, MCMAHONS POINT, NSW, 2060 ("the premises").

B. On 14 July 2021, the EPA varied the licence by notice No. 1610126 to add a Pollution Reduction Program ("PRP") "Air Quality Risk Assessment" at Condition U2.

C. The purpose of the PRP is to ensure that a risk assessment is undertaken to identify and mitigate concerns around air quality as a result of Noakes' day to day activities.

D. On 25 October 2021, Hampton Property Services on behalf of the licensee submitted to the EPA a request for an extension to the timeframes for completion of items required under Conditions U2.3 of the PRP.

E. Hampton Property Services advised that Noakes' obligations within the Land and Environment court has resulted in a delay by consultants SLR in completing the Air Quality Risk Assessment.

F. The EPA considered the justifications provided by Hamptons Property Group on behalf of the licensee, and the current implementation of measures to address odour emissions from the premises.

G. The due date for completion of actions required by Condition U2.3 has been extended to 22 November 2021.

H. The EPA has taken into account the objects of the Act and the relevant factors listed in section 45 of the Act.

Licence Variation

VARIATION OF LICENCE NO. 10893

1. By this notice the EPA varies licence No. 10893. The attached licence document contains all variations that are made to the licence by this notice.
2. The following variations have been made to the licence:
    - Condition U2.3 has been varied to extend due date to 22 November 2021.

Larissa Borysko

A/ Unit Head

Regulatory Operations Metropolitan West

Environment Protection Authority

(by Delegation)

INFORMATION ABOUT THIS NOTICE

- This notice is issued under section 58(5) of the Act.
- Details provided in this notice, along with an updated version of the licence, will be available on the EPA's Public Register (http://www.epa.nsw.gov.au/prpoeo/index.htm) in accordance with section 308 of the Act.

Appeals against this decision

- You can appeal to the Land and Environment Court against this decision. The deadline for lodging the appeal is 21 days after you were given notice of this decision.

When this notice begins to operate

- The variations to the licence specified in this notice begin to operate immediately from the date of this notice, unless another date is specified in this notice.
- If an appeal is made against this decision to vary the licence and the Land and Environment Court directs that the decision is stayed the decision does not operate until the stay ceases to have effect or the Land and Environment Court confirms the decision or the appeal is withdrawn (whichever occurs first).

Environment Protection Licence

Licence - 10893

Licence Details	
Number:	10893
Anniversary Date:	14-February

Licensee
NOAKES GROUP PTY LIMITED
PO BOX 1644
NORTH SYDNEY NSW 2059

Premises
NOAKES BOATYARD
6 JOHN STREET
MCMAHONS POINT NSW 2060

Scheduled Activity
Marinas and boat repairs

Fee Based Activity	**Scale**
Boat construction/maintenance (general)	Any annual handling capacity

Contact Us
NSW EPA 4 Parramatta Square 12 Darcy Street
PARRAMATTA NSW 2150
Phone: 131 555
Email: info@epa.nsw.gov.au
Locked Bag 5022 PARRAMATTA NSW 2124

Environment Protection Licence

Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).

Environment Protection Licence

The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

NOAKES GROUP PTY LIMITED
PO BOX 1644
NORTH SYDNEY NSW 2059

subject to the conditions which follow.

1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Marinas and boat repairs	Boat construction/maintenance (general)	Any annual handling capacity

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

Premises Details
NOAKES BOATYARD
6 JOHN STREET
MCMAHONS POINT
NSW 2060
LOT 2 DP 77853, LOT 1 DP 127195, LOT 2 DP 179730, LOT B DP 420377, LOT A DP 420377, LOT 1 DP 449731, LOT 987 DP 752067
THE PREMISES INCLUDES THE 'WATER LEASE AREA' MARKED IN PINK ON SURVEY PLAN DP 849188, DATED 16.05.1995, PROVIDED TO THE EPA ON 02.10.2019 AND TITLED DOC19/869106-1 SITE SURVEY OF WATER LEASE AREA USED TO DEFINE LICENSED PREMISES BOUNDARY (DP 849188).

A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

In this condition the reference to "the licence application" includes a reference to:
a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

2 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Waste

L2.1 The licensee must not cause, permit or allow any waste to be received at the premises, except the wastes expressly referred to in the column titled "Waste" and meeting the definition, if any, in the column titled "Description" in the table below.
Any waste received at the premises must only be used for the activities referred to in relation to that waste in the column titled "Activity" in the table below.
Any waste received at the premises is subject to those limits or conditions, if any, referred to in relation to that waste contained in the column titled "Other Limits" in the table below.
This condition does not limit any other conditions in this licence.

Code	Waste	Description	Activity	Other Limits
NA	Waste	Any waste received on site that is below licensing thresholds in Schedule 1 of the POEO Act, as in force from time to time	-	NA
NA	General or Specific exempted waste	Waste that meets all the conditions of a resource recovery exemption under Clause 92 of the Protection of the Environment Operations (Waste) Regulation 2014	As specified in each particular resource recovery exemption	NA

L3 Hours of operation

L3.1 (a) Works and activities may only be undertaken at the premises between 7:00 am and 6:00 pm, Mondays to Saturdays.

(b) Works and activities must not be undertaken at the premises on Sundays or Public Holidays.

Exceptions to permitted hours of operation

L3.2 Works and activities are permitted to be undertaken outside of the hours specified in condition L3.1 for:
(i) the delivery of equipment and materials as requested by Police or other authorities for safety reasons;
(ii) emergency work to avoid the loss of lives, damage to property and/ or to prevent environmental harm; and
(iii) use of the travel lift between 8:00 am and 5:00 pm on Sundays for a maximum of 90 minutes in total.

L4 Potentially offensive odour

L4.1 No condition of this licence identifies a potentially offensive odour for the purposes of Section 129 of the Protection of the Environment Operations Act 1997.

L4.2 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

3 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.
This includes:
a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

Note: Materials and substances includes but is not limited to: vessels, watercraft, tanks and engines.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:
a) must be maintained in a proper and efficient condition; and
b) must be operated in a proper and efficient manner.

Note: Plant is defined in the Dictionary. The type of plant and equipment that should be considered includes, but is not limited to, drainage systems; infrastructure and pollution control equipment such as (but not limited to) spill containment and clean-up equipment; dust screens and collectors; sediment collection systems, traps and sumps; waste collection, storage and disposal equipment.

O3 Dust

O3.1 Where neither a concentration nor rate for emission of air impurities has been prescribed, for the purposes of Section 128 of the Act, all operations and activities occuring at the premises must be conducted in a manner that will minimise airborne impurities at the boundary of the premises.

Note: Guidance information on the source and management of odours, dust and particulates is available in the document *Environmental Action for Marinas, Boatsheds and Slipways (EPA, 2007).*

O4 Processes and management

Blasting and painting activities

O4.1 a) Spray painting of vessels must be undertaken inside a shed or building, unless the vessel is too large to fit inside any shed or building on the premises.
b) If the shed or building is occupied by another vessel, only minor repair works are to be undertaken on vessels outside the shed or building.

Note: 'Minor repair works' is defined as the preparation and painting of isolated damaged areas which are up to 10 square metres.

O4.2 Any external spray painting must be encapsulated using tarpaulins.

O4.3 Sand blasting works may only be undertaken inside a shed or building.

Note: Soda blasting works may be undertaken outside of a shed or building.

O4.4 All doors providing access to a shed or building in which sand blasting or spray painting activities are being undertaken must remain closed while those activities are being undertaken.

Note: Doors providing access to a shed or building in which sand blasting or spray painting activities are undertaken may remain open if no sand blasting or spray painting activities are being undertaken at that time.

O4.5 Antifoulant paint may only be applied to vessels using a roller, brush or airless spray application.

Note: Antifoul application using airless spray application outside of a shed or building must only be undertaken following encapsulation / screening using shade cloth or plastic.

Note: Guidance information relating to the Organotin Chemical Control order and application of other antifouling paints is provided in the *Fact sheet - Applying Antifouling paints at marinas* (NSW EPA, 2013).

O5 Waste management

O5.1 All activities at the premises must be carried out in a manner that will prevent waste from polluting waters.

O5.2 The licensee must provide facilities to ensure the collection storage and disposal of waste generated at the premises so that it does not pollute waters.

O5.3 For the purposes of condition O5:
a) Waste generated at the premises includes waste collected from vessels at the premises and may include but not be limited to contaminated bilge water, litter, garbage, fuel, oil and waste from abrasive cleaning, sanding, scraping and painting.
b) Facilities may include but not be limited to tarpaulins, waste bins, pump-out facilities, signage and agreements with those operating on the site.

O5.4 The licensee must ensure that contaminated stormwater at the premises is managed in a manner that will prevent pollution of waters.

O5.5 The licensee must ensure that sewage and greywater, that is associated with vessels at the premises, is managed in a manner that will prevent pollution of waters.

4 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.

M1.2 All records required to be kept by this licence must be:
a) in a legible form, or in a form that can readily be reduced to a legible form;
b) kept for at least 4 years after the monitoring or event to which they relate took place; and
c) produced in a legible form to any authorised officer of the EPA who asks to see them.

M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
a) the date(s) on which the sample was taken;
b) the time(s) at which the sample was collected;
c) the point at which the sample was taken; and
d) the name of the person who collected the sample.

M2 Recording of pollution complaints

M2.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.

M2.2 The record must include details of the following:
a) the date and time of the complaint;
b) the method by which the complaint was made;
c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
d) the nature of the complaint;
e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
f) if no action was taken by the licensee, the reasons why no action was taken.

M2.3 The record of a complaint must be kept for at least 4 years after the complaint was made.

M2.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M3 Telephone complaints line

M3.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.

M3.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.

M3.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

5 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

R1.3 Where this licence is transferred from the licensee to a new licensee:
a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:
a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints Summary must be signed by:
a) the licence holder; or
b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R2 Notification of environmental harm

R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

R3 Written report

R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
a) where this licence applies to premises, an event has occurred at the premises; or
b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

R3.3 The request may require a report which includes any or all of the following information:
a) the cause, time and duration of the event;
b) the type, volume and concentration of every pollutant discharged as a result of the event;
c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;
f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and

g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

6 General Conditions

G1 Copy of licence kept at the premises or plant

G1.1 A copy of this licence must be kept at the premises to which the licence applies.

G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.

G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Other general conditions

G2.1 **Completed Programs**

Program	Description	Completed Date
Prevention of water pollution	Options report for preventing pollution of waters from activities undertaken on the slipway	30-July-2001
Preferred option implementation	Install and operate the preferred option to collect and dispose of wastewater from boat cleaning and maintenance on the slipway to prevent water pollution.	31-May-2003
Noise Impact Assessment	To address ongoing noise issues at the premises a Noise PRP encompassing a Noise Impact Assessment and a Noise Management Plan has been added to the EPL.	23-April-2021
Noise Management Plan	Noise Management Plan added to EPL to address ongoing noise issues at the site	23-April-2021

7 Pollution Studies and Reduction Programs

U1 Implement Noise Mitigation Measures

U1.1 The licensee must complete the staged noise mitigation works by the dates listed in the table below and in accordance with the details provided in section 6 of the Noise Management Plan prepared by SLR Consulting Australia Pty Ltd (SLR reference 610.19179.00200-R02, Version v1.0, dated 23 April 2021; EPA reference DOC21/476638).

Reference	Mitigation Measure	Due Date
a.	Implement all best management practices identified in section 5 of the SLR Noise Management Plan	1 October 2021
b.	Shed 4 - upgrade cladding and seal roof vents and shed door.	1 October 2021
c.	Upgrade of travel lift engine casing and install upgraded high performance muffler	1 November 2021
d.	Use acoustic mobile tent or acoustic screening for any significant noise generating work conducted in zone 2 or zone 3 in the direction of residential receivers, as depicted in Figure 1 of the SLR Noise Management Plan.	By 31 December 2021 and prior to any sandblasting occurring
e.	Upgrade ventilation ductwork to a permanent steel rigid duct to reduce low-frequency noise from the large centrifugal fan located in shed 4.	30 June 2022
f.	Sheds 1, 2 and 3 - Upgrade cladding and seal roof. Note: this measure is only required if sandblasting, needle-gunning or other high noise level generating works are to occur in sheds 1,2 and 3.	Prior to any sandblasting, needle-gunning or other high noise level generating works occurring.

U1.2 Upon completion of the noise mitigation measures under condition U1.1 of this licence, the licensee must engage a competent person(s) to assess the residual noise levels that have been achieved once all reasonable and feasible mitigation measures have been applied, at all relevant receivers within each of the noise catchment areas identified in the Noise Impact Assessment report prepared by SLR Consulting Australia Pty Ltd (SLR Reference 630.19179.00200-RO1, Version v1.0, dated 23 April 2021; EPA reference DOC21/476638). The Post-Commissioning Noise Impact Assessment must be carried out by a competent person which is defined as satisfying one or more of the following:

1. Have qualifications and/or experience sufficient to fulfil the requirements of 'member' grade of the Australian Acoustical Society.
2. Undertake the duties of an acoustic consultant on behalf of a consultancy firm that is a member of the Association of Australasian Acoustical Consultants.

U1.3 The licensee must submit a report electronically to the Director, Regulatory Operations Metropolitan, by 21 January 2023 at RegOps.MetroWest@epa.nsw.gov.au outlining the findings of the Post-Commissioning Noise Impact Assessment described under condition U1.2 of this licence. The report must include, but not necessarily be limited to:
1. details of noise reduction works undertaken;
2. details of noise reduction(s) achieved from various sources (and locations) on the premises.
3. details of the residual noise levels at receiver locations; and
4. any changes to the noise mitigation measures described in the table provided under Condition U1.1 of this licence.

U2 Air Quality Risk Assessment

U2.1 The licensee must engage an independent and appropriately qualified consultant to undertake an Air Quality Risk Assessment. The Assessment must;

1. Include a detailed description of all activities occurring on the site and include:

   a) A process flow diagram clearly showing all activities/ operations carried out on the premises including, but not limited to;

      i. vessel spray painting
      ii. welding, and
      iii. surface preparation activities

   b) A detailed discussion of all activities carried out on the site, including frequency of occurrence and variability (i.e. seasonal, ad-hoc, routine)

   c) A comprehensive inventory of all materials/ products used for performing the identified activities such as paints, thinners, solvents, adhesives and surface coating materials. For each material/ product identified, the following must be included;

      i. details regarding the frequency of use and typical application rates
      ii. details of the volumes used (litre's per annum)
      iii. material Safety Data Sheet

2. Identify all potential sources of air pollutants (including dust, VOC's and odour) arising from activities undertaken and materials used on the site. Sources must be identified as point sources or fugitive sources.

3. Include a detailed site plan clearly showing the layout of the site and;

   a) locations where all activities/ operations occur
   b) all emission sources clearly identified
   c) plant boundary
   d) sensitive receptors (e.g. nearest residences)
   e) topography

4. Include a risk evaluation and assessment of each emission source and their potential impact on air quality. Methods for developing the risk classification must give consideration to, but not necessarily be limited to the:

   a) type of material and specific material properties which may contribute to odour generation;
   b) quantity of individual material types used by the Premises;
   c) specific activities undertaken which utilise the material
   d) odour emission intensity, including the results of any odour sampling where considered reasonable and practical to collect as part of the risk classification process

5. Identify and describe all currently installed emission controls including;

   a) plans, process flow diagrams and descriptions that clearly identify and explain all pollution control equipment and control techniques for all activities occurring on the premises

   b) a description of all aspects of the air emission control systems, with particular regard to any fugitive emission capture systems (e.g. hooding, ducting), treatment systems (e.g. scrubbers, bag filters) and discharge systems (e.g. stacks)

   c) the operational parameters of all emission sources, including all operational variability, i.e. location, release type (stack, volume or area) and release parameters (e.g. stack height, stack diameter, exhaust velocity, temperature, emission concentration and rate)

   d) emission concentrations and rates must be determined;

      i. from all point sources during activities with high potential to cause air impacts
      ii. during peak operations, or at times representing worst case conditions
      iii. for pollutants including particles, odour and volatile organic compounds (VOC's)
      iv. in accordance with the approved methods for the sampling and analysis of air pollutants in NSW

6. Evaluate the effectiveness of currently installed controls at controlling pollutant emissions from all activities with a high potential to cause air quality impacts;

a) the effectiveness must be determined based on the achieved emission performance and removal efficiency of the installed controls, and

b) must be determined based on the results of emission testing for pollutants including particles, odour and VOC's

7. Identify, evaluate and recommend options to reduce air quality impacts (including odour) from the premises. The proposal must specify:

a) how pollutant emissions will be mitigated for each material and activity identified and classified as having high emission potential

b) how emission performance improvements will be implemented for each material and activity identified as having high emission potential

c) a timeline for implementation of each odour performance improvement identified.

d) each mitigation and improvement measure identified must:

i. be tailored to the odour risk for each material and activity, and

ii. include performance targets that are measurable, auditable and consistent with the Objective* of the pollution reduction study.

Note: * The objective of this pollution reduction study is to:

1. understand the risk of air quality impacts from site activities;
2. determine if currently installed pollution controls remain fit-for-purpose; and
3. identify measures to minimise air quality impacts and ensure compliance with section 128 and section 129 of the *Protection of the Environment Operations Act 1997* and Conditions O1-O4 and Condition L4 of this licence.

U2.2 The works required by this Pollution Reduction Study must make reference to methodologies set out in the following documents:

- Technical Framework: Assessment and management of odour from stationary sources in NSW (NSW DEC, 2006);
- Technical Notes: Assessment and management of odour from stationary sources in NSW (NSW DEC, 2006);
- Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW DEC, 2005); and
- Approved Methods for Sampling and Analysis of Air Pollutants in NSW (NSW DEC, 2006).

U2.3 The licensee must submit a report electronically to the Director, Regulatory Operations Metropolitan, by 22 November 2021 at RegOps.MetroWest@epa.nsw.gov.au outlining the findings of the Air Quality Risk Assessment described under condition U2.1 of this licence.

8 Special Conditions

E1 Special Dictionary

E1.1 Special Dictionary

Term	Definition
Soda blasting	An abrasive blasting process that uses sodium bicarbonate and compressed air.
Sand blasting	An abrasive blasting process that uses sand and compressed air.

Antifoulant paint	Coating applied to the hull of a vessel that is a pesticide registered by the Australian Pesticides and Veterinary Medicines Authority.
Spray painting	Application of a paints and other coatings via a high pressure spray technique.
Airless spray application	Application of paints and other coatings via a high pressure spray technique that does not use compressed air.

Environment Protection Licence

Licence - 10893

Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environmen t Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder describe d at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same me aning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 mo nths. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales*.

Environment Protection Licence

TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non - putrescible), special waste or hazardous waste

Mr Warren Hicks

Environment Protection Authority

(By Delegation)

Date of this edition: 14-February-2001

End Notes

1	Licence varied by notice 1019571, issued on 12-Sep-2002, which came into effect on 07-Oct-2002.
2	Licence varied by notice 1035424, issued on 02-Apr-2004, which came into effect on 27-Apr-2004.
3	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
4	Licence varied by notice 1528262 issued on 13-Mar-2015
5	Licence varied by notice 1549209 issued on 06-Feb-2018
6	Licence varied by notice 1586007 issued on 15-Oct-2019
7	Licence varied by notice 1603694 issued on 17-Dec-2020
8	Licence varied by notice 1606020 issued on 18-Feb-2021
9	Licence varied by notice 1609665 issued on 18-Jun-2021
10	Licence varied by notice 1610126 issued on 14-Jul-2021

ANNEXURE 3: NSW DPIE SEARS

Planning, Industry & Environment

Ms Kristy Hodgkinson
Director
Hamptons Property Services
Suite 404 203-233 New South Head Road
EDGECLIFF NSW 2027

Our ref: SEAR 1166

Your ref: 2017147

8 November 2021

Dear Ms Hodgkinson

SEAR 1166 – Boat Repair Facility

6 John Street, McMahons Point, North Sydney LGA

I refer to the letter dated 21 August 2021 seeking clarification from the Department of Planning, Industry and Environment (the Department) regarding consultation requirements for the proposed Boat Repair Facility (SEAR 1166).

It is understood the development application and accompanying Environmental Impact Statement (EIS) was lodged within 2 years of the issue of the Planning Secretary's environmental assessment requirements (SEARs). Accordingly, the Department has no further requirements in relation to the content of the EIS or the consultation to be undertaken in the preparation of the EIS.

Nevertheless, the Department did seek feedback from the Environment Protection Authority (EPA) as to whether it had any further requirements. The EPA confirmed it had no further requirements (see attached letter).

If you have any questions regarding this matter, please contact Zoe Halpin, Planning and Assessment, at the Department on (02) 9995 6430 or via email at zoe.halpin@planning.nsw.gov.au.

Yours sincerely

C. Ritchie

Chris Ritchie

Director

Industry Assessments

DOC21/972768

Ms Zoe Halpin
Para Planner
Department of Planning, Industry and Environment
Email: Zoe.Halpin@planning.nsw.gov.au

Dear Ms Halpin,

Environment Protection Licence No.10893 – Noakes Group Pty Ltd

SEAR 1166

I am writing in response to the request, regarding SEAR 1166, made by the Department of Primary Industry and Environment (DPIE) to the Environment Protection Authority (EPA) on 18 October 2021. The request provided the EPA an opportunity for further input/comments on SEARS 1166. DPIE advised that correspondence was received from Hampton Property Services on behalf of Noakes Group Pty Ltd, seeking consultation on SEAR 1166.

It is the EPA's view that as a development application was made by Noakes within two years of SEAR 1166 being issued, there is no requirement as per Schedule 2, 3(7)(b) *Environment Planning and Assessment Regulation 2000,* that Noakes must consult with agencies. However, in the event that Noakes Group intends to submit a new development application, it is recommended that a new SEAR be sought from the EPA, which will ensure any land use changes are considered and updated guidelines reflected.

If you have any questions in relation to this matter, please do not hesitate to contact Jordan Gavel on (02) 8275 1224 or email: Jordan.Gavel@epa.nsw.gov.au.

