

MARINE POLLUTION RESEARCH PTY LTD

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

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Mr R Treharne

Manly Boatshed Pty Ltd

18 September 20

MANLY BOAT SHED REFURBISHMENT PROJECT SEE - NBC DA2020/0514 COUNCIL ISSUES REPORT – ACID SULPHATE SOILS

1 INTRODUCTION

Northern Beaches Council (NBC) provided an Issues Report for the above DA that included *inter alia* a request from the Environmental Health Unit to “*provide comment on any impact of new or replacement piers/piles on designated Class 5 Acid Sulfate Soil area*”.

The November 2019 Geotechnical Report prepared by Envirotech for the above DA, classified the general subsurface conditions as *shallow quartz sands overlying sandstone bedrock*, and as a consequence did not undertake any borehole or laboratory measurements. Notwithstanding, the report conclusions recommended that, in relation to the possibility of Acid Sulphate Soil (ASS) aggressively:

- the effects of the method of pile construction on the formation of sulfuric acid needs to be considered,
- the design durability of concrete piles (if used) should conform to Section 6 of AS2159-2009.

The following Sections of this present report address the first recommendation, and, as there are no concrete piles to be placed into estuarine sediments (see attached Pile Layout Plan), the second recommendation is not likely to be applicable to this project but should still be made a Condition of Consent in case such piling becomes necessary.

2 CLAUSE 6.1 OF MANLY LEP 2013 & ASS MANUAL REQUIREMENTS

MLEP Clause 6.1 (2) states that *Development Consent is required for the carrying out of works described in the Table to this subclause on land shown on the [Acid Sulfate Soils Map](#) as being of the class specified for those works and for Class 5 Lands the works are described as "works on Class 5 lands that are within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres Australian Height Datum **and** by which the water table is likely to be lowered below 1 metre Australian Height Datum on adjacent Class 1, 2, 3 or 4 land.*

There are no Class 1 to 4 lands within 500m of the Manly Boat Shed for all the lands in the sub-catchments draining towards North Harbour from the north and north east of Manly Boat Shed. The subject site is within 500 m of Class 2 lands below 5m AHD located at the reclaimed lands of North Harbour Reserve, north-west of the site. However, those lands drain groundwater from a sub-catchment to the west of the Reserve, whereas the riparian lands at Manly Boat Shed drain groundwater from a sub-catchment to the north. Therefore, there is no interaction between the Manly Boat Shed site and the water table under Class 2 lands to the south, so Clause 6.1(2) does not apply for this application.

MLEP Clause 6.1 (6) states that *Despite subclause (2), development consent is not required under this clause to carry out any works if:*

- (a) the works involve the disturbance of less than 1 tonne of soil **and***
- (b) the works are not likely to lower the water-table.*

These two clauses are encapsulated in the ASS Manual (ASSMAC 1998) model ASS LEP that states *inter alia*:

The Model Acid Sulfate Soils LEP requires that if works:

- involve disturbance of more than one (1) tonne of soil or lowering of the water-table;*
- and***
- trigger the criteria relating to the land (see the ASS Planning Maps which are based on the level of risk associated with the soil characteristics and the depth and type of works),*

a preliminary test must be undertaken to determine if an ASS Management Plan is required. If an ASS Management Plan is required, a development application must be lodged for the works. The Model ASS LEP clauses only apply to works likely to result in environmental impacts from the disturbance of acid sulfate soil.

3 ASSESSMENT OF PRESENT APPLICATION AGAINST THE MLEP PROVISIONS

The proposal as outlined in the DA2020/0514 SEE, the Aquatic Ecology Impact Report and the project Site Proposal Plan & Sections requires the complete removal or replacement of the present facility piles and placement of additional new piles for the extended decks and facility. The proposal is located in North Harbour, and has the full oceanic tide range of around 0m Lowest Astronomical Tide (LAT) to +2m HAT (Highest Astronomical Tide) and the site is open to wind waves from the south east and accordingly the waters are generally well mixed and oxygenated.