Yours Sincerely,

4 November 2021

Erin Barker
Manager Regional Operations
Regulatory Operations Metro
Environmental Protection Authority

6 December 2021
Ref 21595

LAND & ENVIRONMENT COURT PROCEEDINGS NO. 2021/63136
PROPOSED NEW FLOATING DRY DOCK
6 JOHN STREET, MCMAHONS POINT
RESPONSE TO CONTENTION 7 OF THE SOFACS BY THE OWNERS OF SP 63626

Introduction

This statement has been prepared in relation to the abovementioned Land & Environment Court (LEC) Proceedings pertaining to the refusal of D57/19, involving the demolition of water-based structures, installation of a new floating dry dock (FDD) with removable curtains and various associated infrastructure.

I can confirm that I have read Division 2 of Part 31 of the Uniform Civil Procedure Rules (UCPR) and the Expert Witness Code of Conduct, by which I agree to be bound. A copy of my Curriculum Vitae is attached.

This statement provides my position in respect of the traffic and parking particulars detailed in Contention 7 of the Statement of Facts & Contentions (SOFACs) by the Owners of SP 63626, filed on 10 August 2021.

It is also pertinent to note that a Traffic & Parking Assessment Report (TPAR) was prepared to accompany the DA, prepared by *Colson Budd Hunt & Kafes Pty Ltd* (dated December 2017). The TPAR assessed the traffic (including construction traffic), parking, servicing and public transport impacts/requirements of the proposal. I can confirm I have read the TPAR and concur with the findings and conclusions.

Site

The subject site is located on the southern side of John Street, extending to Munro Street, along the foreshore of Berrys Bay. The site occupies an area of approximately 6,403m^2. The site is currently occupied by a boat repair and maintenance facility, comprising both land and water-based infrastructure. Key land-based features of the existing site are as follows:

- two-storey office building
- four enclosed buildings to undertake maintenance works in confined environments, depending on the type of works being undertaken
- hardstand to locate boats on when being repaired and maintained
- other marine repair infrastructure
- parking area for a total of 32 cars across three separate areas
- previous DA approval for up to 120 staff (under D1164/90), noting that the current operation employs approximately 45 staff (of which approximately 44% drive to work).

Refused Development Proposal

The development proposal which was refused by Council involves the installation of a floating dry dock (FDD) facility to service larger commercial vessels up to 1,000 tonnes, with the FDD largely occupying the water area along the western portion of the site. Whilst staffing levels may change, they are to remain within the permissible 120 staff.

The following aspects of the existing site and operations were proposed to remain unchanged:

- quantum of off-street parking provided on the site
- vehicular access driveways
- pedestrian access arrangements
- loading and servicing requirements, including service vehicle size
- hours of operation (being 7am to 6pm, six days per week)

Contention 7

Contention 7 within the SOFACs is reproduced below.

> *"There is a failure to address the impact of traffic caused by the Development Proposal on the Community. There is no consideration of the access and egress of traffic (in particular trucks) needed to perform work of the kind contemplated, but not set out in any sufficient detail. No consideration is provided in relation to traffic movements, movement of contaminated waste from the site or parking".*

Response to Contention 7

As noted in the foregoing, a detailed TPAR accompanied the DA, which assessed the traffic (including construction traffic), parking, servicing and public transport impacts/requirements of the proposal. The key factors dictating traffic movements associated with the proposal are staff numbers and service vehicle numbers. In this regard, the *Colson Budd Hunt & Kafes* TPAR noted that the facility is expected to continue to operate with less than the permissible maximum of 120 staff, such that the associated traffic and parking impacts will be minimal.

The local road network of John Street and Dumbarton Street and their environmental capacity are not expected to be impacted by the proposal. Furthermore, the existing operation with 45 staff has a car driver rate of approximately 44% - i.e. 20 cars – such that the three existing off-street parking areas with 32 parking spaces is in fact surplus to existing requirements. Lastly, loading and servicing requirements, including service vehicle size, will remain unchanged.

Further to the abovementioned Contention 7 response, the following information is also provided.

Details on truck movements to and from the site (existing), including size and frequency.

Deliveries arrive via the John Street entrance and this will remain unchanged, with vehicle types and frequencies as follows:

- vans: max. 4 per day
- small rigid truck: max. 2 per day
- semi-trailer with 40' container (apx 16m in length): max. 1 per 2 months to 12 months+
- mobile crane (quad-steer axle apx. 13m in length): max. 1 per 2 months to 12 months+

Vans, small trucks and the mobile crane enter and exit the site via the John Street driveway in a forward direction. The infrequent semi-trailer reverses down John Street driveway, thereby allowing it to exit the site in a forward direction.

Details on waste – Council or private, frequency of removal, truck type and waste area.

Waste is collected by private contractor using a typical garbage truck, approximately the same size as Council's garbage truck that collects the residential properties in John Street and Munro Street. The private contractor garbage truck typically arrives mid-morning on a Monday and collects the waste on site. This arrangement has been in place for 28 years.

The proposed floating dry dock will not result in an increase in the quantity of waste. It is also worth noting that since Noakes bought out the charter boat companies that previously operated on the site a decade ago, waste collection has reduced from 3 times per week to once per week, therefore quantities have in fact reduced.

The original development had a dedicated waste area located at the rear of the wash bay, where waste from the former charter boats was washed down after prawn juice and stale beer had fermented for sometimes days. Since the charter boat companies have moved on, the associated odour has also ceased. Now, each work station has a bin, with the current collection area located at the main gate within the boatyard.

Details on impact on pedestrian movements as a result of truck movements into and out of the site.

John Street is used by pedestrians to access Waverton Park from Dumbarton Street. In this regard, John Street has existing footpaths along both sides of the road between Dumbarton Street and the rail overpass, at which point the footpaths end. The southern footpath then continues, west of the rail overpass down to the entrance to Waverton Park.

It is noted that pedestrians are required to walk onto the John Street road carriageway as they make their way under the rail overpass, however this arrangement has been in place for decades, long before Noakes occupied the site.

If Council were of the opinion that this arrangement was an issue, it is reasonable to assume that something would have been done to address the perceived issue. For example, the two existing on-street parking spaces located on the southern side of John Street, underneath the rail overpass, could be removed and No Stopping/No Parking signs installed. A new footpath could then be constructed *or* pram ramps at either end with linemarking on the road surface.

Noakes have advised that they have had no recorded accidents or incidents with their trucks, and point out that Council's garbage and maintenance truck movements outweigh Noakes truck movements.

Noakes have also advised that they use (staff) spotters when a large delivery arrives to assist the driver and ensure pedestrian safety. The spotters are required to wear high-vis vests, in line with standard OH&S requirements.

How many car parks required in existing consent and of those how many are on site, and how many, if any, are on John Street.

Unlike most new DA consent approvals, I understand development consent 1164/90 did not specify the quantity of car parking to be provided. Notwithstanding, whilst the consent itself did not specify the required number of parking spaces, the stamped approved plans from March 1992 note that 40 car parking spaces were provided, comprising:

- 14 spaces located in "Building A" which were never formalised
- 12 spaces located within the northern on-site car park
- 4 spaces located above the northern on-site car park
- 5 spaces located on the hardstand within the site
- 5 spaces located off Munro Street within the site

The original approval did not define in the conditions of consent the necessary on-site parking provision.

Noted.

The approved stamped plans of the original development show 40 parking spaces were required on-site.

Noted.

The existing parking provision of the development is 17 parking spaces and not 32 spaces as estimated in the traffic report.

The existing site arrangement makes provision for 32 parking spaces, comprising:

- 12 spaces located within the northern on-site car park
- 8 spaces located on the southern side of the slipway
- 4 spaces located adjacent to the workbays
- 8 spaces located off Munro Street within the site

Application of Council's existing parking rate to the development (assuming building area of the original consent) would require 16 on-site parking spaces.

Council's *DCP 2013* specifies a *maximum* parking rate for "boat repair facilities" of *1 space per 200m^2 GFA.* Application of this rate to the stamped approved plans from March 1992, with a total building floor area of 3,149.9m^2, yields a *maximum* parking requirement of 16 spaces, as noted in the Respondent's comment above.

It is pertinent to note in this regard, that "Building B", as shown on the stamped approved plans from March 1992, was never constructed. As such, the existing building floor area on the site is in the order of approximately 1,670m^2. Application of the above parking rate to the existing total building floor area of approximately 1,670m^2, yields a *maximum* parking requirement of 9 spaces.

Therefore, any increase in floor space at the development would result in an on-site parking shortfall.

The proposed development involves the installation of a floating dry dock facility at the site. No additional building area is proposed to be constructed, such that no additional off-street parking is required, based on Council's *DCP 2013* parking rates.

The mode of travel survey of existing staff show a high mode share to private vehicles.

The existing operation with 45 staff has a car driver rate of approximately 44% - i.e. 20 cars – with 41% staff travelling by public transport, with the remaining 15% of staff either walking, riding or travelling by boat.

It is worth noting that the site is located approximately 800m walking distance to/from Waverton railway station and approximately 850m walking distance to/from North Sydney railway station. Furthermore, there are an extensive amount of bus services that operate outside North Sydney railway station, in addition to bus services which operate along nearby Union Street and Blues Point Road. The site is therefore ideally located to encourage the use of public transport.

Data from the Bureau of Statistics indicates that in 2011, approximately 67% of Sydney residents drove to work, with approximately 23% travelling by public transport. This data therefore suggests that the car driver rate for staff at the existing facility is in fact much lower than greater Sydney whilst the public transport rate for existing staff is much higher than greater Sydney.

Parking demands of the estimated 45 staff working at the time of the survey were such that the site had reached its maximum parking provision.

As noted above, the car driver rate of staff at the time the travel mode survey was undertaken was approximately 44%, equating to 20 cars. The existing site arrangement makes provision for 32 parking spaces which is in fact surplus to actual requirements.

A staff demand of 120 (noted to be permitted in the original development consent) would result in a potential parking demand of 46 vehicles or a shortfall of 29 on-site parking spaces.

Whilst the original development consent allows up to 120 employees, this is unlikely to ever occur. Noakes envisage an increase of approximately 25 additional employees on site as a result of the proposed floating dry dock, many of whom will be apprentices who traditionally have a low car ownership rate. The total on-site workforce is therefore expected to be approximately 70 staff.

Application of the 44% car driver rate to the potential for 70 staff yields a parking requirement of approximately 31 cars, of which 32 are currently provided. In theory therefore, there will not be any overspill of employee parking onto the surrounding streets.

In addition, staff will be encouraged to travel to/from work by alternate means, such as public transport, walking, cycling or carpooling. Consideration could also be given to implementing a Green Travel Plan, which is a package of actions designed to encourage safe, healthy and sustainable travel options. The objectives of a Green Travel Plan are to remove barriers to active travel for all users of developments and to maximize the number of people who walk, cycle or take public transport to and from a development.

A key feature of a Green Travel Plan includes a plan detailing the location of all public transport services, footpath walking routes and cycle routes located within a 5 minute and 10 minute walking radius of the site, as well as contact details and websites for local bus companies, taxi companies and the like.

Consideration should be given to providing parking in accordance with current travel behaviour instead of application of Council's general parking rate for such a development.

As noted in the foregoing, there is a surplus of on-site parking based on the existing building floor area on the site and Council's *DCP 2013* parking rates. Furthermore, even based on the current travel behaviour of staff, existing and future, there is expected to be sufficient on-site parking.

The increase in traffic and truck movements in John Street who are required to walk within the roadway beneath the railway bridge.

The existing loading and servicing requirements, including service vehicle size and frequencies, will remain unchanged.

The turning circle from John Street into the yard appears inadequate and not compliant with Australian Standards. Once truck size and movements are confirmed, a program such as AutoTURN which uses CAD plans as a base should verify these movements are feasible.

Vehicular access to the site is currently provided via a single lane ramp off John Street, as per the original consent approval, which has been operating for decades without issue. All regular staff and service vehicles are able to enter and exit the site in a forward direction, with the exception of the *occasional* 40' container delivery. The infrequent semi-trailer reverses down John Street driveway, thereby allowing it to exit the site in a forward direction. Noakes have also advised that they use (staff) spotters when a large delivery arrives to assist the driver and ensure pedestrian safety. The spotters are required to wear high-vis vests, in line with standard OH&S requirements.

Again, the existing loading and servicing requirements, including service vehicle size and frequencies, will remain unchanged.

Conclusion

In summary, the existing development is already a low traffic generating operation with a low parking demand, and the proposal is not expected to increase traffic or parking to any significant extent. It is therefore concluded that the proposed development will not have any unacceptable traffic, parking, servicing or access implications.

Please do not hesitate to contact me on telephone 9904 3224 should you have any enquiries.

Yours sincerely

Chris Palmer
Executive Engineer B.Eng (Civil)
Varga Traffic Planning Pty Ltd

VARGA TRAFFIC PLANNING Pty Ltd

Transport, Traffic and Parking Consultants

Chris Palmer - Traffic Engineer

Chris Palmer is a traffic engineer at Varga Traffic Planning Pty Ltd, a company which offers specialist services in the fields of transport and traffic engineering and road related design.

He holds a Bachelor of Civil Engineering from the University of Western Sydney and has successfully completed a number of traffic related courses including the IMEA/RMS course for Road Safety Auditors, TfNSW courses for Prepare Work Zone Traffic Management Plans and also SIDRA modelling courses.

Chris joined Varga Traffic Planning Pty Ltd in 2005 and has been an integral part of its success. Over the past 16 years he has developed a specific expertise in traffic and transportation planning and the integration of that discipline into the overall planning process, with particular emphasis on assessing the traffic and parking implications of development proposals as well as well as during the construction and occupation stages.

Chris has completed a considerable amount of traffic and/or parking studies for an extensive client portfolio, from development applications and planning proposals through to construction documentation and occupation documentation.

As part of his position, Chris oversees junior engineers within the company and provides assistance to them as required. He also directly liaises with various authorities including Council and TfNSW to assist in achieving the desired outcome for his clients.

Chris is an effective communicator and prides himself on creating and maintaining client relations within the industry and enjoys seeing projects come to fruition.

He has proficiency in many traffic and transport related software programs including INTANAL, SCATES, SIDRA, AutoCAD, AutoTURN & AutoTRACK.

Chris also has also acted for both the Applicant and Council as an expert witness in a wide range of s.34 conferences and contested hearings in the NSW Land & Environment Court, as well as more recently in the Supreme Court.

APPENDIX A

Visual Impact Assessment
Stannards Marine, 6, John St, McMahons Point.
December, 2021.

DRAWING:

CLIENT: **Stannards Marine.**

PROJECT: **6, John Street, McMahons Point.**

ISSUE: **A- 10.2021**

DWG. NO:

SCALE:

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Aerial site photo - indicating location of camera viewpoints

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DRAWING:	CLIENT:	PROJECT:	ISSUE:	SCALE:
Viewpoint site plan	Stannards Marine.	6, John Street, McMahons Point.	A- 10.2021	

DWG. NO.

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Viewpoint 1

Existing photo

Photomontage - FDD in submerged position

DRAWING:	Viewpoint 1	CLIENT:	Stannards Marine.	PROJECT:	6, John Street, McMahons Point.	ISSUE: DWG. NO.	A- 10.2021

SCALE:

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Viewpoint 1

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 1

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

SCALE:

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Viewpoint 2

Existing photo

Photomontage - FDD in submerged position

DRAWING:	Viewpoint 2
CLIENT:	Stannards Marine.
PROJECT:	6, John Street, McMahons Point.
ISSUE:	A- 10.2021
DWG. NO.	
SCALE:	

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Viewpoint 2

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 2

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

SCALE:

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Viewpoint 5

Existing photo

Photomontage - FDD in submerged position

DRAWING:	Viewpoint 5	CLIENT:	Stannards Marine.	PROJECT:	6, John Street, McMahons Point.	ISSUE: / DWG. NO.	A- 10.2021
SCALE:							

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Photomontage - FDD in working position
- acoustic curtains open

Viewpoint 5

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 5

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

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Viewpoint 16

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 16

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

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Viewpoint 16

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 16

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

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Viewpoint 18

Existing photo

Photomontage - FDD in submerged position

DRAWING:	Viewpoint 18	CLIENT:	Stannards Marine.	PROJECT:	6, John Street, McMahons Point.	ISSUE:	A- 10.2021
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Viewpoint 18

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 18

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

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Viewpoint 19

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 19

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

SCALE:

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Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

Viewpoint 19

DRAWING:	CLIENT:	PROJECT:	ISSUE:	SCALE:
Viewpoint 19	Stannards Marine.	6, John Street, McMahons Point.	A- 10.2021	

DWG. NO.

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Viewpoint 29

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 29

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

SCALE:

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Viewpoint 29

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 29

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

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Viewpoint 35

Existing photo

Photomontage - FDD in submerged position

DRAWING:	Viewpoint 35	CLIENT:	Stannards Marine.	PROJECT:	6, John Street, McMahons Point.	ISSUE:	A- 10.2021
						DWG. NO.	
						SCALE:	

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Viewpoint 35

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING:	Viewpoint 35
CLIENT:	Stannards Marine.
PROJECT:	6, John Street, McMahons Point.
ISSUE:	A- 10.2021
DWG. NO.	
SCALE:	

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Viewpoint 37

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 37

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

SCALE:

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Photomontage - FDD in working position
- acoustic curtains open

Viewpoint 37

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 37

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

SCALE:

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Viewpoint 40

Existing photo

Photomontage - FDD in submerged position

DRAWING:	CLIENT:	PROJECT:	ISSUE:	SCALE:
Viewpoint 40	Stannards Marine.	6, John Street, McMahons Point.	A- 10.2021	

DWG. NO.

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Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

Viewpoint 40

DRAWING: Viewpoint 40

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

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Viewpoint 43

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 43

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

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Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

Viewpoint 43

DRAWING: Viewpoint 43

CLIENT: Stannards Marine.

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Viewpoint 44

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 44

CLIENT: Stannards Marine.

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Viewpoint 44

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING:	CLIENT:	PROJECT:	ISSUE:	SCALE:
Viewpoint 44	Stannards Marine.	6, John Street, McMahons Point.	A- 10.2021	

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Viewpoint 45

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 45

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

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Viewpoint 45

Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

DRAWING: Viewpoint 45

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

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Viewpoint 48

Existing photo

Photomontage - FDD in submerged position

DRAWING: Viewpoint 48

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

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Photomontage - FDD in working position
- acoustic curtains open

Photomontage - FDD in working position
- acoustic curtains closed

Viewpoint 48

DRAWING: Viewpoint 48

CLIENT: Stannards Marine.

PROJECT: 6, John Street, McMahons Point.

ISSUE: A- 10.2021

DWG. NO.

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VISUAL IMPACT ASSESSMENT

6, John Street, McMahons Point.
Stannards Marine Pty Ltd v North Sydney Council

December, 2021

urbaine architectural

urbaine architectural | Suite 6, 15 The Corso, | Manly NSW 2095
ABN: 313 182 542 24 | T: 61 2 8355 6770

Stannards Marine Pty Ltd V North Sydney Council.
VISUAL IMPACT ASSESSMENT.

CONTENTS

1. INTRODUCTION

1. Scope and Purpose of Report:

This Visual Impact Assessment has been prepared by John Aspinall, Principal of Urbaine Architectural, in relation to the proposal for the demolition of existing water-based structures associated with the existing boat repair and maintenance facility which operates at 6 John Street, McMahons Point (Site) and the installation and use of a steel floating dry dock.
See Figure 1.
The lots forming the Site include: Lot 987in Deposited Plan 752067; Lot 2 in Deposited Plan 77853; Lot 1 in Deposited Plan127195; Lot 1 in Deposited Plan 449731; Lot A in Deposited Plan 420377; Lot B in Deposited Plan 420377; Lot 1 in Deposited Plan 182585; Lot 1 in Deposited Plan 179730; Lot 2 in Deposited Plan 179730; Lot 3 in Deposited Plan 179730; Lot 4 in Deposited Plan 179730.

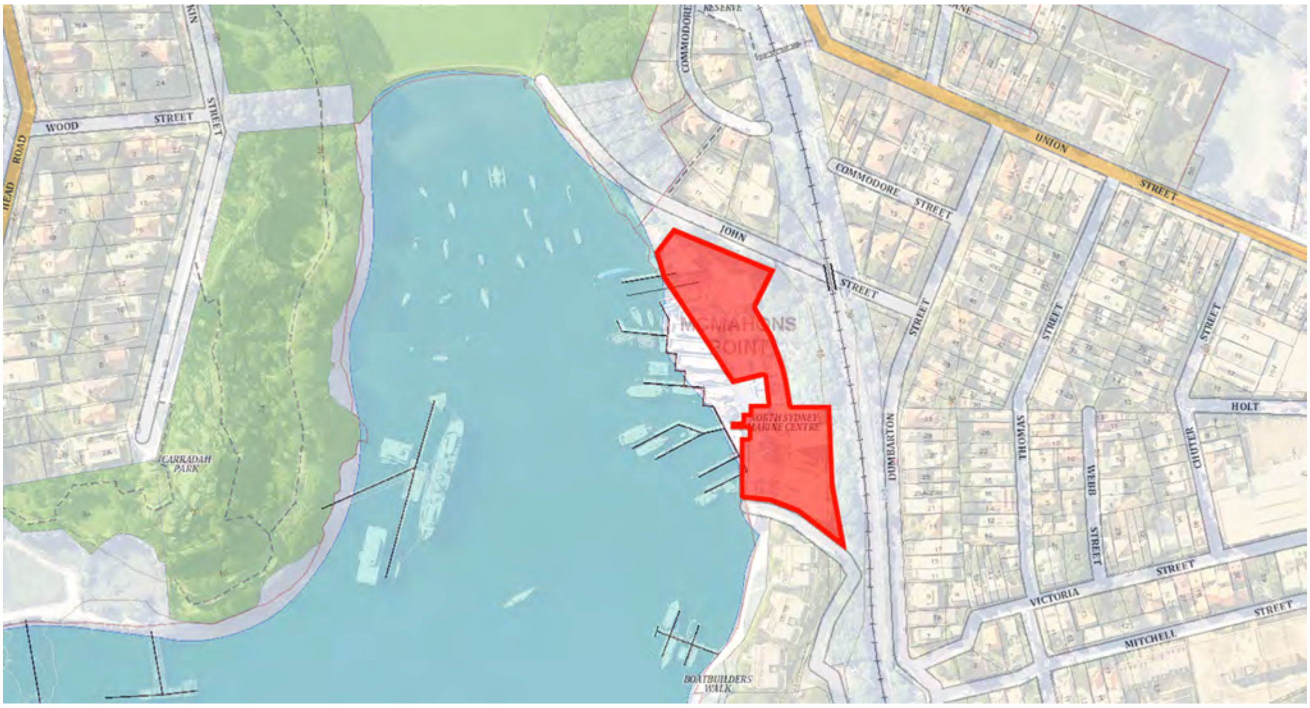


Figure 1 – site location shown in red overlay.

I have been briefed with a copy of the Division 2 of part 31 of the Uniform Civil Procedures Rules 2005 and the Expert Witness Code of Conduct in Schedule 7 of those rules. I have also been briefed with the Court's Joint Expert Report Policy and Conference of Expert Witnesses Policy, both dated 12 June 2015. I have read and agree to be bound by the Court's Order and policies, as well as the Expert Witness Code of Conduct.
This report should be read in conjunction with my Visual Impact Assessment dated October 2021 (Visual Impact Assessment), as submitted with the responses to Statements of Facts and Contentions.
A copy of my CV is attached to this document as Appendix B, together with methodology statements and the Land and Environment Guidelines for the preparation of Photomontages also contained in this Appendix.

1.2.1 The Site and existing property.

The site is currently used as a boat repair and maintenance facility in accordance with the relevant environmental planning instruments, being the North Sydney Local Environmental Plan 2013 (the LEP) and the Sydney Regional Environmental Plan (Sydney Harbour) 2005 (the SREP). The existing use of the site is permissible with development consent and the installation of the floating dry dock (described later) will remain a permitted use. The site zoning is defined within: IN4 Working Waterfront zoning

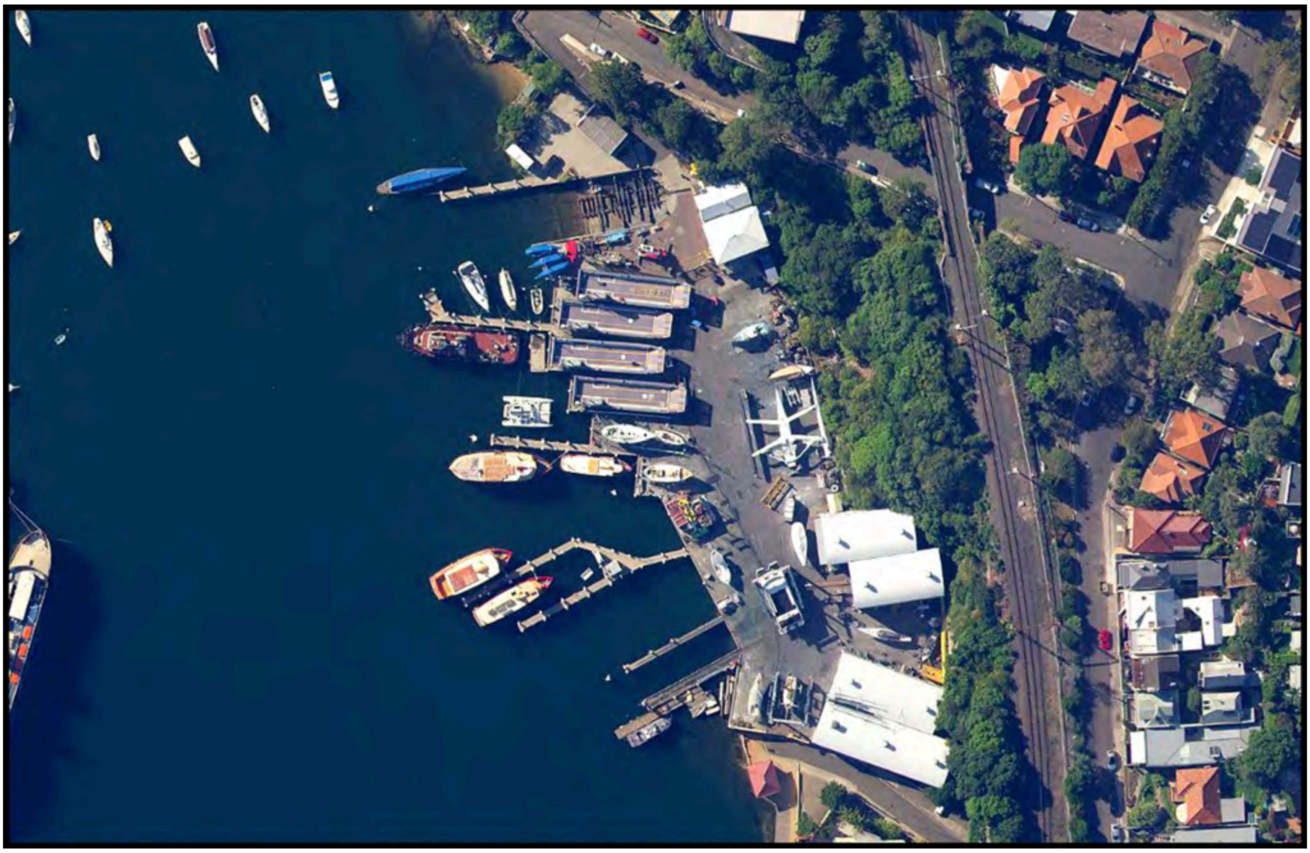


Figure 2: Aerial view of Stannards Marine maintenance facility.

The site is currently occupied by a boat repair and maintenance facility. This comprises both land and water-based infrastructure. See Figure 2.
On the landward side of the site are:
- car parking areas
- hardstand to locate boats on when being repaired and maintained
- four enclosed buildings to undertake maintenance works in confined environments, depending on the type of works being undertaken
- a two storey office building
- other marine repair infrastructure.

In terms of the context of the site, surrounding the site is a relatively broad diversity of land uses. Generally, east of the site are residential land uses, of low-medium density, including three storey apartment buildings – see Figure 3. To the west of the site are marine related uses. The topography is generally from east to west and therefore slopes down towards Berrys Bay, with certain properties benefitting from water views. Another maritime facility, Dolphin Wharf, opposite the site, moors vessels for various periods of time, currently occupied by the ferry, ‘South Steyne’.

Figure 3: View of Stannards Marine maintenance facility from eastern side of Berrys Bay, looking west.

The site is located within close proximity of other marina facilities, used for commercial and private uses, demonstrating the appropriateness of the proposal within the context of the site.
Berrys Bay escarpment and its associated pathways are above this and other marine-related uses are further south-west of the site. The railway line aligns the top of the escarpment and there is a substantial sandstone cliff face from this towards the shipyard itself. Beyond this is Dumbarton Street. Residential property also aligns the top of the escarpment to the west.
Residential property also aligns the top of the escarpment to the west, along Balls Head Road and Larkin Street below.
The subject site is identified as a heritage item, and there are also a number of other heritage items within the vicinity of the site, as set out in the Responses to the Contentions, included later in this report.

1.3 Methodology of Assessment:

The methods used by Urbaine, for the generation of photomontaged images, showing the proposed development in photomontaged context are summarised in an article prepared for New Planner magazine in December 2018 and contained in Appendix B. A combination of the methods described were utilised in the preparation of the photomontaged views used in this visual impact assessment report, providing the basis for the responses to the SOFAC. This same methodology is currently under review by the Land and Environment Court as a basis for future VIA guidelines to supercede the current instructions, also attached as Appendix B.

1.3.1 Process:

Initially, a fully contoured 3d model was created of the site and surrounding buildings to the extent of the designated viewpoints, with detailed modelling matching the FDD design and envelope of the latest Altis Architecture design and its associated interaction with the surrounding site.
Virtual cameras were placed into the 3D model to match various selected viewpoints, in both height and position. These locations were measured on-site, relative to known, existing physical elements, such as trees, light poles, walls etc. From these cameras, rendered views have been generated and photomontaged into the existing photos, using the ground plane for alignment. Several site location poles were placed, both physically and also into the 3d model to allow accurate alignment with the original photo.
The final selection of images shows these stages, including the block montage of the original development application and concluding with an outline, indicating the potential visual impact and view loss. In addition, Appendix A contains 'full context' 120 degree panoramic photos from each location. It is from these that a better understanding can be gained, regarding the visual impact in the overall urban context, although for the purposes of statutory requirements, the images within the report are of a standard lens format, as are the views contained within Appendix A.
The Visual Impact Assessment includes detailed evaluation of views from several properties on the northern side of the subject site, along John Street and Commodore Street.

The 3 images below show the various stage of photomontage composition. Original photo / original photo with 3D ‘point cloud’ drone survey overlaid / original photo with 3D CAD modelling aligned to 3d survey.

Original photo

Original photo with 3D ‘point cloud’ drone survey overlaid

Original photo with 3D CAD modelling aligned to 3d survey

1.3.2 Assessment Methodology:

There are no set guidelines within Australia regarding the actual methodology for visual impact assessment, although there are a number of requirements defined by the Land and Environment Court (LEC) relating to the preparation of photomontages upon which an assessment can be based (contained within Appendix B).
Where a proposal is likely to adversely affect views from either private or public land, Council will give consideration to the Land and Environment Court's Planning Principle for view sharing established in Tenacity Consulting v Warringah Council [2004] NSWLEC 140. This Planning Principle establishes a four-step assessment to assist in deciding whether or not view sharing is reasonable:

Step 1: assessment of views to be affected.
Step 2: consider from what part of the property the views are obtained.
Step 3: assess the extent of the impact.
Step 4: assess the reasonableness of the proposal that is causing the impact.
An additional source of reference in relation to view sharing and visual impact in this area is found within the North Sydney Development Control Plan 2013: Section 3.2.8 Views:
Due to North Sydney's sloping topography and proximity to Sydney Harbour, views and vistas comprise special elements that contribute to its unique character and to the amenity of both private dwellings and the public domain.
New development has the potential to adversely affect existing views. Accordingly, there is a need to strike a balance between facilitating new development while preserving, as far as practicable, access to views from surrounding properties.
When considering impacts on views, Council will generally not refuse a development application on the grounds that the proposed development results in the loss of views, where that development strictly complies with the building envelope controls applying to the subject site.
Objectives:
O1 To protect and enhance opportunities for vistas and views from streets and other public places.
O2 To protect and enhance existing views and vistas from streets and other public spaces.
O3 To provide additional views and vistas from streets and other public spaces where opportunities arise.
O4 To encourage view sharing as a means of ensuring equitable access to views from dwellings, whilst recognising development may take place in accordance with the other provisions of this DCP and the LEP.
Provisions
P1 Where appropriate, the opening up of views should be sought to improve the legibility of the area.
P2 Use setbacks, design and articulation of buildings to maintain street views and views from public areas.
P3 Maintain and protect views identified in the relevant area character statement (refer to Part C of the DCP) from future development.
P4 Where a proposal is likely to adversely affect views from either public or private land, Council will give consideration to the Land and Environment Court's Planning Principles for view sharing established in Rose Bay Marina Pty Ltd v Woollahra Municipal Council and and/or [2013] NSWLEC 1046 and Tenacity Consulting v Warringah Council [2004] NSWLEC 140.

Although these reference documents provide guidelines for assessment, there is no peer review system for determining the accuracy of the base material used for such visual impact assessments. As a result, Urbaine Architectural provides a detailed description of its methodologies and the resultant accuracy verifiability – this is contained within Appendix B.
The methodology applied to the visual assessment of the current design proposal has been developed from consideration of the following key documents:

■ Environmental Impact Assessment Practice Note, Guideline for Landscape Character and Visual Impact Assessment (EIA-N04) NSW RMS (2013);
■ Visual Landscape Planning in Western Australia, A Manual for Evaluation, Assessment, Siting and

Design, Western Australia Planning Commission (2007);
■ Guidelines for Landscape and Visual Impact Assessment, (Wilson, 2002);

In order to assess the visual impact of the Design Proposal, it is necessary to identify a suitable scope of publicly accessible locations that may be impacted by it, evaluate the visual sensitivity of the Design Proposal to each location and thence determine the overall visual impact thereof. Accessible locations that feature a prominent, direct and mostly unobstructed line of sight to the Project are used to assess the visual impact of the Design Proposal. The impact to each location is then assessed by overlaying an accurate visualisation of the new design onto the base photography and interpreting the amount of view loss in each situation, together with potential opportunities for mitigation.
Views of high visual quality are those featuring a variety of natural environments/ landmark features, long range, distant views and with no, or minimal, disturbance as a result of human development or activity. Views of low visual quality are those featuring highly developed environments and short range, close distance views, with little or no natural features.
Visual sensitivity is evaluated through consideration of distance of the view location to the site boundary and also to proposed buildings on the site within the Design Proposal. Then, as an assessment of how the Design Proposal will impact on the particular viewpoint. Visual sensitivity provides the reference point to the potential visual impact of the Design Proposal to both the public and residents, located within, and near to the viewpoint locations.

Site Inspections:
A site inspection was undertaken to photograph the site and surrounding area to investigate:
- The topography and existing urban structure of the local area
- The streetscapes and houses most likely to be affected by the Proposal
- Important vistas and viewsheds
- Other major influences on local character and amenity
The map, see figure 4, indicates chosen locations for site photography – a larger version of this is shown in Appendix A.

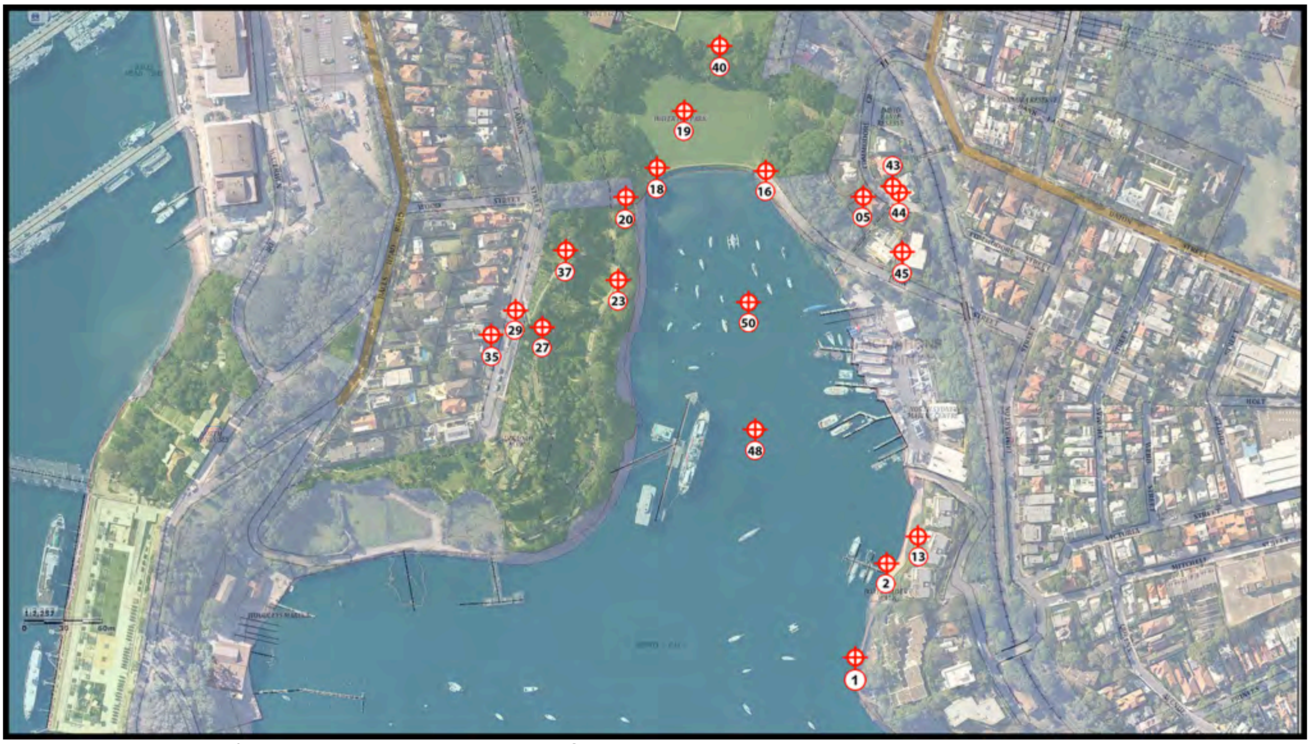


Figure 4: Aerial photo/map indicating photo locations for photomontaged images

2. THE SITE AND THE VISUAL CONTEXT

2.1 The Visual Context:

Within the Road context, development is predominantly 1, 2 and 3 storey individual dwelling houses and small apartment buildings, orientated to maximise ocean and district views. The subject property is not heritage listed.
Within the urban context, there is a diverse fabric consisting of predominantly low density residential, with wide Roads and mature, established landscaping.
The iconic views from Berrys Bay are to main harbour to the south and the southeast. These are relatively unaffected by the visual impact of the current design proposal. There are a small number of locations where view loss can be assessed, but for the mostpart, this assessment relates to the visual impact of the new proposal.
Visual impacts occur within an existing visual context where they can affect its character and amenity. This section of the report describes the existing visual context and identifies its defining visual characteristics.
Defining the local area relevant to the visual assessment of a proposed development is subject to possible cognitive mapping considerations and statutory planning requirements. Notwithstanding these issues, the surrounding local area that may be affected by the visual impact of the proposed development is considered to be the area identified on in the general topographical area map, See Figure 5.

2.2 Roadscapes:

Within the local and surrounding areas, the roadscapes are typical of a well-established suburban area, that being focused on public amenity. The residential lots are medium to large and, as a result of the topography, have the option of enabling view sharing throughout the neighbourhood.

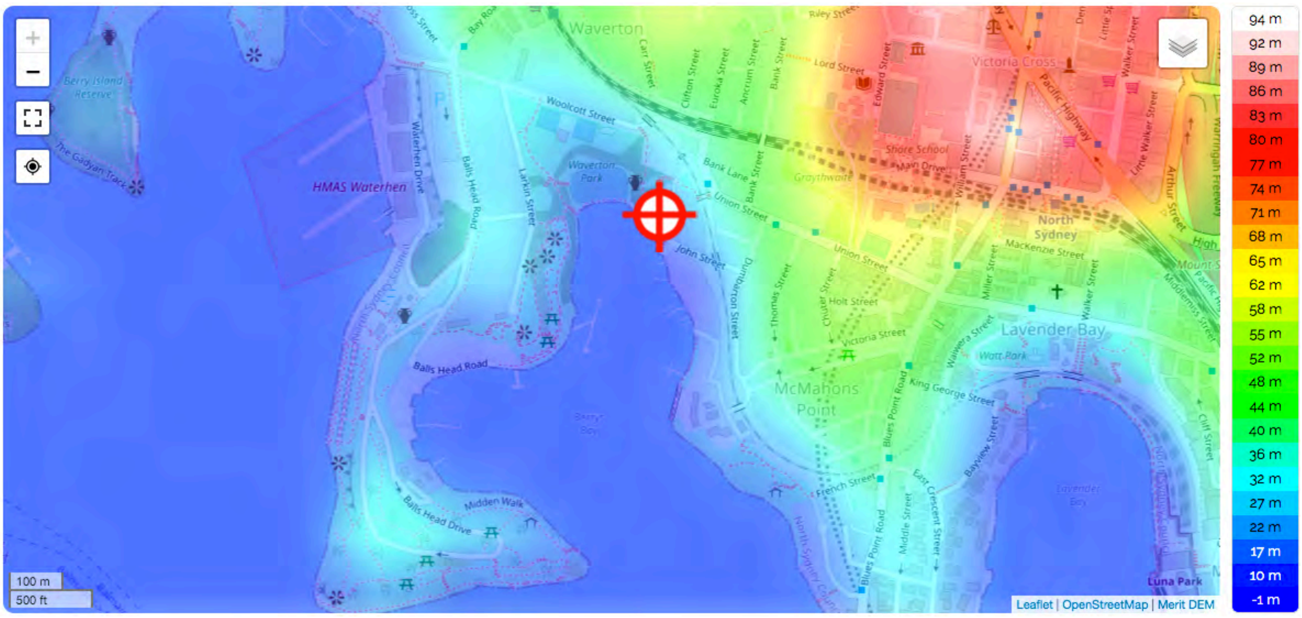


Figure 5: Subject Site topographical map – site location indicated with red target symbol.

2.3 The selected view locations for the local view analysis:

As a result of the site's topography, the visual impact is primarily relevant from the residential properties surrounding the subject site and also from the gaps between houses, observed from the Road. The houses on the northern side of the subject site, on John Street, have the greatest potential for negative visual impact.
A large number of site photos were taken and a smaller number of local views selected from these, relevant for the private viewing locations, as described above. These are a mixture of static viewpoints, namely, fixed locations, as opposed to locations where viewing from a vehicle may be more likely – dynamic.

The selected photos are intended to allow consideration of the visual and urban impact of the new development at both an individual and local level. They incorporate private viewing locations from areas and residences adjoining the site, where the land falls within direct line of sight and has the potential to impact on the neighbouring views, public viewing locations and roads and pathways across Berrys Bay to the west

2.4 Period of View:

The view is either
(a) Intermittent, or Dynamic if it will be viewed from a car travelling along a road; or
(b) Stationary, or Static if the proposal can be viewed from a fixed location or for an extended period of time. In this instance, most views will be considered as stationary, since the impact is most significant on views from adjoining gardens.
Context of View:
The context of the view relates to where the proposed development is being viewed from. The context will be different if viewed from a neighbouring building, or garden, where views can be considered for an extended period of time, as opposed to a glimpse obtained from a moving vehicle.
Extent of View:
The extent to which various components of a development would be visible is critical. For example, if the visibility assessment is of a multi-storey development proposal in a low-density context of 2 to 3 storey buildings, it would be considered to have a significant local scale visual impact, whereas if a development proposal is located in an area of a CBD containing buildings of a similar scale and height, it may be considered to have a lower scale visual impact.
The capacity of the landscape to absorb the development is to be ranked as high, medium or low, with a low ranking representing the highest visual impact upon the scenic environmental quality of the specific locality, since there is little capacity to absorb the visual impact within the landscape.

3. VISUAL IMPACT OF THE PROPOSED DEVELOPMENT

The proposed development is for the re-location of a FDD alongside the existing Stannards Marine complex in Berrys Bay. The proposal includes the demolition of two existing wharfs so as to allow the FDD to be moored alongside the western side of the existing hard stand area. See Figure 6

Figure 6: Demolition plan, indicating the sections of wharf to be removed to accommodate the FDD and its rotation.