3.1 Potential for ASS Soil Disturbance During Demolition

In terms of disturbance of the seabed for the demolition phase, the proposal requires the removal of the existing dolphin piles, the sliprails and all boatshed support plus existing pontoon locator piles:

- Sliprail removal will only disturb the seabed surface layer, which is in direct contact with overlaying tidal waters, and will not disturb sub-surface seabed sediments. Accordingly there are no potential ASS disturbance issues for this part of the demolition.
- There are up to 27 piles to be removed (including the dolphin piles) and there are up to 24 turpentine piles to be placed into marine sediments (see attached piling plan). It is noted that the present boatshed support piles are a mixture of brick, concrete and wood piles with many set directly onto exposed basement rock. It is estimated that at least twelve of the 27 piles to be replaced are boatshed support piles generally sited on basement rock (see for instance Figures 2 and 3 in Envirotech (2019)).
- As the precise number of the remaining piles that are set onto rock versus piles into sediment is not known, the following assessment uses the conservative assumption that all remaining 15 piles below MHWL are set into marine sediments:
 - Piles into marine sediments are generally driven to around 3m depth on average in Sydney Harbour estuary and, due to remobilisation and bioturbation of surface sediments by physical and faunal activity over time, the top half metre of seabed sediment is saturated by overlaying oxygenated waters so that there is no PASS remaining in this upper layer.
 - Assuming a (conservative) consistent level of PASS in sub-surface sediments, up to 2.5m of existing pile surfaces could have been driven into PASS sediments. At up to 0.3m diameter, each pile has a maximum 2.35m^2 of pile surface in contact with sediments that could be PASS sediments prior to pulling.

- For the pile removal project to generate the 1000kg of disturbed PASS required for PLEP Clause 7.6, each 0.3m diameter pile would need to disturb and bring to the surface some 66.7 kg of PASS sediment.
 - That is, each pile would need to have between 15 to 20mm depth layer of PASS uniformly adhering to the whole 2.5m length of pile brought to the surface. This is considered highly unlikely, particularly given that many of the boatshed support piles are actually keyed directly into exposed basement rock
- For the twelve boatshed support piles generally sited on basement rock, these will be cut off under the shed and then physically removed from the seabed with no implications for disturbance of PASS or ASS.
- The remaining 15 piles that are (conservatively) located in marine sediments, will be extracted by pulling using floating plant mounted equipment with the piles then extracted through tidal waters:
 - For the most part there is very low adhesion of sub-surface soils extracted with the piles, as friction effects from the surrounding pressurised soils during the extraction process rubs the soils off, with residual sub-surface soil mixing with shallow saline and non-ASS surface sediments on final extraction.
 - Accordingly, for the most part there is a short pulse of adhered soil material dispersed to the overlaying waters as the pile is extracted through the water column.
 - Rarely, where there are adhesive clays, there may be some sediment adhering to the piles as it is raised above the surface and these are likely to be PASS. These layers are thin (no more than 5mm) and non-uniform in areal distribution around the pile.
- The resultant pulse subsurface sediments mobilised by the pile extraction procedure are dispersed in the estuarine waters and do not provide any ASS hazard, as they remain saturated in the estuarine waters and ASS/PASS require time out of the water for these soils to be fully oxygenated (in air) to trigger or start the acid forming process. These soils will eventually be dispersed and reincorporated into estuarine sediments and pose no ASS/PASS risk to overlaying waters or to seabed sediments and seabed biota.
- Whilst the small amounts of PASS that may remain adhered to the piles that are brought to the surface can become ASS, this requires considerable time (up to 18 hours exposure to air). Whilst overall this is a low risk given the small amounts of soils that are actually brought out of the water, the risk can be further minimised by appropriate pile removal management as detailed in **Section 3.5** below.

3.2 Potential for PASS Soil Disturbance During Construction

In terms of PASS soil disturbance during construction, there will be no excavation required for the project as all piles are to be driven into seabed sediments, keyed into exposed basement rock or into

the existing concrete slipway or supported on concrete way beams (see attached pile layout diagram).

- All the new piles to be driven into inter-tidal or shallow sub-tidal sediments will be placed from a barge-mounted pile driving rig and therefore there will be no sediments mobilised, as the pile driving action pushes and compresses soils aside with some entrained downwards via friction effects. As a result, the sediments remain intact and under water, and as they are not exposed to air, there is no risk of acid generation arising from piling activities.
- Pile driving is associated with pulse turbidity, and this is caused partly by rig and pile driving head lateral vibration, and also via compression of sediments, whereby the laterally-compressed sediments compress waters in adjacent benthic fauna burrows jetting turbid water up out from burrows.
- As the local waters are generally full marine salinity, these sediments rapidly fall back to re-settle on the seabed.
- There is therefore no 'secondary excavation' or any exposure to air of sediments associated with turbidity caused by pile placement/driving.

3.3 Potential for Alteration of the Water Table

The level of the water table below the tidal seabed will fluctuate dynamically according to the interplay of gravity pressure from fresh groundwater flow (which varies with the rate of wet or dry weather infiltration), and the back pressure imposed by the tidal waters that saturate the seabed sediments down to the water table.

Accordingly, removal or placement of piles will have no material effect on the sub-surface water table levels nor on the rates of exchange/mixing of freshwater groundwater with overlaying saline waters. That is, there is no potential for alteration of the water table associated with pile removal or driving activities into intertidal and sub-tidal waters. Further, as there are no temporary or permanent excavations associated with the project inshore, there will be no lowering of the local water table.

3.4 Assessment against Manly LEP 2013 Clause 6.1

In sum, no soil is to be excavated for the project, there will be less than 1 tonne of PASS disturbed for the project, and the small amounts of PASS that could be disturbed and brought from the seabed surface would for the most part be returned to the estuarine waters to be dispersed and re-incorporated into the seabed sediments with no exposure to air. and no opportunity to become ASS. Accordingly, the project would meet both provisions of Manly LEP Clause 6.1 (6) and thus the

project should not require development consent under Section 6.1 (2), and there is no requirement for the preparation of an ASS Management Plan as per Clause 6.1 (3).

Over and above this conclusion, it is also concluded that there is likely to be a small residual amount of PASS adhering to some piles that are removed which, if left intact on the piles, and with the piles subsequently stored exposed to air, could generate a small amount of acid.

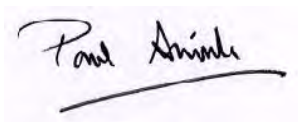
Whilst, based on my assessment of the proposal, I conclude that the project as described above would meet the objectives of Clause 6.1 (1), in that the development would not disturb, expose or drain acid sulfate soils OR cause environmental damage to the locality or to the waters and ecology of North Harbour, I also conclude and recommend that the residual risk from the small amounts of sediments adhering to pulled piles as described above be managed *in situ* via the following recommended pile removal management plan.