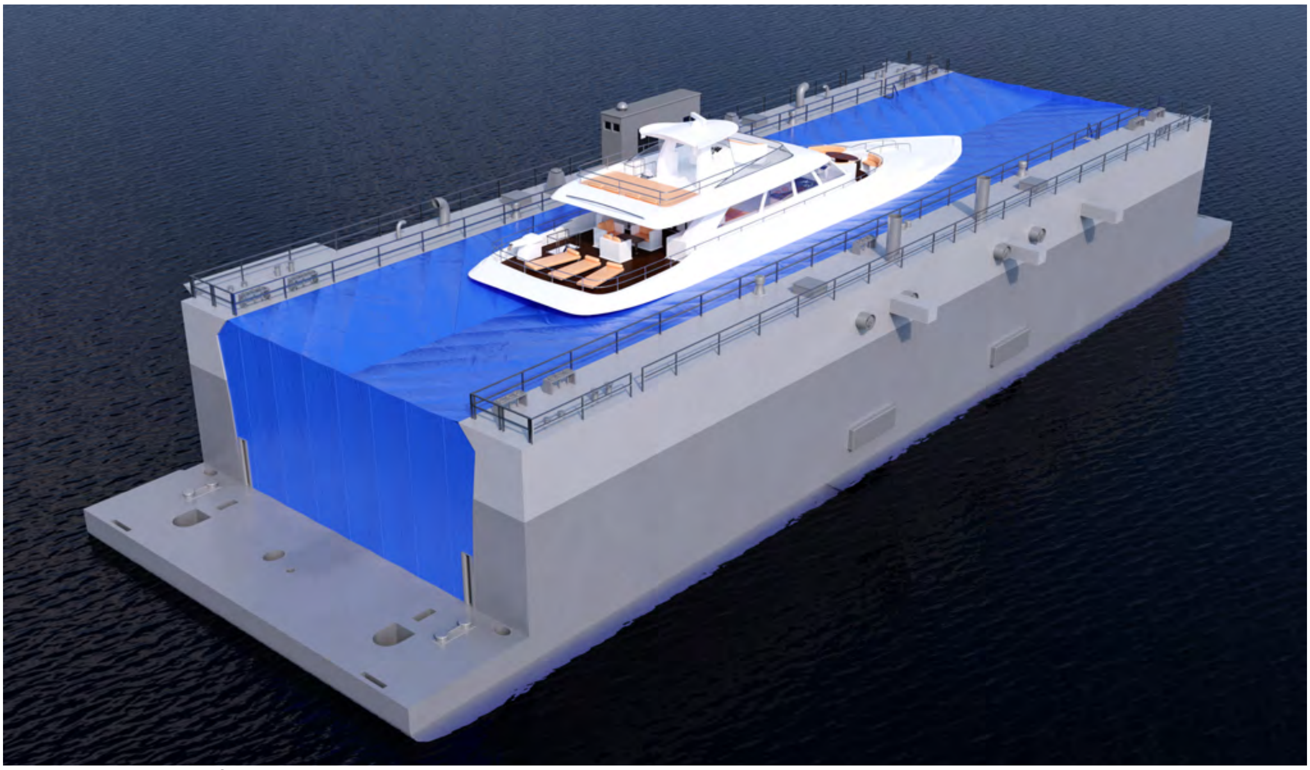
The existing Stannards Marine facility is situated in the north-east corner of the bay and accessed from John Street in the north and Munro Street in the south. The facility includes four large curved-roofed work sheds set back at the foot of the escarpment at the south end and various other buildings at the north end, behind a large hard stand area. The dock itself includes a number of wharfs and a large slipway. Two motorised 80-tonne boat lifts operate to lift vessels of various sizes from the water and onto temporary storage on the hard stand for maintenance work. These uses will continue.

Two existing wharfs, to which vessels are currently moored, would be demolished, to allow the FDD to be moored close and parallel to the western side of the hard stand.

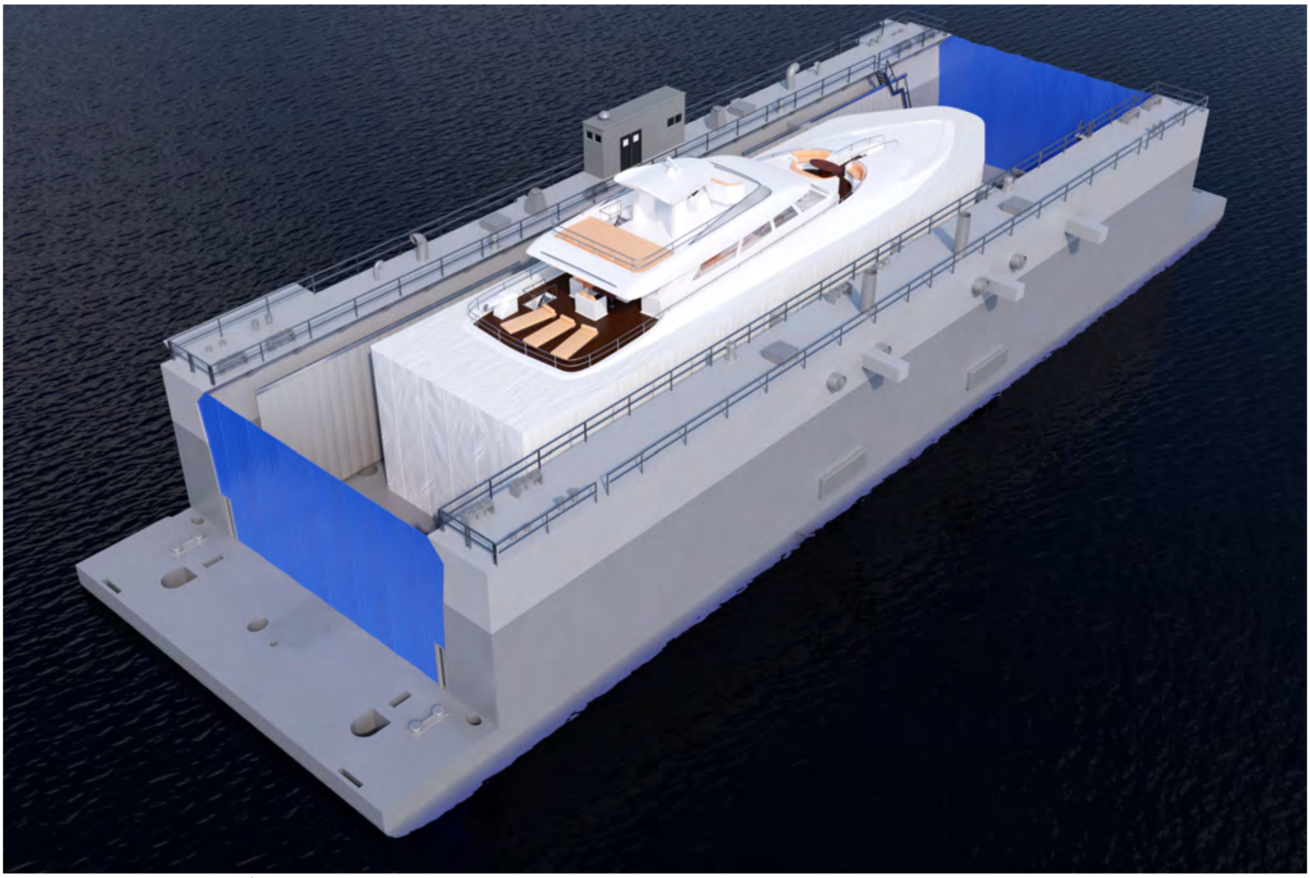
The overall shape of the FDD can be described as an open-ended box with thick walls on the long sides. The wall elements and hull below the internal floor contain tanks that can be evacuated to provide the necessary floatation to support vessels on the internal deck. Vessel maintenance can then be undertaken in a safe and secure environment, quickly and efficiently. See Figure 7 for a photo of the existing FDD.

Figure 7: Existing FDD to be relocated.

During operation, there will be occasions when full, or partial encapsulation is required. This is achieved with the use of acoustic curtains at the ends of the FDD and an encapsulation cover above – see figures 8 and 9 below for both options.



Full encapsulation of FDD


Partial encapsulation of FDD

3.1 Visual Impact Assessments, with reference to the requirements of the Land and Environment Court.

When undertaking the assessment of visual impacts, the guidelines stipulated by the Land and Environment Court, NSW, are used as a starting point for compliance (contained in Appendix B).

3.2 Visual Impact Assessments from 9 local viewpoint locations – static, private / public locations:

Viewpoint No.1: Existing site photo. Single Frame.

Viewpoint No.1: Photomontage showing FDD in submerged location

Viewpoint No.1: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.1: Photomontage showing FDD in raised position with acoustic curtains close

Viewpoint No.2: Existing site photo. Single Frame.

Viewpoint No.2: Photomontage showing FDD in submerged location

Viewpoint No.2: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.2: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.5: Existing site photo. Single Frame.

Viewpoint No.5: Photomontage showing FDD in submerged location.

Viewpoint No.5: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.5: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.16: Existing site photo. Single Frame.

Viewpoint No.16: Photomontage showing FDD in submerged location.

Viewpoint No.16: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.16: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.18: Existing site photo. Single Frame.

Viewpoint No.18: Photomontage showing FDD in submerged location.

Viewpoint No.18: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.18: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.29: Existing site photo. Single Frame.

Viewpoint No.29: Photomontage showing FDD in submerged location.

Viewpoint No.29: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.29: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.43: Existing site photo. Single Frame.

Viewpoint No.43: Photomontage showing FDD in submerged location.

Viewpoint No.43: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.43: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.45: Existing site photo. Single Frame.

Viewpoint No.45: Photomontage showing FDD in submerged location

Viewpoint No.45: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.45: Photomontage showing FDD in raised position with acoustic curtains closed.

Viewpoint No.48: Existing site photo. Single Frame.

Viewpoint No.48: Photomontage showing FDD in submerged location.

Viewpoint No.48: Photomontage showing FDD in raised position with acoustic curtains open.

Viewpoint No.48: Photomontage showing FDD in raised position with acoustic curtains closed.

3.2.1 Method of Assessment:

In order to allow a quantitative assessment of the visual impact, photos were selected that represented relevant private viewing locations from John Street, Commodore Street, public parks and areas to the south and east of the subject site.
A Canon EOS Full Frame Digital Camera with fixed focal length of 50mm lens was used to take all view point photos, at an eye level of 1600mm.
Alongside, this, an accurate 3d CAD model was created of the FDD and the subject site, using the following source documentation:

1. Greater Site Plan, prepared by Altis Architecture, dated 28 June, 2017. See Figure 8
2. Survey, part 6 John Street McMahons Point, prepared for Noakes Group Pty Ltd by Norton Survey Partners, dated 27 November, 2017
3. Hydrographic Survey, 6 John Street, Berrys Bay, prepared by Harvey Hydrographic Surveys, dated 27 November, 2017
4. Floating Dry Dock Facility (Marinas and other related land and water shoreline facilities), 6 John Street, McMahons Point, North Sydney LGA, Secretary’s Environmental Assessment Requirements (SEAR) 1166

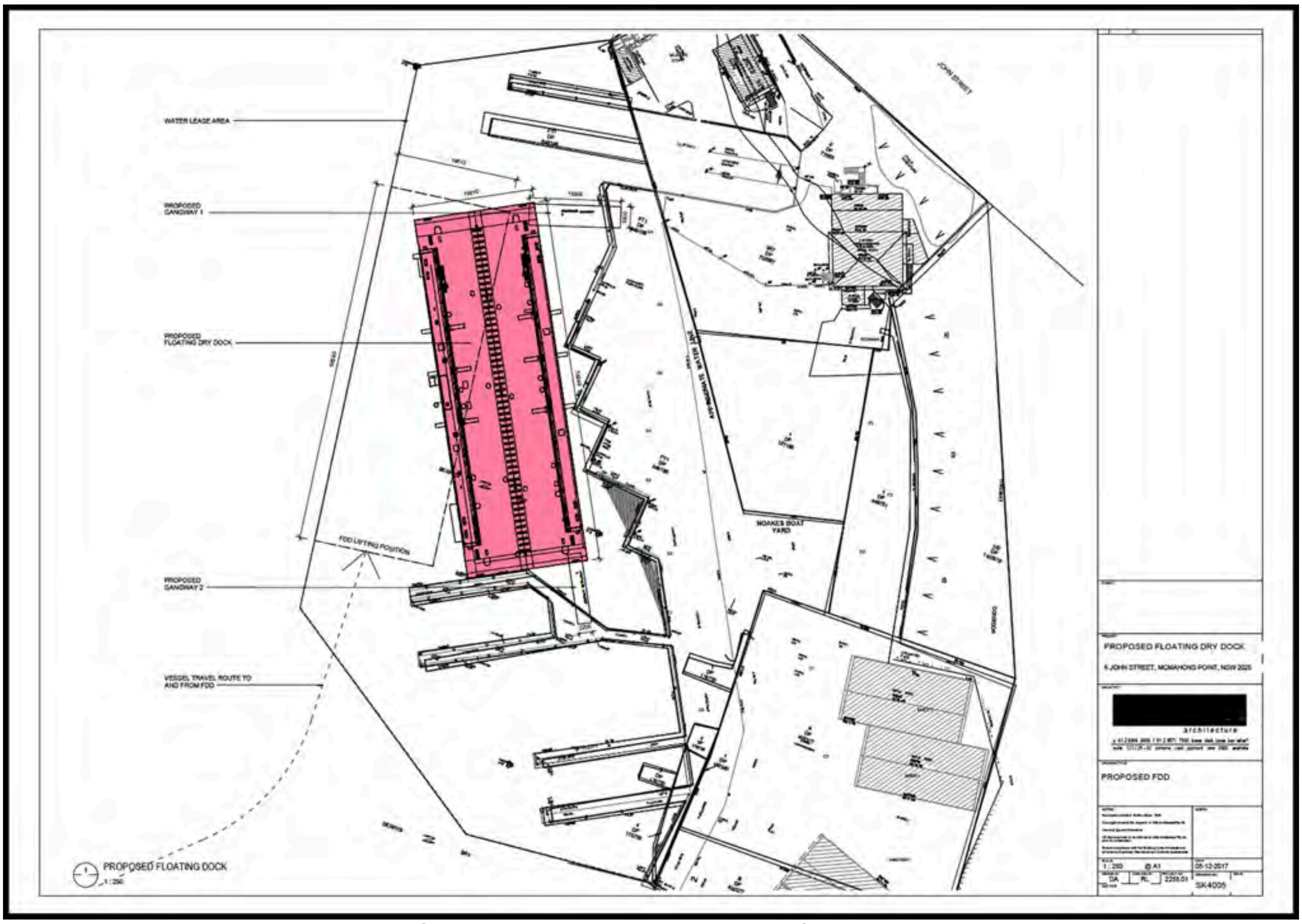


Figure 8: Plan indicating new location of FDD and its rotation path into the lifiting position.

The photos include location descriptions, to be read in conjunction with the site map. Additionally, information is supplied as to the distance from the site boundary for each location and the distance to the closest built form is provided in Section 3.2.2 below.
To assess the visual impact, there are 2 relevant aspects - view loss of actual substance (landscape, middle and distance view elements etc.) and also direct sky view loss.
To a large extent, the value associated with a view is subjective, although a range of relative values can be assigned to assist with comparing views. Figure 9 is a scale of values from 0 to 15, used to allow a numeric value to be given to a particular view, for the purposes of comparison.
On the same table are a series of values, from zero to 15, that reflect the amount of visual impact.
The second means of assessment relates to assigning a qualitative value to the existing view, based

on criteria of visual quality defined in the table – see figure 9.
The % visual content is then assessed, together with a visual assessment of the new development's ability to blend into the existing surroundings.
The table in Figure 10 indicated the relative visual impact on heritage-related items and surrounding.

Scale	Value	Visual quality	Visual impact
0	**Negligible**	N/A	No negative impact on the pre-existing visual quality of the view.
1 2 3 4 5	**Low**	Predominant presence of low quality manmade features. Minimal views of natural formations (e.g. cliffs, mountains, coastlines, waterways, ridges etc). Uniformity of land form.	A minor negative impact on the pre-existing visual quality of the view. Examples: – Minor impacts on natural landscapes. – No impact on iconic views – Impacts on a small number of receivers. – Significant distance between the development and receiver.
6 7 8 9 10	**Medium**	Presence of some natural features mixed with manmade features. Some views of distinct natural formations (e.g. cliffs, mountains, coastlines, waterways, ridges etc).	A medium negative impact on the pre-existing visual quality of the view: Examples: – Moderate impacts on iconic views or natural landscapes. – Impacts on a moderate number of receivers. – Located nearby the receiver.
11 12 13 14 15	**High**	Predominantly natural features. Minimal manmade features, however if present of a high architectural standard. Significant views of distinct natural formations (e.g. cliffs, mountains, coastlines, waterways, ridges etc). Presence of iconic regional views or landmark features.	A high negative impact on the pre-existing visual quality of a view: Examples: – Loss of iconic views. – Impacts on a significant number of receivers. – Overshadowing effect. – Directly adjacent the receiver.

Figure 9 – Urbaine Architectural Visual Assessment Scale

Visual Impacts Factors

Factors	Low Impact	Medium Impact	High Impact
Compatibility with heritage items and settings	High compatibility with the character, scale, form, colours, materials and geometrical arrangements of existing items in the immediate context. Low contrast with existing elements of the adjacent environment. Identified heritage views are not significantly affected by the proposal. Proposal has no physical impact on heritage values. Proposal is a background item that does not significantly affect the heritage significance of the setting. Views affected are of level 4 or 5 in significance.	Moderate compatibility with the character and built form of the existing setting in the immediate and also the wider context. The proposal introduces new features, but these are compatible with the scenic character and qualities of the setting. Proposal has a low impact on values of views identified as of level 1-3 in significance. The composition of the setting of the items or conservation areas in the views is either not significantly affected or is affected to a medium extent.	The character, scale, form and spatial arrangement of the proposal has low compatibility with the context or which could reasonably be expected to be new additions to it. The view affected by the proposed development is identified as a heritage view in relevant planning instruments and policies. The proposed development is a foreground element affecting appreciation or interpretation of views of level 1-3 in significance. The attributes of the proposal devalue the established heritage significance of recognised views, items or settings.

Figure 10 – Urbaine Architectural Indicative ratings table of visual impacts on settings of heritage items

4. RESPONSES TO STATEMENTS OF FACTS AND CONTENTIONS

Development Application No. 57/19 (DA) was lodged with Council on 5 March 2019 as an Integrated Application and was not recommended for approval. A Statement of Facts and Contentions, was filed by North Sydney Council (the Respondent) on 13 May 2021 (SOFAC). The responses to the SOFAC, in relation to the relevant sections 4 and 5 are presented herewith: The Respondent's contentions are listed first, followed by the response from Urbaine Architectural, specifically in relation to visual impact and view loss.

SOFAC: Section 4: VISUAL IMPACT / VIEW LOSS

The Development Application should be refused because the FDD will have an unacceptable visual impact on properties along the foreshore areas, waterway users, and other public land-based vantage points.

Particulars:

SOFAC Contention from The Respondent:

(a) The FDD at its highest point when raised is approximately 11.5 metres. Therefore the height is greater than the maximum building height standard of 10 metres which applies to the land-based part of the Site under the NSLEP.

Response from Urbaine Architectural:

This contention is based on the assessment of the overall height of the FDD above water level. As can be observed in Figure 11, although the overall structure height, including the control room, is approximately 11.5m. Approximately 2m of this height / depth is within the water. The actual height from water level, excluding the submerged portion of the FDD, to the top of the main structure, being the upper access deck, excluding the small control room, is approximately 8.5m. This height is not measured from the neighbouring ground level, as would be the case with a built form on the Stannards Marine site. If a water-to-ground level height of 1500mm is used, then the actual visible height of the floating structure (to top deck), above ground level, is 7m. This will vary with the rise and fall of the tide within the harbour. The suggestion that the overall height, when raised, is 11.5 metres is an erroneous assessment.

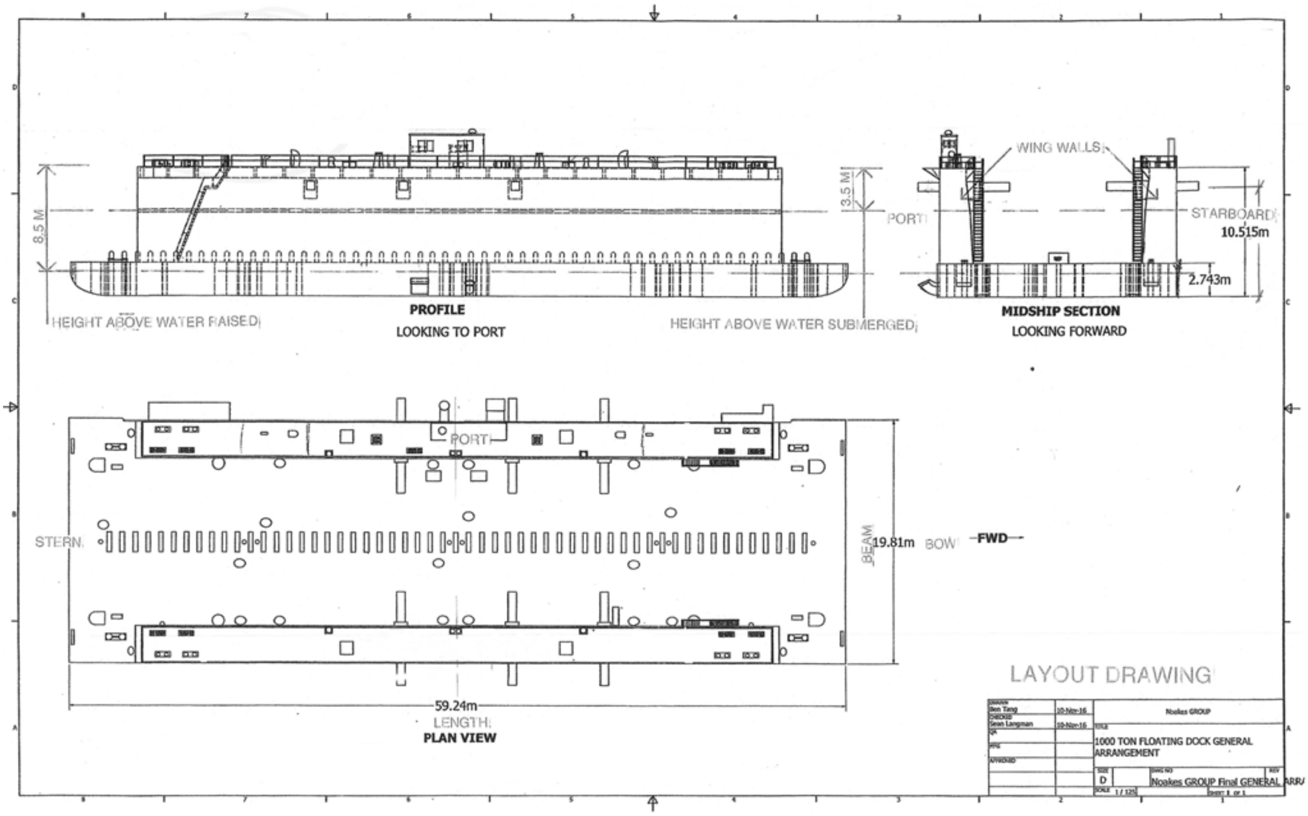


Figure 11 – Drawing from Noakes Group, indicating heights above waterline of the new FDD.

The position of the floating dock will not be on zoned or unzoned land, but contained entirely within the water. Therefore, the NSLEP provisions should not be applied to the floating dock itself. Notwithstanding this, the proposal does not constitute a height of greater than 10 metres above water level, as outlined above.
In addition, the FDD is not a building, but rather a vessel, registered with NSW RMS - registration number FDD1N. It should, therefore, be assessed in the same way as a tug or barge, which, likewise, are used to transport other vessels. As a result of this, no Clause 4.6 variation would be required.
In terms of view loss and visual impact, caused as a result of the structure's height, this cannot therefore be assessed in the same way as a land-based building, particularly in relation to the ruling contained within the Tenacity Consulting v Warringah (2004) NSWLEC case. The Tenacity Ruling can be used as a guideline only.

SOFAC Contention from The Respondent:
(b) The scale of the FDD and its lack of articulation is considered unacceptable having regard to the surrounding built form and local features in the small eastern cove of Berrys Bay.

Response from Urbaine Architectural:
This contention is, in my opinion, largely unfounded. The scale of the FDD is a result of its necessary functional capacity, servicing large maritime vessels – a case of form following function, which is often the case with such structures. The surrounding built form, on the adjoining Stannards Marine site, is of a comparable height and the extent of existing structures again reflects the nature of the work being undertaken by a large maritime maintenance facility. The existing maintenance sheds have little visual articulation, since they are effectively enclosed, large volumes of space, rather than architectural forms that require any specific elevation treatment for their effective function or integration.
The colours and finishes of the FDD are characteristic of the general maritime environment within Sydney Harbour and as such, sit comfortably in this particular shipyard setting.
However, if the lack of articulation is an issue, this can be addressed by the Applicant in a variety of ways, including colour treatment, addition of a 'filigree' of additional external elements to break up the continuous façade, or a combination of matt and gloss paint finishes to respond to the water reflection and the background behind the FDD.
In terms of visual impact, it is my opinion that the FDD will integrate well into its proposed location.

Figure 12: View towards the subject site from 6-18, Munro Street to the north.

SOFAC Contention from The Respondent:
(c) The proposed acoustic curtains deprive those looking on of the visual opportunity of vessels being worked on, which causes the Proposed Development to lose its value in terms of the area's maritime heritage.

Response from Urbaine Architectural:
In my opinion, this contention contradicts the requirements for noise suppression, which for neighbouring residents will, almost certainly, be of greater significance.
Additionally, much of the current maritime maintenance work, particularly on larger vessels, takes place within the land-based sheds at the rear of the site. In this current situation, the work being undertaken is already almost entirely hidden from sight.
The maintenance of boats on the main current hardstanding area of the Stannards dock will continue and it is these boats and vessels that offer more visual interest for observers. See Figure 12 for an example of the continued viewlines to the maintenance area on the dock from neighbouring residential buildings to the south of the subject site.
There are very few locations from which the actual maritime maintenance work can be closely observed by the public. Furthermore, the extent to which the observation of maritime maintenance is a popular pastime amongst the general public is not authoritatively determined.
In relation to the visual impact, the presence of the acoustic curtains would, in my opinion make no difference to the extent of view loss, or visual impacts assessed under the relevant ruling contained within the Tenacity Consulting v Warringah (2004) NSWLEC case.
The inclusion of the acoustic curtains in the application would make no difference to the assessment of view loss and only a very minor-to-insignificant increase in the visual impact assessment component in all the views in this report.

Figure 13: View towards the subject site from the walkway around Waverton Park, showing the various marine maintenance activities occurring behind the moored bock on the dock of Stannards Marine.

SOFAC Contention from The Respondent:
(d) The bulk and scale of the FDD will fundamentally change the nature of the activities on the Site and convert the maritime service character of Berrys Bay to a considerably more intensive 'utilitarian maritime industrial character'.

Response from Urbaine Architectural:
In my opinion, 'the nature of the activities' itself will not change as a result of the bulk and scale of the FDD – they are not linked and the same nature of activities will continue to be performed within the FFD. These same activities will be conducted in a more controlled manner with regards to noise, safety, pollution and ease of access to the boats. As can be seen from Figure 13 and its associated photomontage, later in this report, there is an abundance of nautical activity in the area of the Stannards Marine site and this visual overlay of boats and masts will help to integrate the FDD into its surroundings.
It will be a direct consequence of the installation of the FDD that there will be a faster turnaround of boat maintenance which will result in increased activity on the site – a positive outcome in terms of the issues raised in this contention and in terms of the zooming requirements of this particular site.
For the continuation of maritime maintenance within a working harbour, it is important that companies continue to evolve and this is achieved through the adoption of new technologies and methods. This may, in some instances, such as this, result in new structures to accommodate better working methods. As with any new structure, an increased degree of visual impact is inevitable.

However, I consider it an exaggeration to suggest this will create a ‘utilitarian maritime industrial character’.
It is my opinion that the size and scale of the proposed dock is commensurate with the activity contained therein, the maritime location and respectful of the heritage context of the site.
As will be observed in figure 14, there are many and varied scales of boats and machinery in the current location, including the retired ‘South Steyne’ ferry on the western bank of Berrys Bay.


Figure 14: View across Berrys Bay towards the subject site with ‘South Steyne’ ferry in the foreground.

SOFAC Contention from The Respondent:
(e) The photomontages in the Visual Impact Assessment are likely to underrepresent the visual impacts that will arise from the FDD as the exclusive use of a 35mm focal length lens for the base photographs reduces the apparent visual impact, creating what appears to be a greater distance between the viewer and the proposed FDD – thereby suggesting a more expansive eastern cove spatial volume within Berrys Bay than actually exists. Additional photomontages should be prepared using a lens with a focal length of 50mm in order to provide a more accurate representation of the spatial relationships and arising visual impacts.

Response from Urbaine Architectural:
A new set of photomontaged views have been prepared from key locations and are submitted with this response. The current montages, prepared as part of this response, are in accordance with the requirements of the Land and Environment Court - Use of photomontages - as below:

The following requirements for photomontages proposed to be relied on as or as part of expert evidence in Class 1 appeals will apply for proceedings commenced on or after 1 October 2013. The following directions will apply to photomontages from that date:
Requirements for photomontages
1. Any photomontage proposed to be relied on in an expert report or as demonstrating an expert opinion as an accurate depiction of some intended future change to the present physical position concerning an identified location is to be accompanied by:
Existing Photograph.
a) A photograph showing the current, unchanged view of the location depicted in the photomontage from the same viewing point as that of the photomontage (the existing photograph);
b) A copy of the existing photograph with the wire frame lines depicted so as to demonstrate the data from which the photomontage has been constructed. The wire frame overlay represents the existing surveyed elements which correspond with the same elements in the existing photograph; and
c) A 2D plan showing the location of the camera and target point that corresponds to the same location the existing photograph was taken.
Survey data
d) Confirmation that accurate 2D/3D survey data has been used to prepare the Photomontages. This is to include confirmation that survey data was used:
i. for depiction of existing buildings or existing elements as shown in the wire frame; and
ii. to establish an accurate camera location and RL of the camera.

2.Any expert statement or other document demonstrating an expert opinion that proposes to rely on a photomontage is to include details of:
A: The name and qualifications of the surveyor who prepared the survey information from which the underlying data for the wire frame from which the photomontage was derived was obtained; and
b) The camera type and field of view of the lens used for the purpose of the photograph in (1)(a) from which the photomontage has been derived.

It is my view, which is one that is seeking greater favour in the Land and Environment Court, that additional views, accompanying the compliant images, serve to demonstrate the wider context. This is critical in cases such as this, where the visual impact should be assessed within the broader scope of the harbour and expansive water views that are available from many locations around the site.
Full panoramic views are contained within Appendix A and LEC compliant single frame 50mm images are integrated into this report.

SOFAC Contention from The Respondent:
(f) The FDD is unsympathetic to the high-quality visual and environmental surroundings, and is out of character in the visual context and its heritage.

Response from Urbaine Architectural:
It is my opinion that the existing buildings on the site, in particular the 4 more modern boat maintenance sheds at the rear of the site could not be considered as examples of high-quality architecture with respect to their design or overall visual appearance, based on my architectural knowledge (UK Registered Architect, RIBA, 1988). There are smaller, heritage-listed buildings also on the site, which remain fully visible from almost all locations with the FDD in place.
It could be claimed that it is the randomness of the many boats being serviced that creates the visual interest, both in terms of their scale and design. This will not change as a result of the installation of the FDD. Many boats of varying designs and sizes will still be visible.
Regarding the environmental surroundings, these will not be directly affected by the FDD, as discussed later in this report, referencing the montaged views.
Many different sizes of vessels are brought to the current facility for maintenance. It is the nature of water-based craft, that their designs will be diverse. with respect to scale, proportion, colour and overall design. This is the nature of the maritime industry. The FDD is effectively another vessel, adding to the visually exciting variety of elements within, and surrounding, the Stannards Marina. It is not designed to be anything other than functional, which is often the case

SOFAC Contention from The Respondent:
(g) The Proposed Development will result in unacceptable view loss to the dwellings immediately north of the Site, including those in John Street and Commodore Crescent.

Response from Urbaine Architectural:
Since the houses on John Street and Commodore Crescent are elevated above the subject site, to varying degrees, the view loss will be mostly of the water only, which alone is not considered as being a highly valued view in terms of the ruling of the Tenacity Consulting v Warringah (2004) NSWLEC case. A number of photos from these locations are shown in the accompanying photomontaged views.
The views from John Street and Commodore Street are already filtered through screening of mature trees and other neighbouring buildings.
The FDD would cause some minor-to-moderate view loss for views from some rooms in dwellings at 11-13 John Street, the precise impacts on which would need to be assessed with access to those buildings. Commodore Street is significantly higher and view loss is minimal, as will be observed in the visual impact photomontaged views and also with reference to the existing views below, Figures 15 to 18.
Based on photomontages prepared to accord with the Land and Environment Court of New South Wales practice note for preparation of photomontages, it appears unlikely that dwellings in 16-18

Munro Street would experience significant visual effects, such as view loss, since the views to the north are already largely obscured by the variety of vessels moored at the Stannards Marine Facility at various times. There would, however, be a degree of visual impact from a new vessel being located at Stannards Marine.
These areas that experience a degree of view loss could be assessed against the rulings of Tenacity, although, since the proposal is not strictly a building, this assessment would be for guidance only.

Figure 15: View from No.9, John Street, looking south-southeast towards subject site.

Figure 16: View from No.7, Commodore Street, looking southeast towards subject site.

Figure 17: View from No.7, Commodore Street, looking southeast towards subject site.

Figure 18: View from John Street, looking south-southeast towards subject site.

SOFAC Contention from The Respondent:

(h) The Proposed Development is not compatible with the local areas in terms of its scale in relation to its surroundings.

Response from Urbaine Architectural:

In terms of visual impact, the Proposed Development is viewed within the immediate context of a working maritime maintenance facility. This presents a combination of buildings, which although noted for their heritage significance, cannot be considered as noteworthy examples of architecture, as mentioned earlier. The main maintenance sheds are of a similar scale to the new proposal and already present a modern, utilitarian architecture.
Most areas of built form within this overall locality are situated well above the subject site and visually separated by the sandstone cliff and also by road and rail boundaries.
The nature of the maintenance facility results in vessels of varying sizes being received. The scale of these vessels is in proportion to the buildings required to contain them. Hence, the requirement for the FDD to be of this size and scale.
Views to the site and to the adjoining urban fabric, are, for the mostpart, from houses and public viewing locations to the west of the site, across Berrys Bay, looking east. Many of the views are filtered through existing mature landscaping and can be separated into 3 visual zones: See Figure 19 for plan locations.

Figure 19: Urbaine's indicative assessment of Plan Zones of Visual Content.

These zones can be described as follows:
1. The water in the Bay, including the boats and other floating structures.
2 The foreshore and associated developments, with a backdrop of a steeply sloping topography, including a sandstone cliff, as described earlier in this report. This component of the site's environs is effectively 'capped' by the railway line and Dumbarton Street.
3. The raised residential streetscape above the site, mostly contained within the Union Bank and Thomas Street Conservation Area [NCC LEP2013 CA-15].
These are shown in elevational photographic context in Figure 20.

Figure 20: Elevational Zones of Visual Content

In my opinion, the qualitative visual values of these zones are also different. The intermediate zone 2 is the 'working' zone, in terms of activity – transport and industry with the backdrop of the vertical sandstone cliff. Visual appropriateness and integration between the zones is harder to justify than within the zones, although it is admitted that the ideal situation would be that all zones would be mutually responsive.
In this case, zone 2 effectively contains the proposed development and the existing large maintenance sheds. The relationship between these and to the cliff behind are, in my opinion, acceptable in the context of visual compatibility. The boundaries between these visual zones are very defined and, due to their nature, are unlikely to change over time – those being the road and rail as the upper boundary and the water to land interface as the lower boundary.

SOFAC Contention from The Respondent:
(i) Under the SREP DCP, the Site is identified as Landscape Character Type 11. The performance criteria applying to Landscape Character 11 includes:
- views of the remaining natural elements along the foreshore and behind existing development are preserved in a continuous unbroken line to soften the impact of the built form;
- the maritime nature of industrial uses on the harbour is preserved. Pressure for these uses to relocate is minimised. New developments adjoining maritime activities are designed and sited to maintain compatibility with existing maritime activities;
- it is designed to maintain the scale and height of existing development and to have regard for the visual dominance of the islands and the industrial elements within the harbour.

Response from Urbaine Architectural:
As mentioned earlier in this report, the FDD is not considered a 'built form', but rather a vessel.

- In terms of the continuation of natural elements along the foreshore – in this case, this will be relevant to the wharfside retaining wall and the sandstone cliff at the rear of the site. From most viewing locations, this remains uninterrupted in the area where sandstone is visible, between the existing maintenance sheds.

The proposed FDD has no physical or visual impact on the fabric or views of the sandstone cliff behind the shipyard. The FDD is set well back from the cliff, in the water, and as such all the existing close views of the sandstone cliff are retained. The further views remain unchanged as the cliff face is generally obscured by the vegetation on the top of the cliff and in the railway embankment directly above the cliff. The cliff can be seen in Figure 21 and in the photomontages provided.


Figure 21: Heritage sandstone cliff visible at the rear of the site between landscaping and existing buildings.

- The new proposal clearly satisfies the requirement to preserve the maritime nature of industrial uses on the harbour. This does not preclude the adoption of modern methods of maintaining boats, as is the case with the FDD, forming the basis of this proposal. It is the development of new buildings adjoining the site that is to be controlled, in terms of compatability and potential for visual impact, under this performance criteria guideline.

- Although the new proposal is a floating vessel, rather than a building, it still relates to the scale and height of the buildings within the existing development, the most dominant of which are the 4 modern maintenance sheds at the rear of the site. Additionally, the FDD reflects the industrial elements of the harbour through its ‘form follows function’ design.

SOFAC Contention from The Respondent:
(j) The FDD will detract from the local heritage item I0484 and associated buildings as well as sandstone cliff face that runs along behind the Site known as local heritage item I0483.

Response from Urbaine Architectural:
This has been discussed earlier in the report. However, in response, these items remain visible from most relevant locations, as can be observed in the new photomontaged views.
The nature of a maritime servicing facility will inevitably result in many different types of boats and vessels being brought to the site, all with varying degrees of visual impact and causation of view loss. The FDD is another maritime facility vessel, reinforcing the observable function and purpose of the facility as a marine industry.
The sandstone cliff, where visible through the existing landscaping, retains its dominant visual positioning at the back of the site and is only visually impacted by the FDD to a very minor degree and only from a small number of locations, as will be observed from the new photomontaged views. The largest visual impact would be from the water, in close proximity to the FDD and, since this is a non-stationary, non-residential viewing location, the view loss would be assessed as minor.
As noted in the earlier response, the proposed FDD has no physical or visual impact on the fabric or views of the sandstone cliff behind the shipyard. The FDD is set well back from the cliff, in the water, and as such all the existing close views of the sandstone cliff are retained. The further views remain unchanged as the cliff face is generally obscured by the vegetation on the top of the cliff and in the railway embankment directly above the cliff.

SOFAC Contention from The Respondent:
(k) The Proposed Development is inconsistent with the following planning principles in Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (SREP):

(i) Sydney Harbour Catchment:
Cl 13(f) development that is visible from the waterways or foreshores is to maintain, protect and enhance the unique visual qualities of Sydney Harbour,

Response from Urbaine Architectural:
Sydney harbour and its visual qualities are unique in many ways. Perhaps one of the most relevant contributory factors towards this uniqueness lies in its continuance as a fully functioning harbour. A significant part of this is linked to the maritime industry, both public and private vessels. It is the observance of these in the inner harbour that give it the distinction of being both beautiful and functional.
To continue this legacy requires the encouragement of growth within the maritime trades, whilst still respecting the natural beauty of the existing environment.
This statement does relate to developments, whereas the proposal for the FDD is specifically for a vessel. Notwithstanding this, the current maintenance boatyard would clearly form a part of the 'unique visual qualities of Sydney Harbour'. The additional of the FDD will add further to the value of the Harbour as, not only a place of natural beauty, but also a fully-working marine environment. This is something that should not be undervalued, when so much attention is given to the increasing amount of waterfront residential development.

SOFAC Contention from The Respondent:
(ii) Foreshores and Waterways Area:
Cl 14(d) development along the foreshore and waterways should maintain, protect and enhance the unique visual qualities of Sydney Harbour and its islands and foreshores.

Response from Urbaine Architectural:
Reponses to this planning principle are adequately covered in the responses above.

SOFAC Contention from The Respondent:
(iii) Heritage conservation
Cl 15(e) significant fabric, settings, relics and views associated with the heritage significance of heritage items should be conserved,

Response from Urbaine Architectural:
Fabric, settings and relics are all conserved. The visual impact of the FDD will result in a minor reduction in views of the main dock of Stannards Marine, as outlined in the Visual Impact Assessment. This is an inevitable result of any new development, although, in this case, it is resulting from the relocating of a floating vessel, not a land-based structure. A small portion of the existing access wharves are demolished to accommodate the FDD. However, the wharves at the perimeter of the subject site, to the north and south of the FDD, are retained, providing a visual screening to the FDD.

SOFAC Contention from The Respondent:
(I) The FDD has an unacceptable impact on the scenic quality of the foreshores and waterways having regard to the matters required to be taken into consideration by the consent authority pursuant to clause 25 of the SREP, in relation to the maintenance, protection and enhancement of the scenic quality of foreshores and waterways.

Response from Urbaine Architectural:
The Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 zones relevant areas of the waterways for specific uses. The relevant part of Berrys Bay is zoned: IN4 Working Waterfront, which is a zone that includes other important maritime precincts such as areas of commercial, maritime and working harbour resources.
The objectives of this zone relevant to visual impacts are as follows:

(a) to give preference to and protect waters required for the effective and efficient movement of commercial shipping, public water transport and maritime industrial operations generally,

Matters for consideration:
25 Foreshore and waterways scenic quality

The matters to be taken into consideration in relation to the maintenance, protection and enhancement of the scenic quality of foreshores and waterways are as follows:
(a) the scale, form, design and siting of any building should be based on an analysis of
(i) the land on which it is to be erected, and
(ii) the adjoining land, and
(iii) the likely future character of the locality,
(b) development should maintain, protect and enhance the unique visual qualities of Sydney Harbour and its islands, foreshores and tributaries,
(c) the cumulative impact of water-based development should not detract from the character of the waterways and adjoining foreshores
In relation to clause 25(a)(i)-(iii), the visual impact has been considered in relation to each specified item. The impact assessment in relation to adjoining land requires a demonstration that its use is consistent with maintenance of a working harbour.
Under Clause 25, maintaining the unique visual qualities of Sydney Harbour includes the retentions of unique industrial and commercial uses, compatible with clause 23 of the same SREP, again relating to the maintenance of a working harbour.
Many of the unique visual qualities of Sydney Harbour include its industrial maritime uses as proposed to be continued and expanded via the current application in Berrys Bay, one of the few specifically zoned sites for the intended purpose.
The visual nature of the subject site is one that reflects maritime industry and, specifically, boat maintenance. As such, and in line with the overall intentions of the zoning requirements, the installation of the FDD, can be considered as maintaining the existing activities and the observance thereof.

SOFAC Contention from The Respondent:
(m) The Proposed Development detracts from and does not maintain, protect or enhance the views to and from Sydney Harbour, contrary to clause 26(a) of the SREP.