3.5 Recommended Pile Removal and Placement Management Plan

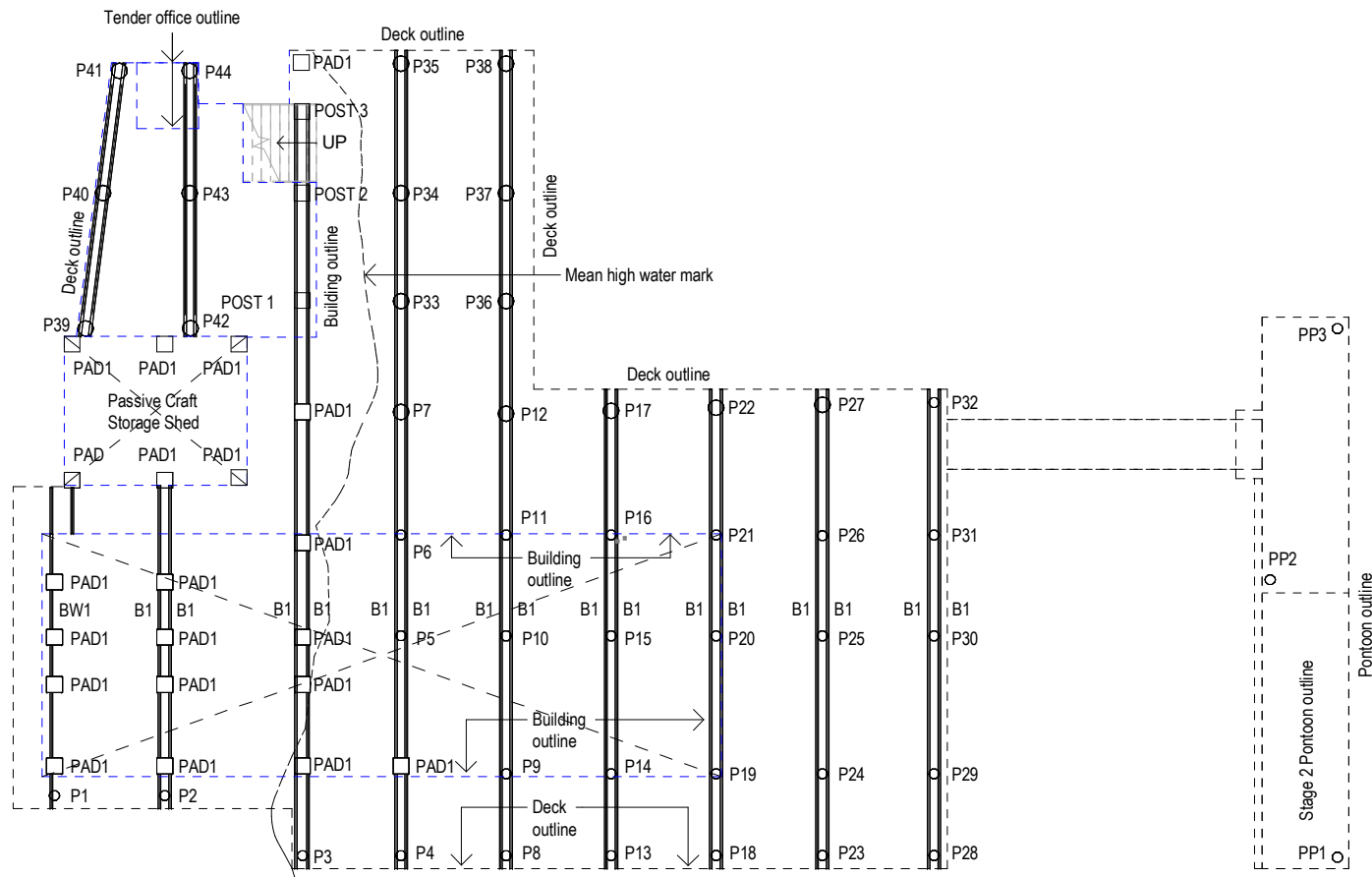
The following Pile Removal and Placement Plan is intended to mitigate any residual environmental risk from the small amounts of sediments adhering to pulled piles:

1. Pile removal and placement works are to be enclosed using a floating silt curtain to facilitate rapid dispersal of disturbed sediments back to the seabed.
2. All seabed sediment adhering on piles that are being removed is to be hosed off the piles prior to piles leaving the silt curtain area, preferably as each pile is being pulled.
3. Piles or demolition material with adhered sub-surface seabed sediment that cannot be cleaned immediately, but needs to be stored exposed to air prior to cleaning must be stored within the confines of the floating silt curtain area, and then washed and hosed off into estuarine waters contained by the floating silt curtain as soon as practicable, with a maximum exposure time of 18 hours.

Signed:

A handwritten signature in black ink, reading "Paul Anink", with a horizontal line underneath.

This report has been prepared by Paul Anink, Managing Director and Principal Scientist at Marine Pollution Research Pty Ltd. Final Report 18 September 2020.



1 SITE PLAN - PILES
1 : 200

Pile Legend

PP1 - PP3	323Ø x 12.7 STEEL CHS	PAD1	600SQ. CONCRETE PAD ON ROCK
P1 - P7, & P12, P17, P22, P27, & P33 - P38	600Ø HDPE SLEEVE CONCRETE FILLED SET ON CONCRETE WAY BEAM	D1	140 x 35 KILN DRIED HARDWOOD
P8 - P32	350Ø TOE TURPENTINE F22 PILE HDPE SLEEVE TO UNDERSIDE OF BEAMS	B1	300 x 100 HEADSTOCK
		POST 1 - 3	100 X 100 HW POST SUPPORT ON EXISTING DECK
		POST 39 - 44	NEW PILE AS PER PIER 1



MANLY BOATSHED



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MANLY BOATSHED PROPOSED ALTERATIONS AND ADDITIONS

Manly Boatshed Pty Ltd

PILE LAYOUT

date 29/11/19 scale@A3 project no. 170046 drawing no. DA01-10_G

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