Response from Urbaine Architectural:
Under Clause 26 of the SREP, the matter to be taken into consideration is:
(a) development should maintain, protect and enhance views (including night views) to and from Sydney Harbour,
In this case, the views to Sydney Harbour that are impacted moderately are from some rooms in dwellings at 11-13 John Street.
The SREP relates to 'developments' and, as such could not be literally applied to a floating vessel, such as the FDD. However, the rulings of Tenacity could still be applied in terms of assessing any potential view loss for the purposes of discussion.
All views to the harbour from neighbouring parks and from the western side of Berrys Bay are maintained. The FDD sits alongside Stannards Marine main dock, orientated in a north-south direction. As such, any visual obstruction from these locations is to the rear of the site, not towards the harbour. This can be observed in several of the new, photomontaged views.

SOFAC Contention from The Respondent:
(n) The Proposed Development does not minimise adverse impacts on views and vistas to and from public places, landmarks, and heritage items, contrary to clause 26(b) of the SREP.

Response from Urbaine Architectural:
As above:
Under Clause 26 of the SREP, the matter to be taken into consideration is:

(a) development should maintain, protect and enhance views (including night views) to and from Sydney Harbour,
As will be observed in the accompanying photomontaged views, the impact on views from public places, most notably from Waverton Park and for foreshore walk through Carradah Park to the east of the subject site, are minimal. There is no loss of water view and many of the vistas are partially screened by mature landscaping.
The same analysis applies to the maintenance of night views. As can be seen from the photographs of the existing situation, in Figures 22 to 24, the Stannards Marine site is not in the direct line of sight towards the harbour from these public viewing locations.


Figure 22: View from the walkway to Waverton Park, looking south. Stannards Marine site is to the left, not obscuring any harbour views.


Figure 23: View from Waverton Park, looking south. Stannards Marine site is to the left, not obscuring any harbour views.


Figure 24: View from Waverton / North Sydney Bowling Club, looking south. Stannards Marine site is to the left, not obscuring any harbour view

SOFAC: Section 5: HERITAGE IMPACTS

The Development Application should be refused because the FDD will have adverse effect upon the heritage significance of heritage items in the vicinity of the FDD as well as associated settings and views.

Particulars:

SOFAC Contention from The Respondent:
(a) The proposed location of the FDD and its dimensions and working height will have an unacceptable impact on the visual qualities of the heritage-listed site, Stannard Brothers Shipyard McMahons Point, being Heritage Item I0484 in North Sydney LEP 2013.

Response from Urbaine Architectural:

The Stannard Brothers Shipyard at McMahons Point, being Heritage Item I0484 in North Sydney LEP 2013 is described in the link below:
https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2180702
Stannard Bros Shipyard and associated industrial buildings:
It is described as one of the most historically important ship building sites in Sydney Harbour, due to associations with the Dunn and Ford families and the boats and ships built there. It has technical and scientific interest for the technologies employed and is an important feature in the development of the waterfront of Berrys Bay and the urban fabric of surrounding areas.
An extensive area of waterfront land occupied by a variety of maritime industrial buildings and structures. Slipways, cranes, wharves and jetties, engineering sheds, workshops, stores buildings and other equipment, built of iron, steel and timber, dating from the late nineteenth century to the present, exist on this extensive site.
As per the above description, the heritage designation is largely related to the 'technical and scientific interest for the technologies employed…' Taking this as the starting point for the continuation of the site's heritage status, it would be reasonable to assert that the technological advancement of the site should continue, alongside progress within the field of maritime maintenance. If this is accepted, then the integration of the FDD into this site is the perfect solution to the continuing evolution of a maritime maintenance site, such as Stannards Marine. Any visual impacts caused as a result, should be addressed within this context.

SOFAC Contention from The Respondent:

(b) The immediate curtilage of the shipyard includes the sandstone cliff face, being Item I0483 pursuant to Schedule 5 of the NSLEP. The FDD will have an unacceptable adverse impact on this item as it will obscure views to it.

Response from Urbaine Architectural:

The heritage status of item 10484 is described as follows:
https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=2186355
Sandstone cliff
Munro Street MCMAHONS POINT NSW 2060
Item: Landscape
Item Group: Landscape - Natural
Item Category: Landform site or area

This feature is observed partially from the water and mostly from the western side of Berrys Bay, looking east. As will be observed in Figure 20, the sandstone cliff element, as described in the heritage listing, is largely concealed behind dense landscape and also by existing buildings and the many vessels on, and surrounding, the Stannards Marine site. The impact of the FFD is almost insignificant when observed in the photomontaged views, since most of the visible section of the sandstone is observed to the south of the subject site and remains entirely visible once the FDD is in place.

As can be observed in Figure 20, the sandstone cliff, forming the subject matter of the heritage status designation, forms the backdrop of the Stannards Marine facility, with various layers of vessels and buildings in the forefront.

Figure 25: View from the water, looking towards the 2 heritage listed areas – Stannards Marine and the sandstone cliff

The views to the sandstone cliff face, being Item I0483, pursuant to Schedule 5 of the NSLEP, are predominantly experienced from the western side of Berry's Bay and from an elevated position, as can be observed in the section through the bay. From these elevated positions, the FDD does not impact significantly upon views of the sandstone cliff which is beneath Commodore Street.
As previously noted, the proposed FDD has no physical or visual impact on the fabric or views of the sandstone cliff behind the shipyard. The FDD is set well back from the cliff, in the water, and as such all the existing close views of the sandstone cliff are retained. The further views remain unchanged as the cliff face is generally obscured by the vegetation on the top of the cliff and in the railway embankment directly above the cliff.

SOFAC Contention from The Respondent:

(c) The heritage significance of the marine shipyards and support facilities to the eastern side of Berrys Bay (which includes the Site) consists of the complex visual character which is produced by the assembly of small and medium sized sheds, stocks, cranes, hardstands, slipways, and pontoons. This character, a key aspect of the heritage significance of Heritage Item I0484, has been maintained in successive phases of operation and alteration, including the most recent redevelopment of the 1990s. The FDD will visually isolate and block important vistas to and through this aspect of heritage significance from much of the related surrounds, including the waterway.

Response from Urbaine Architectural:

As per the previous 2 responses, the view of the working dock is mostly enjoyed, visually, from the eastern side of Berrys Bay and, for the mostpart, from an elevated position above the water. At low level, large parts of the subject site are already entirely blocked by the visual obstruction caused by the ferry, 'South Steyne' and by dense mature landscape along the pathways.
In contrast to the ferry, the FDD will have observable activity in and around the vessel and will allow most views of the existing dock to be maintained.
The FDD is effectively becoming a working element of the Stannards Marine site and, as with the large maintenance sheds to the rear of the site, its functionality reflects the zoning requirement, which encourages the continuation of maritime activities within the IN4 Working Waterfront Zones.

In my opinion, the visual 'isolation and blocking' of any important vistas, will only occur from close proximity to the FDD from the water. Views to and through the site from the related surrounds will be largely maintained, as will be observed in the photomontaged views.
The character of Heritage Item 10484 is maintained and, in many aspects, enhanced, with the addition of the FDD, which represents a logical advancement for the boatyard, in terms of more efficient and more modern methods of maintenance.

SOFAC Contention from The Respondent:
(d) The FDD will result in an unacceptable reduction in the visual significance of Heritage Item I0484, its relationship to Berrys Bay, and to the visually related fabric and setting of other heritage items as well as the Union Bank and Thomas Street Conservation Area [NCC LEP2013 CA-15]], which is in the visual curtilage of Heritage Item I0484.

Response from Urbaine Architectural:
In my opinion, the visual significance of Heritage Item 10484, namely the sandstone cliff, located behind the Stannards site, is retained. The heritage item is already largely obscured by natural vegetation and further by the 4 existing maintenance sheds at the rear of the Stannards Marine site. Since the FDD is located to the northwest of the visible area of sandstone, there are few locations from which any quantifiable visual impact can be observed.
Similarly, the Union Bank and Thomas Street Conservation areas remain entirely visible from all land-based locations, as can be observed in Figure 26

Figure 26: View from the western side of Berrys Bay, looking east to the subject site and beyond.

SOFAC Contention from The Respondent:
(e) The form, massing, and sheer side walls of the FDD indicated as a long-term feature of the setting do not equate to other floating vessels of comparable size likely to periodically enter the Bay or moor there, such as the former Manly Ferry 'South Steyne', moored opposite.

Response from Urbaine Architectural:
Vessels, as with buildings, serve very different functions and purposes. These varying requirements result in built and visual forms that are as varied as the designated task for which the vessels, or buildings, exist. The types of boat entering Berrys Bay will include public transportation ferries, police patrol boats, large private yachts, retired and historic vessels, in addition to structures, such as the FDD. Their purposes define their shape and form and to suggest that the design of the FDD should somehow 'equate to other floating vessels of comparable size' ignores this fact.

Rather, in a vibrant working harbour, such as Sydney harbour, the co-existence of vessels of such varying functionality should be encouraged, on both a practical and visual level, in my opinion. This is reinforced in the zoning intentions of a W1 site, such as this.

SOFAC Contention from The Respondent:
(f) The indicated movement pattern of the FDD further limits the mooring of smaller vessels about the shipyard, further removing elements of visual significance in the related setting to the shipyard.

Response from Urbaine Architectural:
There will, inevitably, be a reduction in the number and variety of boats able to moor off the subject site, as will be observed in the reduced number of wharves indicated in the demolition plan. See Figure 4.
However, as previously noted in this report, the rotation of the FDD into its boat-loading location, requires approximately 15 degrees of anticlockwise movement from a fulcrum point on its northeast corner. As a result of this limited movement pattern, several of the northern and southern access decks are retained, providing a visual ‘buffer’ of moored boats visible on approach to the site and also from the main public viewing areas to the north. As a result, there will still be a strong visual variety of vessels available to the observing public and also to local residents.


Figure 27: Subject Site topographical map

The indicated movement plan does not remove any further water-based mooring facilities than the installed position of the FDD. As can be observed from the many site photos, there are no additional moorings in this rotation zone area currently.


Figure 28: Subject Site topographical map

SOFAC Contention from The Respondent:
(g) The fine grain of small-scale sheds and other shipyard structures provides a cohesive link with the residential forms dominating the eastern skyline above the rail embankment. This relationship will be obscured by the FDD when viewed from the opposing shore of Berrys Bay, leaving the sheer wall of the FDD and the rail embankment as the prominent aspects of the eastern shore. This will remove much of the historic pattern of fine-grained construction seen on the eastern slope of Berrys Bay.

Response from Urbaine Architectural:
In my opinion, and as referenced earlier in this report, there are 3 distinct bands of visual elements to be observed around the subject site – water, working maritime zone and residential. The 3 are distinctly separate, as shown in Figures 19 and 20. The changing visual relationship between these would be of greater concern if any of the 3 separate elements were visually obscured. However, with the addition of the proposed FDD, the 3 strata remain separated and the suggestion that the 'sheer wall of the FDD and the rail embankment' will become the prominent aspects of the eastern shore are not realistic. There is a significant gap between these elements and the visual impact upon existing buildings is minor, if non-existent from most viewing locations.
The visual link of maritime structures, including the small-scale sheds will continue to provide the cohesive link with the residential forms, located much higher and distinctly separate to the working zone, as previously described. These smaller buildings remain visible from almost every viewing location included in the photomontaged views.
The 'sheer wall' of the FDD can only reasonably be described as such, when in very close proximity, as will be seen from the accompanying photomontages. From most viewing locations, its form complements the existing marine maintenance buildings and hoists that are currently in place, while providing a clear visual link to the activities around it.
The suggestion that 'the fine grain of small-scale sheds and other shipyards structures provides a cohesive link with the residential forms dominating the eastern skyline' seems erroneous to me, when viewed from a typical public viewing location on the western side of Berrys Bay. Apart from the site office to the north of the dock, the dominant visual features are the 4, modern maintenance sheds. Their height exceeds the above-dock height of the FDD and their architectural treatment could not be described as 'fine grained'. I would suggest that, if these buildings form an acceptable visual link to the areas above the site, to the east, then, the FDD will also contribute to the cohesiveness of the area.

SOFAC Contention from The Respondent:
(i) The Proposed Development does not meet the following objectives in clause 5.10 of the NSLEP:
(a) to conserve the environmental heritage of North Sydney,
(b) to conserve the heritage significance of heritage items and heritage
conservation areas, including associated fabric, settings and views,
(d) to conserve Aboriginal objects and Aboriginal places of heritage significance.
(j) For the reasons set out above, the Proposed Development is unsatisfactory when assessed pursuant to Section 4.15 (a), (b) (c) and (e) of the EPA Act.

Response from Urbaine Architectural:
(a) The IN4 Working Waterfront zoning of the site encourages the continuation and growth of maritime services. As much as this can be done, while conserving the environmental heritage of North Sydney, the addition of new methods of vessel maintenance satisfy these zoning requirements.
(b) This has been answered in various responses already contained in this report.
There are a small number of wharves being removed to accommodate the FDD, apart from which, all other heritage items remain untouched. The view retention is adequately covered in the report and in the accompanying photmontages. These should be reviewed, not according to the Tenacity Ruling, for building developments, but as any other floating vessel within the harbour.
(d) Not relevant to this site.
(j) See Heritage Report for response.

5. SUMMARY ASSESSMENT.

This report seeks to address the issues raised by North Sydney Council in relation to the development application for the installation of a floating dry dock, alongside the Stannards Marine Facility at 6, John St, McMahons point.

The proposal and the proposed use are both permissible within the relevant planning controls.

The issues considered relate specifically to the potential visual impact and view loss caused as a result of the new FDD installation. It is the nature of such a vessel that its proposed use will cause some view loss, as a result of its functionality and high-sided form. However, the FDD's height out of the water is visually comparable to the South Steyne ferry, that is currently moored on the opposite side of the bay and is no higher. Many of the modern, existing buildings located on the heritage site, being Stannards Marine, are taller than the FDD, once its true height is assessed, relative to the water level. In that regard, we consider the proposal to be reasonable, notwithstanding it causes some view loss.

As noted, view loss, of any significance, is limited to only a few locations to the north of the site, along John Street. These cannot necessarily be assessed under the terms of the Tenacity Consulting v Warringah (2004) NSWLEC case, since the FDD is not a building, but a registered floating vessel.

There will, inevitably, be a localised character change observable in the north eastern end of Berrys Bay, as a result of the FDD's positioning. However, the overall visual quality will not be diminished and view loss of the activities on the dock will be relatively small. Activities within the FDD will be observable in addition, which provides a positive outcome for those walking around the site and the western side of Berrys Bay, looking towards the subject site.

The impact on the Heritage listed elements of the site and surroundings will be limited, as a result of the FDD's positioning in the water. It could be argued that the existing maintenance sheds, at the rear of the site create a greater visual obstruction to one of the heritage items, being the sandstone cliff, below Commodore Street to the east of the Stannards Marine site.

It should be noted that, the zoning of the site is IN4 Working Waterfront and this specifically promotes and encourages the continuation and growth of maritime related activities in the Harbour, as a means of maintaining its continued use as a fully functioning maritime area. These conditions, when viewed alongside the other relevant planning instruments could be considered as the most important guidelines for future growth of the Stannards Marine site. The installation of the FDD clearly satisfies these requirements and also results in an acceptable amount of view loss and visual impact as a result.

The overriding clause of the SREP guidelines relate to function, as below:

(d) to ensure a prosperous working harbour and an effective transport corridor.

In this respect and taking into account the assessment of view loss and visual impact, I would recommend the development proposal for approval.

Signed: 2nd December, 2021

John Aspinall (BA(Hons) BArch(Hons)),
PRINCIPAL, Urbaine Architectural.

6. APPENDICES.

- 6.1 APPENDIX A: Photomontages and view loss assessment images of the Proposed Development from local viewpoints + verification diagrams.

- 6.2 APPENDIX B: Land and Environment Court guidelines for photomontages.
  Aspinall CV 2021.
  Methodology article – Planning Australia, by Urbaine Architecture.

APPENDIX B:

Land and Environment Court guidelines for photomontages.
Aspinall CV 2021.
Methodology article – Planning Australia, by Urbaine Architecture.

LAND AND ENVIRONMENT COURT
Use of photomontages

The following requirements for photomontages proposed to be relied on as or as part of expert evidence in Class 1 appeals will apply for proceedings commenced on or after 1 October 2013. The following directions will apply to photomontages from that date:

Requirements for photomontages

1. Any photomontage proposed to be relied on in an expert report or as demonstrating an expert opinion as an accurate depiction of some intended future change to the present physical position concerning an identified location is to be accompanied by:

   Existing Photograph.
   a) A photograph showing the current, unchanged view of the location depicted in the photomontage from the same viewing point as that of the photomontage (the existing photograph);
   b) A copy of the existing photograph with the wire frame lines depicted so as to demonstrate the data from which the photomontage has been constructed. The wire frame overlay represents the existing surveyed elements which correspond with the same elements in the existing photograph; and
   c) A 2D plan showing the location of the camera and target point that corresponds to the same location the existing photograph was taken.

   Survey data.
   d) Confirmation that accurate 2D/3D survey data has been used to prepare the Photomontages. This is to include confirmation that survey data was used:
      i. for depiction of existing buildings or existing elements as shown in the wire frame; and
      ii. to establish an accurate camera location and RL of the camera.

2. Any expert statement or other document demonstrating an expert opinion that proposes to rely on a photomontage is to include details of:
   a) The name and qualifications of the surveyor who prepared the survey information from which the underlying data for the wire frame from which the photomontage was derived was obtained; and
   b) The camera type and field of view of the lens used for the purpose of the photograph in (1)(a) from which the photomontage has been derived.

CURRICULUM VITAE:

JOHN ASPINALL. Expert Witness – Land and Environment Court.

dob 8.2.63

Registered Architect RIBA BA(Hons) BArch(Hons) Liverpool University, UK.
Qualified 1987, London UK

24 years' architectural experience in London and Sydney.
Halpin Stow Partnership, London, SW1
John Andrews International, Sydney
Cox and Partners, Sydney
Seidler and associates
NBRS Architects, Milsons Point
Urbaine Architectural (current)

Design Competitions:
UK 1990 – Final 6. RIBA 'housing in a hostile environment'. Exhibited at the Royal Academy, London
UK Design Council – innovation development scheme finalist – various products, 1990.
Winner: International Design Competition: Sydney Town Hall, 2000
Finalist: Boy Charlton Swimming pool Competition, Sydney, 2001
Finalist: Coney Island Redevelopment Competition, NY 2003

Design Tutor: UTS, Sydney, 1997 – 2002
This role involved tutoring students within years 1 to 3 of the BA Architecture course. Specifically, I developed programmes and tasks to break down the conventional problem-solving thinking, instilled through the secondary education system. Weekly briefs would seek to challenge their preconceived ideas and encourage a return to design thinking, based on First Principles.

Design Tutor: UNSW, Sydney 2002 – 2005
This role involved tutoring students within years 4 to 6 of the BArch course. Major design projects would be undertaken during this time, lasting between 6 and 8 weeks. I was focused on encouraging rationality of design decision-making, rather than post-rationalisation, which is an ongoing difficulty in design justification.

Current Position: Urbaine Architectural. 2005 to present.
Currently, Principal Architect of Urbaine Architectural - architectural design development and visualisation consultancy: 24 staff, with offices in: Sydney, Shanghai, Doha and Sarajevo.
Specialist in design development via interactive 3d modelling.

Co-Founder Quicksmart Homes Pty Ltd. ,2007 - 2009
Responsible for the design and construction of 360 student accommodation building at ANU Canberra, utilising standard shipping containers as the base modules.

Design Principal and co-owner of Excalibur Modular Systems Pty Ltd: 2009 to present.
High specification prefabricated building solutions, designed in Sydney and being produced in China.
Excalibur has developed a number of modular designs for instant delivery and deployment around the world. Currently working with the Cameroon Government providing social infrastructure for this rapidly developing country.
The modular accommodation represents a very low carbon footprint solution,

Expert Legal Witness, 1998 to present.
In Australia and the UK, for the Land and Environment Court. Expert witness for visual impact studies and view loss assessments of new developments.
Currently consulting with many NSW Councils and large developers and planners, including City of Sydney, Lend Lease, Mirvac, Foster + Partners, Linklaters.
Author of many articles relating to the accuracy of Visual Impact Assessments. An article contained in Australian Planner Magazine, 2018, is attached as Appendix A.

The experience, in architectural design and 3D visualisation, over 30 years, as outlined above, gives John Aspinall a foundation of skills and experience to deliver highly competent visual information as the basis for very accurate visual impact assessment reports, both in Australia and internationally.

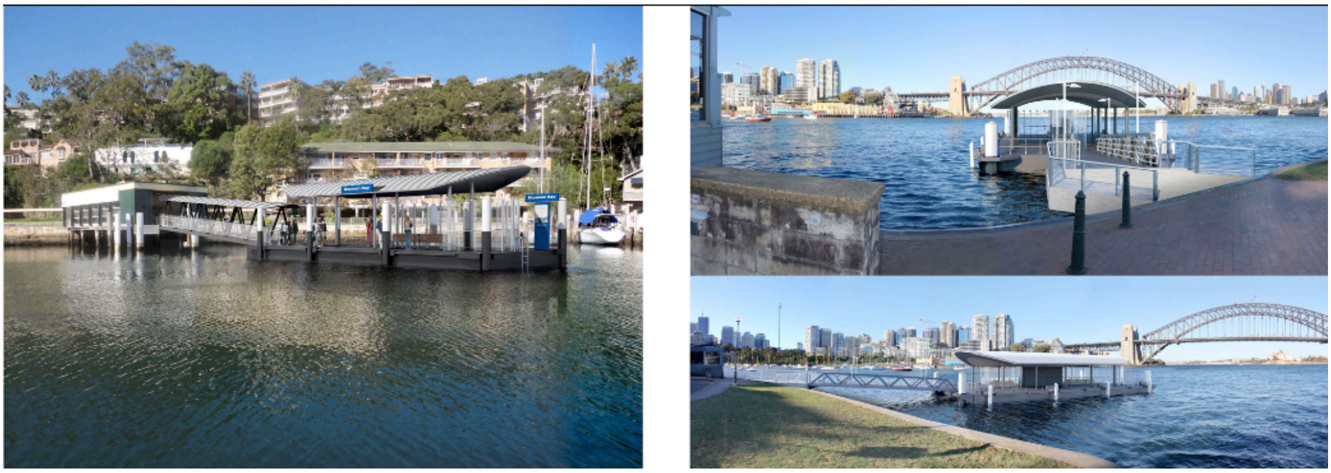
VISUAL IMPACT ASSESSMENTS: A REALITY CHECK. BY JOHN ASPINALL.

Photomontaged views of new apartment building at Pyrmont: Urbaine

Australia’s rapid construction growth over the past 10 years has coincided with significant advances in the technology behind the delivery of built projects. In particular, BIM (Building Information Modelling). Virtual Reality and ever-faster methods of preparing CAD construction documentation.

Alongside these advances, sits a number of potential problems that need to be considered by all of those involved in the process of building procurement. Specifically, the ease with which CAD software creates the appearance of very credible drawn information, often without the thoroughness and deliberation afforded by architects, and others, in years past.

Nowhere is this more apparent than in the area of visual impact assessments, where a very accurate representation of a building project in context is the starting point for discussion on a project’s suitability for a site. The consequences of any inaccuracies in this imagery are significant and far-reaching, with little opportunity to redress any errors once a development is approved.



Photomontaged views of new Sydney Harbour wharves: Urbaine

Urbaine Architecture has been involved in the preparation of visual impact studies over a 20 year period, in Australia and Internationally. Urbaine’s Director, John Aspinall, has been at the forefront of developing methods of verifying the accuracy of visualisations, particularly in his role as an expert witness in Land and Environment Court cases.

In Urbaine’s experience, a significant majority of visualisation material presented to court is inaccurate to the point of being invalid for any legal planning decisions. Equally concerning is the amount of time spent, by other consultants, analysing and responding to this base material, which again can be redundant in light of the frequent inaccuracies. The cost of planning consultant reports and legal advice far exceeds that of generating the imagery around which all the decisions are being made.

Over the last 10 years, advances in 3d modelling and digital photography have allowed many practitioners to claim levels of expertise that are based more on the performance of software than on a rigorous understanding of geometry, architecture and visual perspective. From a traditional architect’s training, prior to the introduction of CAD and 3d modelling, a good understanding of the principles of perspective, light, shadow and building articulation, were taught throughout the training of architects.

Statutory Authorities, and in particular the Land and Environment Court, have attempted to introduce a degree of compliance, but, as yet, this is more quantitative, than qualitative and is resulting in an outward appearance of accuracy verification, without any actual explanation being requested behind the creation of the work.

Currently, the Land and Environment Court specifies that any photomontages, relied on as part of expert evidence in Class 1 appeals, must show the existing surveyed elements, corresponding with the same elements in the photograph. Often, any surveyed elements can form such a small portion of a photograph that, even by overlaying the surveyed elements as a 3d model, any degree of accuracy is almost impossible to verify. For sites where there are no existing structures, which is frequent, this presents a far more challenging exercise. Below is one such example, highlighted in the Sydney Morning Herald, as an example of extreme inaccuracy of a visual impact assessment. Urbaine was engaged to assess the degree to which the images were incorrect – determined to be by a factor of almost 75%.


Domain The Sydney Morning Herald

Inaccurate images anger residents

February 21

Kelsey Munro

Picture imperfect ... the original interpretation of how the Lewisham Estates development will look.

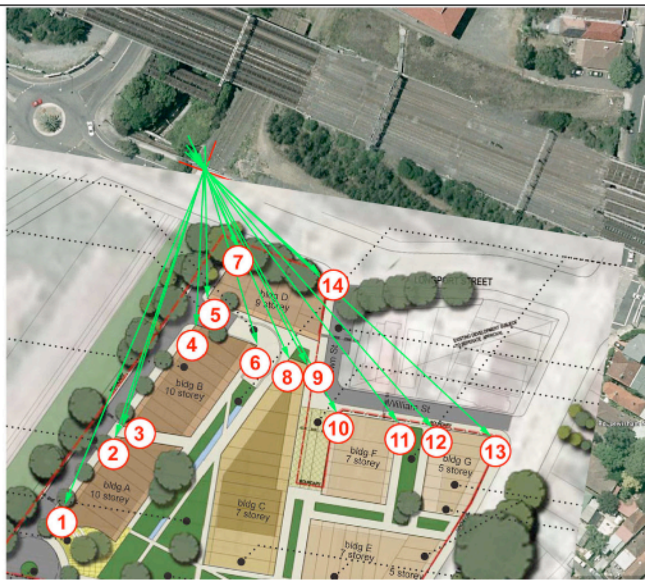
CAN residents affected by big development proposals rely on developers' photo montages?

One inner west group thinks not, after inaccuracies were found in a series of digital photo montages which made the proposed Lewisham Estates development appear much smaller than it would if built.

The developer was sent back to the drawing board by the Department of Planning to redo the images that were publicly exhibited for the project after questions were raised over their accuracy.

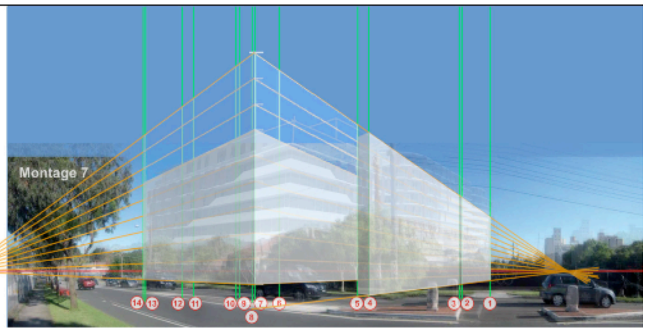
The corrected interpretation of how the Lewisham Estates development will look.

The No Lewisham Towers residents' action group claims the original images were so misleading that the corrected ones should go on public exhibition before the Planning Assessment Commission makes its determination next week.



SMH article re inaccurate visualisations

Key visual location points on site: Urbaine



Photomontage submitted by developer

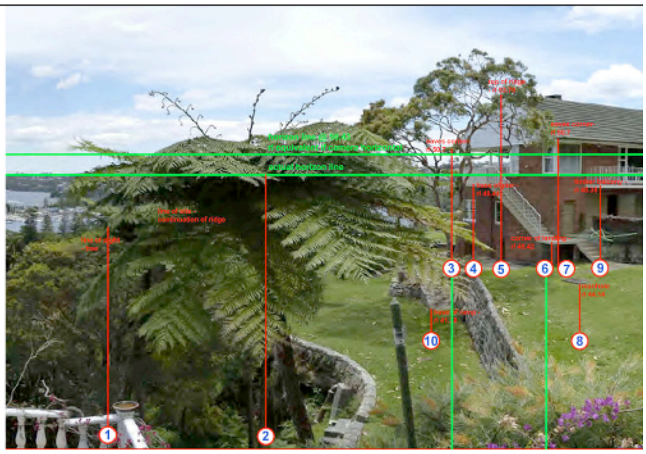
Assessment of inaccuracy by Urbaine

Urbaine has developed a number of methods for adding verification data to the 3d model of new proposals and hence to the final photomontages. These include the use of physical site poles, located at known positions and heights around a site, together with drones for accurate height and location verification and the use of landscaped elements within the 3d model to further add known points of references. Elements observed in a photograph can be used to align with the corresponding elements of the new building in plan. If 4 or more known positions can be aligned, as a minimum, there is a good opportunity to create a verifiable alignment.

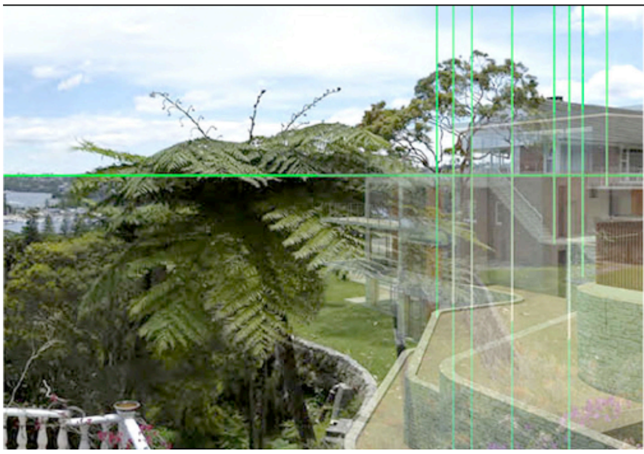
Every site presents different opportunities for verification and, often, Urbaine is required to assess montages from photographs taken by a third party. In these cases, a combination of assessing aerial photography, alongside a survey will allow reference points to be placed into the relevant 3d model prior to overlaying onto the photos for checking.

The following example clearly demonstrates this – a house montaged into a view, by others, using very few points of reference for verification. By analysing the existing photo alongside the survey, the existing site was able to be recreated with a series of reference elements built into the model. A fully rendered version of all the elements was then placed over the photo and the final model applied to this. As can be seen, the original montage and the final verified version are dramatically different and, in this case, to the disadvantage of the complainant.

Photomontage submitted by developer



Key visual location points on site: Urbaine



Key points and 3d model overlaid onto existing photo

Final accurate photomontage: Urbaine

Often, Urbaine's work is on very open sites, where contentious proposals for development will be relying on minimising the visual impact through mounding and landscaping. In these cases, accuracy is critical, particularly in relation to the heights above existing ground levels. In the following example, a business park was proposed on very large open site, adjoining several residential properties, with views through to the Blue Mountains, to the West of Sydney. Urbaine spent a day preparing the site, by placing a number of site poles, all of 3m in height. These were located on junctions of the various land lots, as observed in the survey information. These 3d poles were then replicated in the 3d CAD model in the same height and position as on the actual site. This permitted the buildings and the landscaping to be very accurately positioned into the photographs and, subsequently, for accurate sections to be taken through the 3d model to assess the actual percentage view loss of close and distant views.

Physical 3000mm site poles placed at lot corners

3d poles located in the 3d model and positioned on photo

Proposed buildings and landscape mounding applied

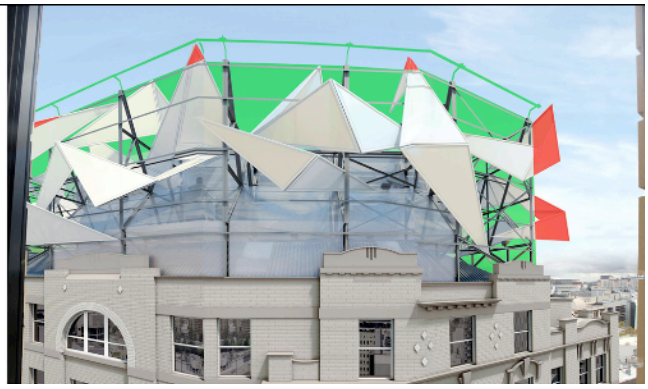
Proposed landscape applied – shown as semi-mature

Final verified photomontage by Urbaine

Further examples, below, show similar methods being used to give an actual percentage figure to view loss, shown in red, in these images. This was for a digital advertising hoarding, adjoining a hotel. As can be seen, the view loss is far outweighed by the view gain, in addition to being based around a far more visually engaging sculpture. In terms of being used as a factual tool for legal representation and negotiation, these images are proving to be very useful and are accompanied by a series of diagrams explaining the methodology of their compilation and, hence verifying their accuracy.

Photomontage of new proposal for digital billboard

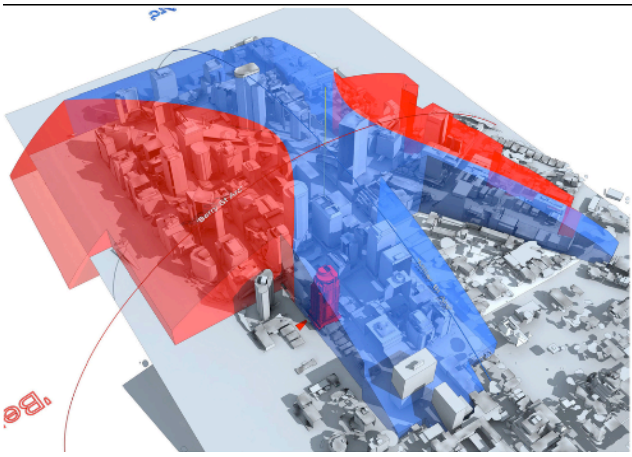
Existing situation – view from adjoining hotel

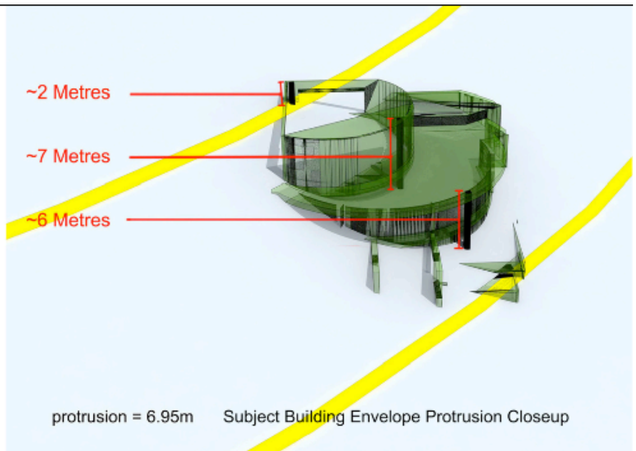


Photomontage of view from hotel

View loss – green = view gain / red = view loss

There are also several areas of assessment that can be used to resolve potential planning approval issues in the early stages of design. In the case below, the permissible building envelope in North Sydney CBD was modelled in 3d to determine if a building proposal would exceed the permitted height limit. Information relating to the amount of encroachment beyond the envelope allowed the architect to re-design the plant room profiles accordingly to avoid any breach.





3d model of planning height zones

Extent of protrusion of proposed design prior to re-design

Urbaine's experience in this field has place the company in a strong position to advise on the verification of imagery and also to assist in developing more robust methods of analysis of such imagery. As a minimum, Urbaine would suggest that anyone engaging the services of visualisation companies should request the following information, as a minimum requirement:

1. Height and plan location of camera to be verified and clearly shown on an aerial photo, along with the sun position at time of photography.
2. A minimum of 4 surveyed points identified in plan, at ground level relating to elements on the photograph and hence to the location of the superimposed building.
3. A minimum of 4 surveyed height points to locate the imposed building in the vertical plane.
4. A series of images to be prepared to explain each photomontaged view, in line with the above stages.

This is an absolute minimum from which a client can determine the verifiability of a photomontaged image. From this point the images can be assessed by other consultants and used to prepare a legal case for planning approval.

Verified photomontage for proposed apartments in Milsons Point by Urbaine.

VISUAL IMPACT ASSESSMENT

6, John Street, McMahons Point.
Stannards Marine Pty Ltd v North Sydney Council

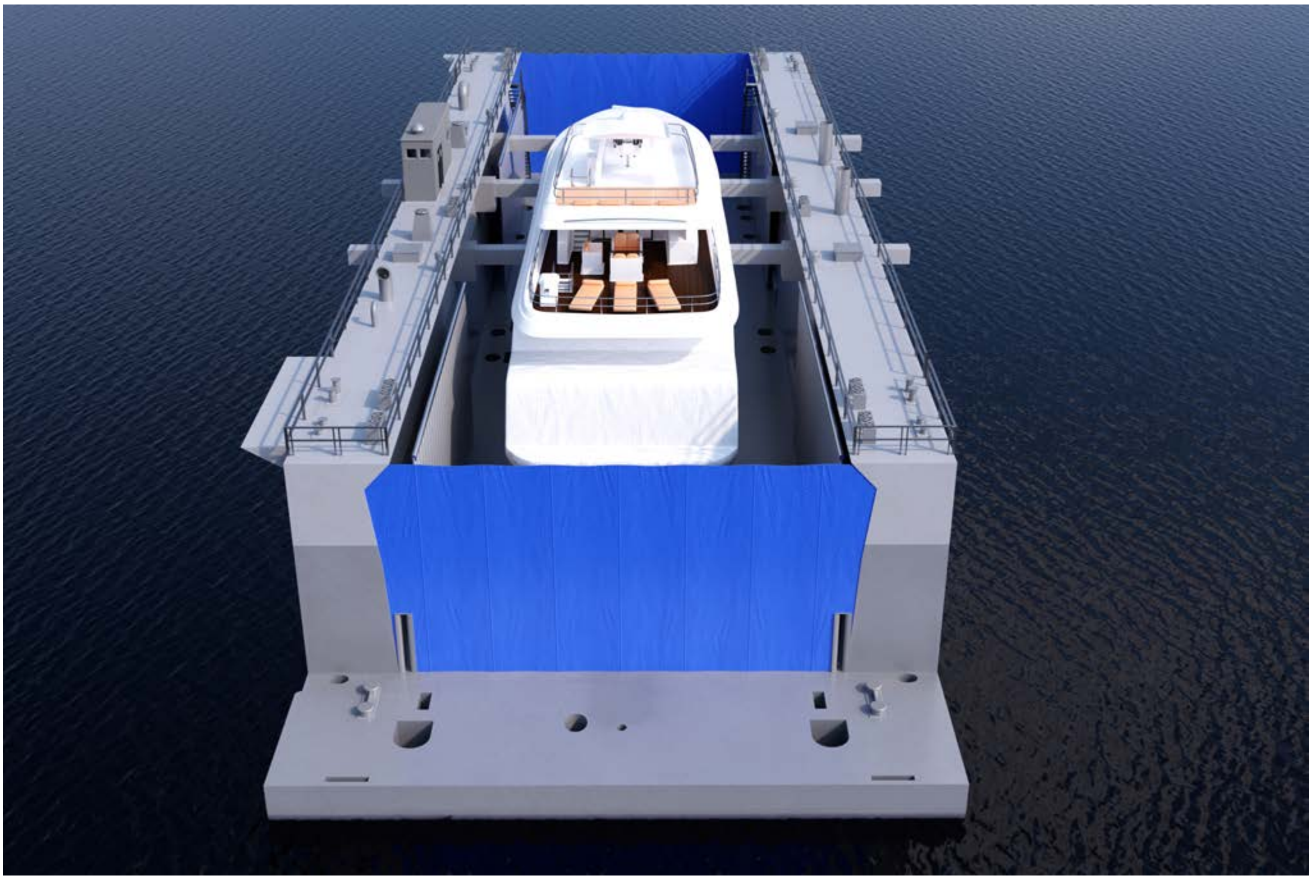
December, 2021

urbaine architectural

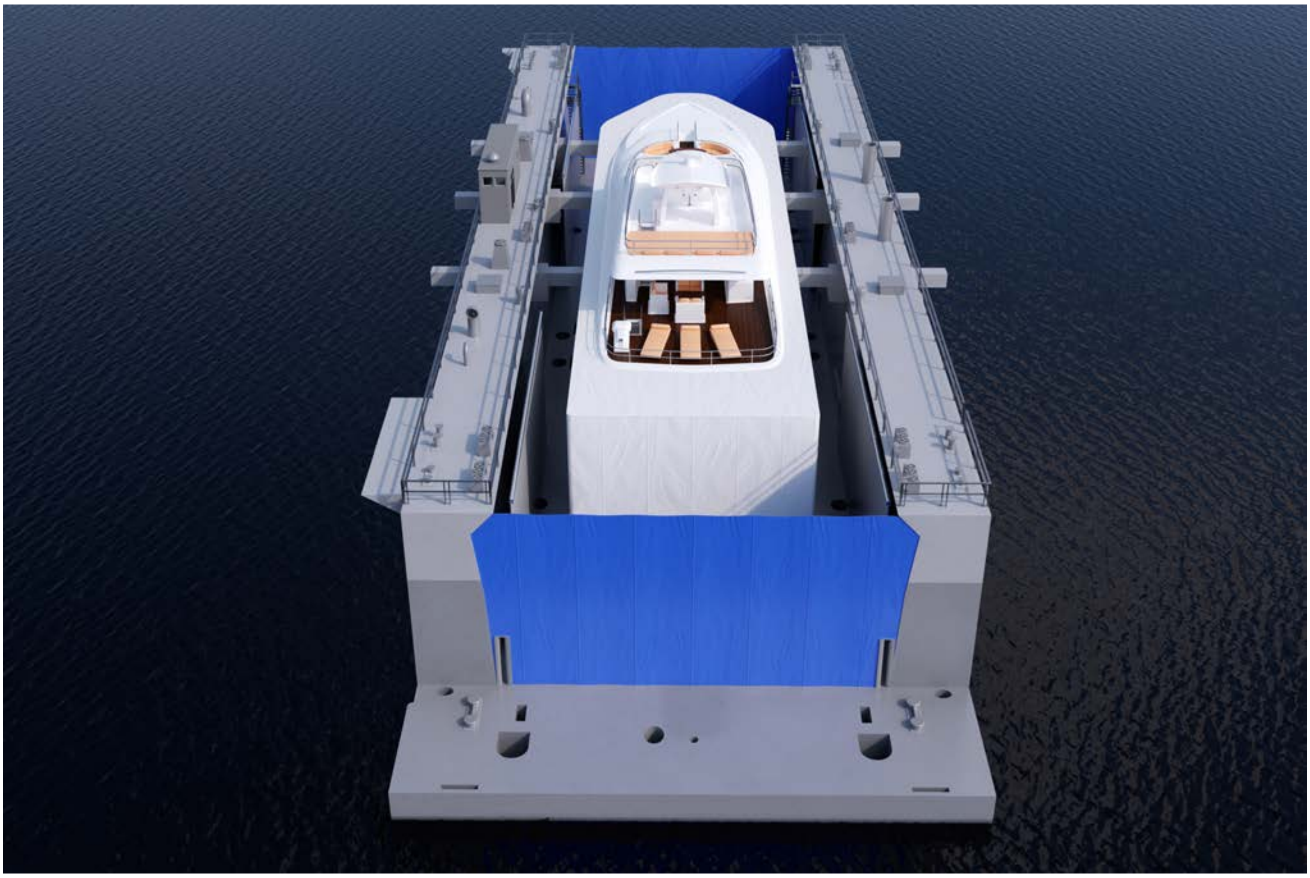
urbaine architectural | Suite 6, 15 The Corso, | Manly NSW 2095
ABN: 313 182 542 24 | | T: 61 2 8355 6770

FDD ENCAPSULATION:

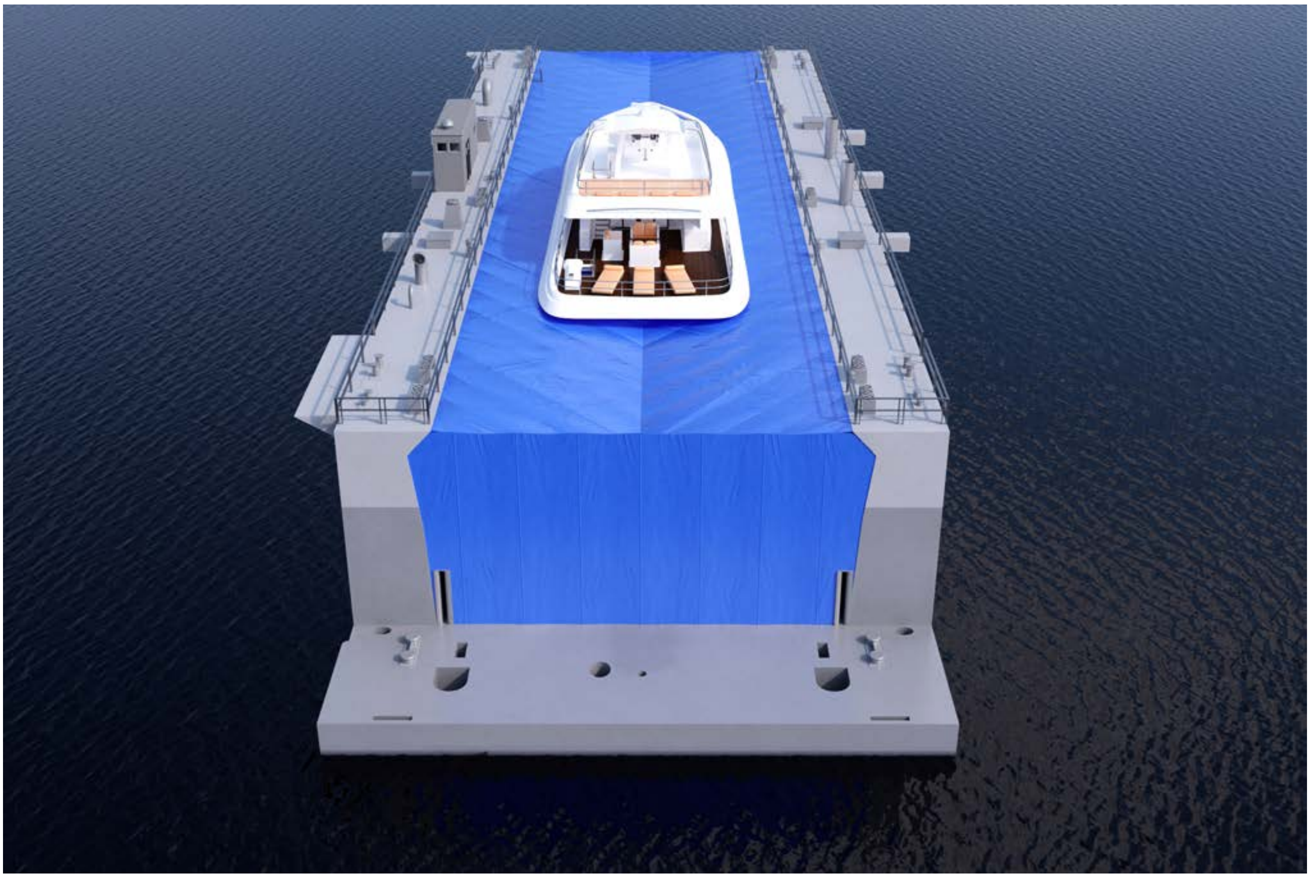
Images demonstrating the various forms of encapsulation of the Floating Dry Dock:
Acoustic curtains only / Partial encapsulation / Full encapsulation



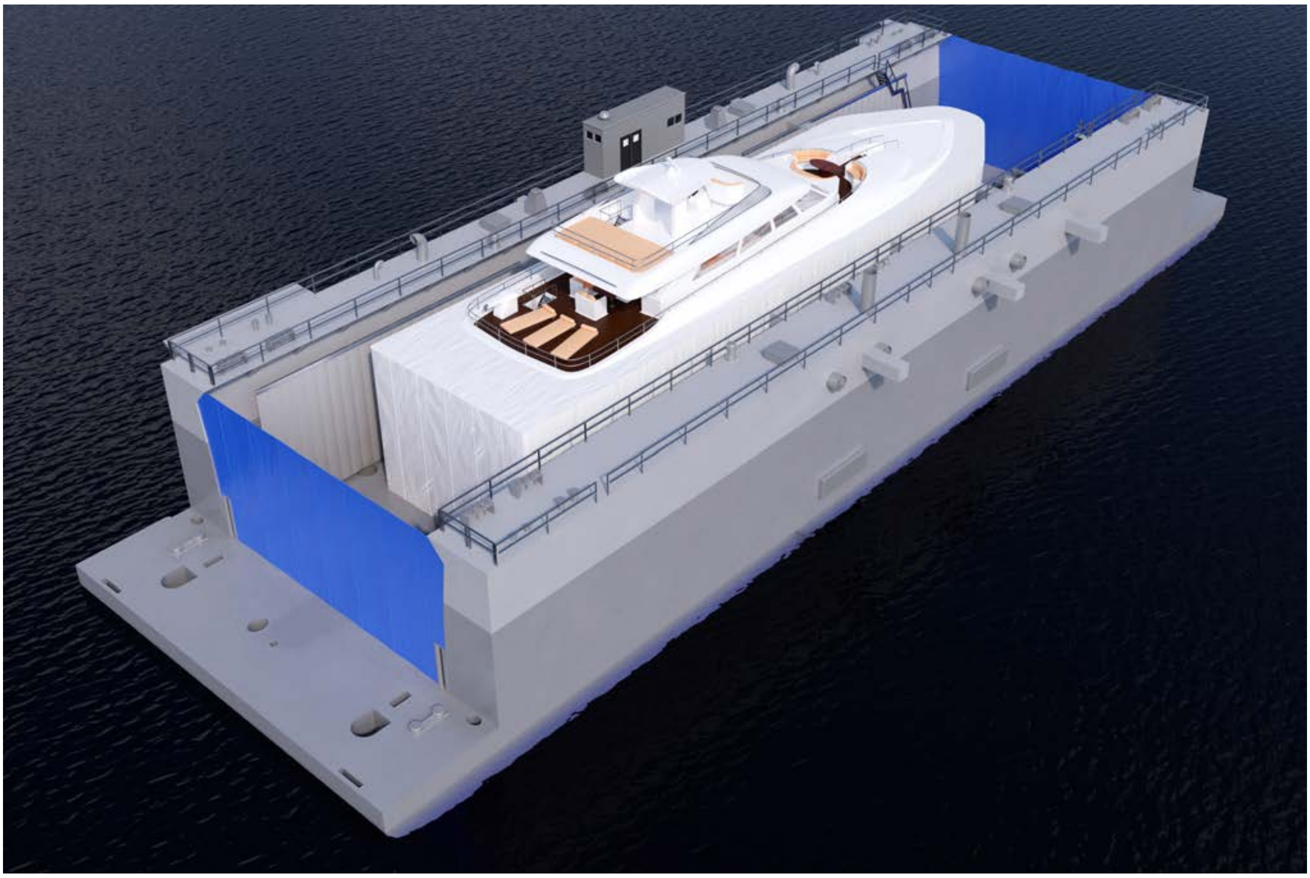
Front aerial view showing acoustic curtains.



Front aerial view showing acoustic curtains and partial encapsulation.

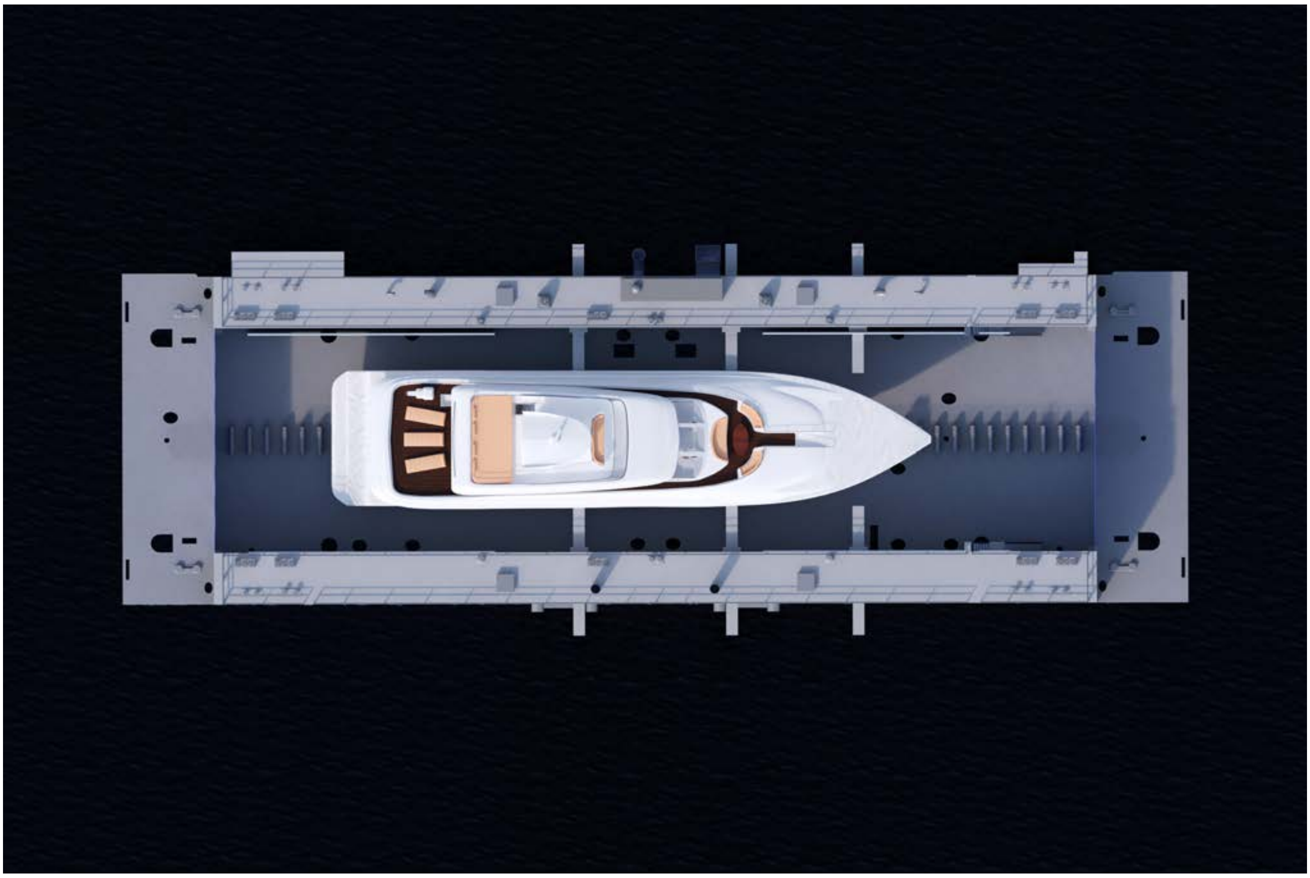

Front aerial view showing full encapsulation.

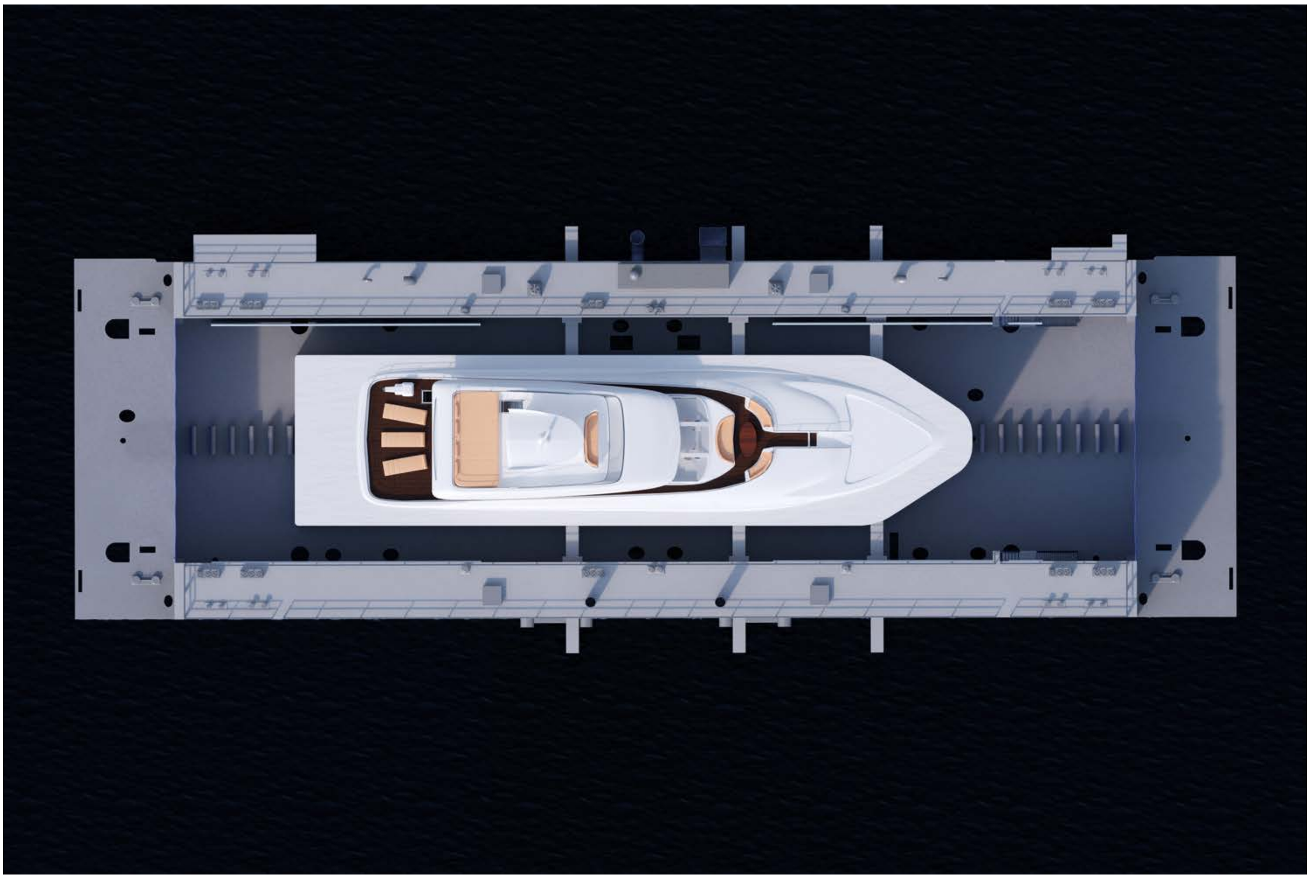
Axonometric view showing acoustic curtains.

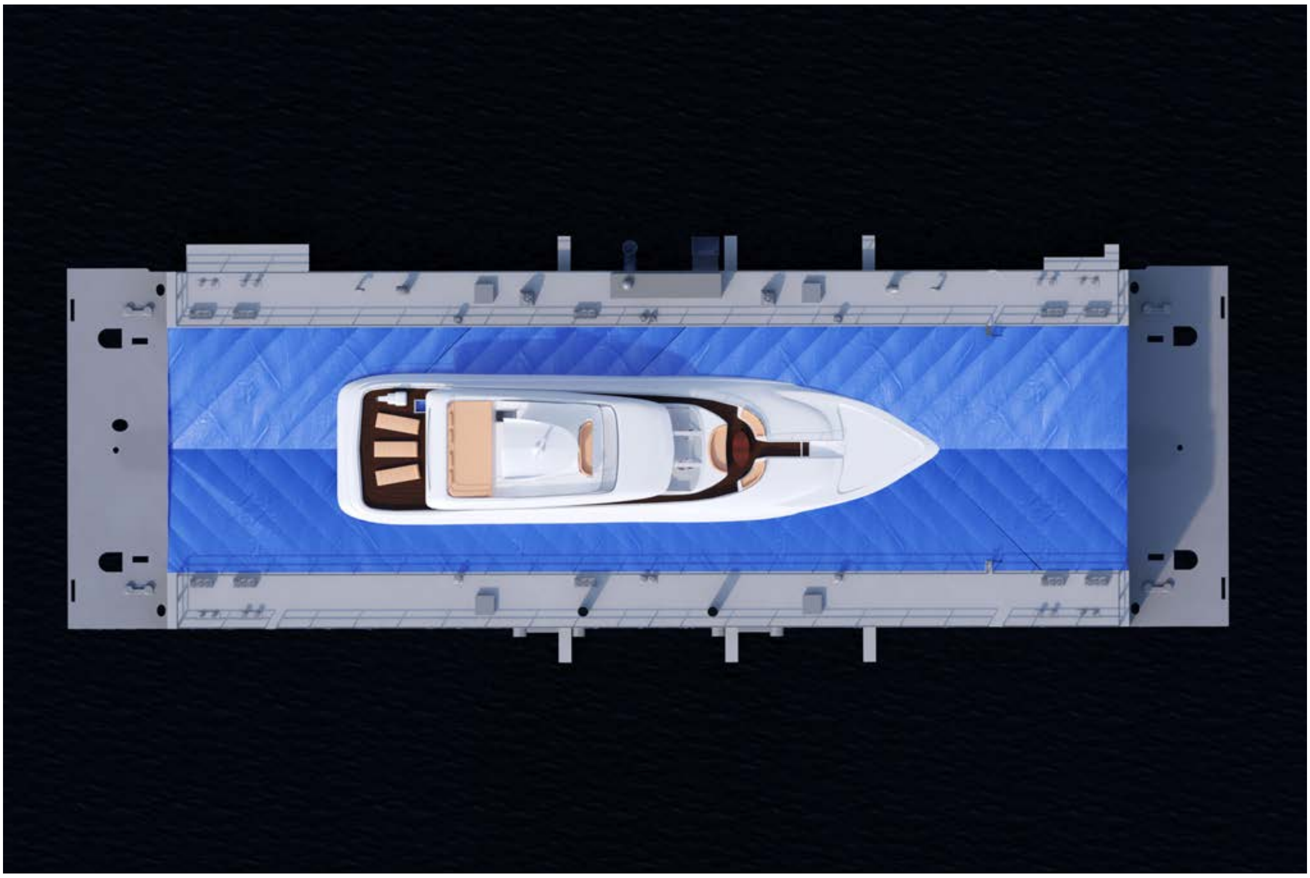


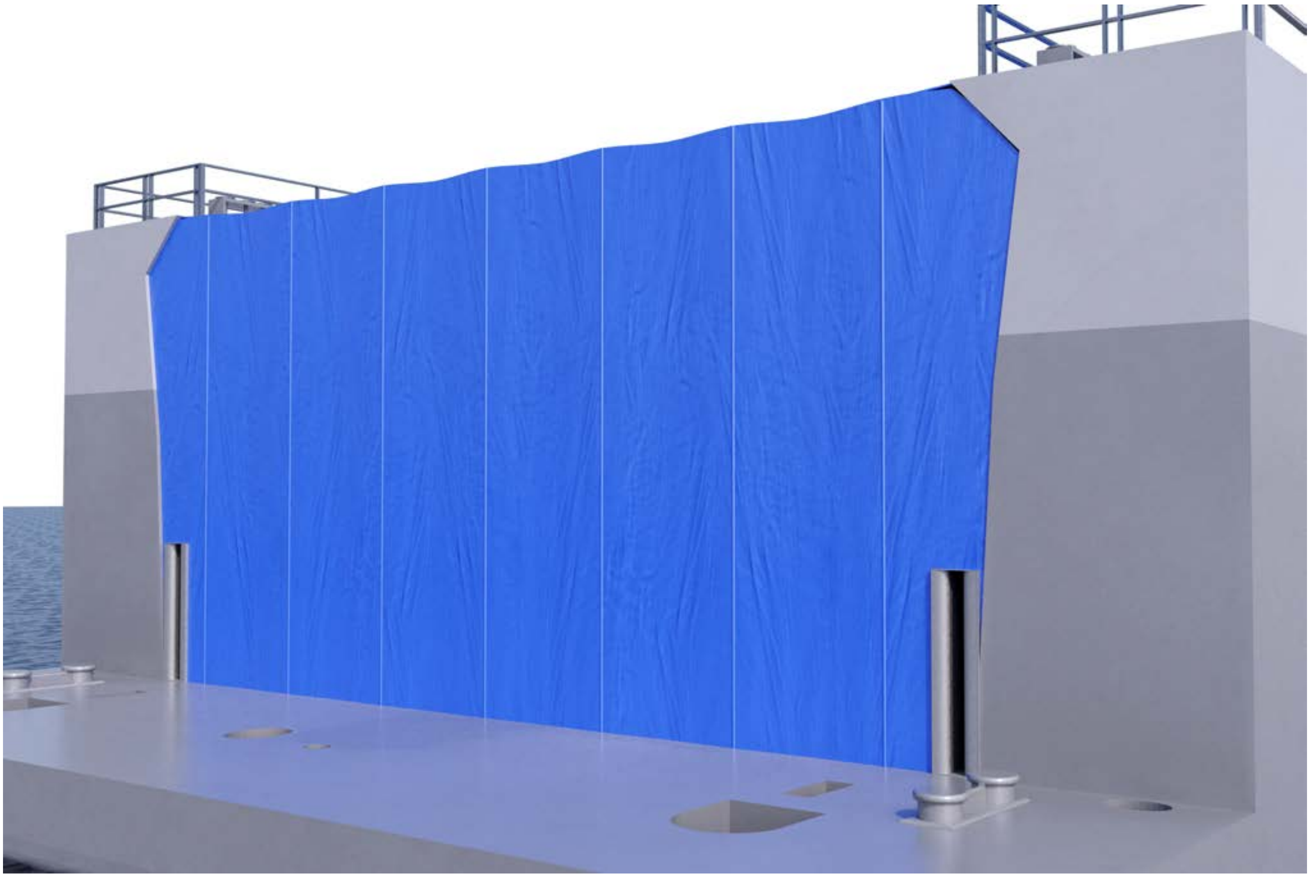
Axonometric view showing acoustic curtains and partial encapsulation.


Axonometric view showing full encapsulation.


Plan view showing acoustic curtains.


Plan view showing acoustic curtains and partial encapsulation.


Plan view showing full encapsulation.


Detail view of acoustic curtains.