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Gladesville Bridge Marina Refurbishment Project Acid Sulfate Risk Assessment and Construction Management Plan

1 COUNCIL REQUEST

As part of its DA preliminary assessment, Canada Bay Council requested further information regarding the EIS Part 2.3 statement that "acid sulfate soils are not anticipated within the development areas on land or on the water" and enquired whether an acid sulfate soil plan would be required for the construction works. The following sets out the Canada Bay LEP 2013(CBLEP) requirements, reviews the proposal and addresses this issue.

2 CLAUSE 6.1 OF CANADA BAY LEP 20143& ASS MANUAL REQUIREMENTS

CBLEP 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 Soil Maps as being of the class specified for those works. The LEP Acid Sulfate Soils Map (Sheet ASS_006 - see Figure 1 below) indicates the site to be Class 5 and as per this clause Development Consent is required for 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.*

Whilst the subject site is within 500 m of class 2 lands below 5m AHD (south along the foreshore of Five Dock Bay at The Esplanade), those lands are on the other side of the Victoria Place Ridge line to the Marina site, with ground water flow generally flowing downslope from this ridge line; i.e., south to Five Dock Bay and north to Parramatta River. Therefore, there is no interaction between the site and the water table under Class 2 lands to the south so Clause 6.1(2) does not apply.

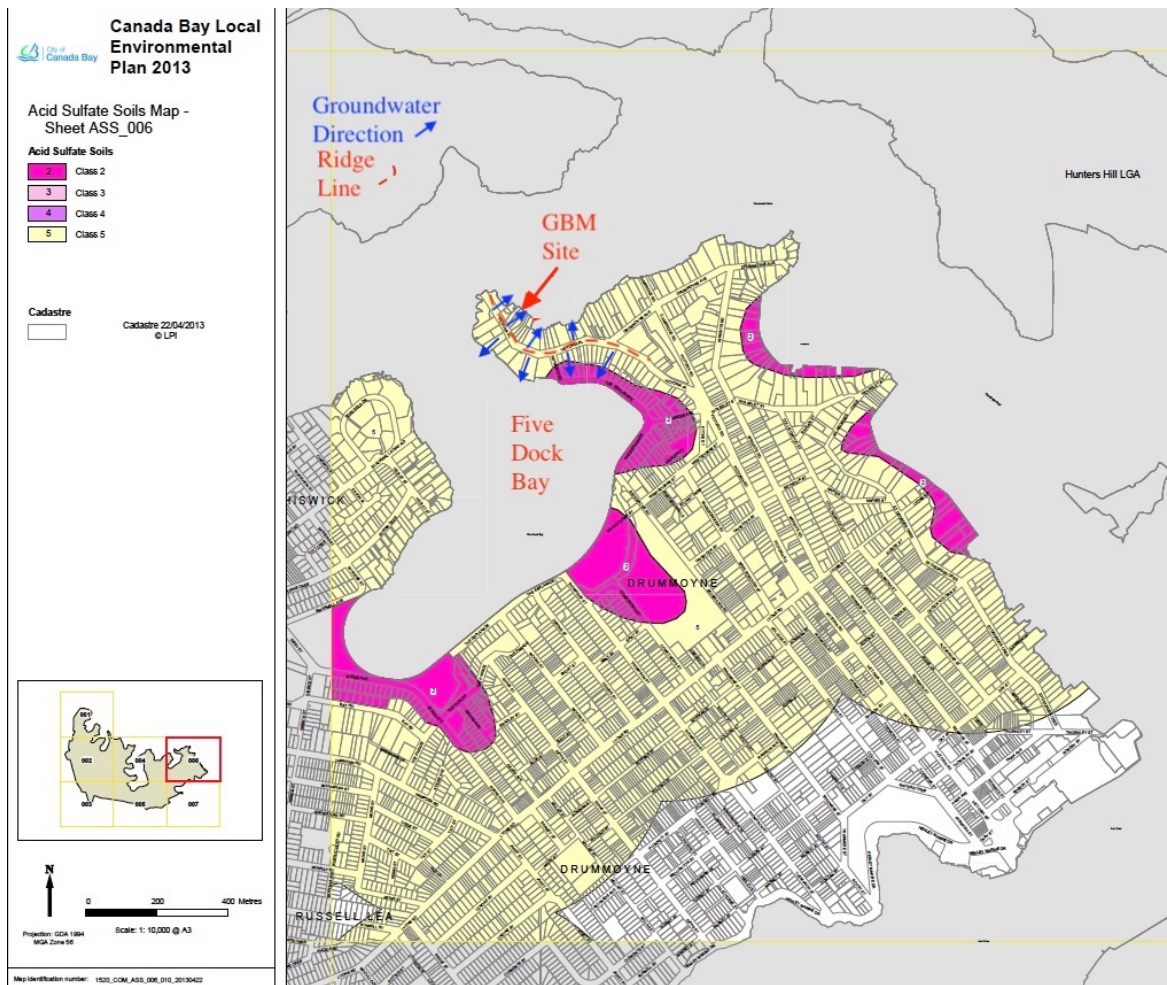


Figure 1 Portion of CBLEP 2013 ASS Map Sheet 006

LEP Clause 6.1 (5) 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 LEP PROVISIONS

The proposal as outlined in the EIS, the Aquatic Ecology Impact Report and the project Site Proposal Plan & Sections requires reconfiguration of the existing marina berth layout and addition of new eastern extensions for both marina arms. On-shore ground works are confined to removal of the slip rails from the existing concrete slipway. There are no onshore ground excavation activities associated with the proposal and no offshore excavation (dredging) proposals.

The proposal is located in Parramatta River estuary which has the full tide range of around 0m Lowest Astronomical Tide (LAT) to +2m HAT (Highest Astronomical Tide). Where project Plan Contours are shown as mAHD, 0m AHD approximates +0.925m LAT.

3.1 Potential for ASS Soil Disturbance During Demolition

In terms of disturbance of the seabed for the demolition and construction phase, the proposal requires the removal of mooring blocks, existing marine locator and pen piles and placement of reconfigured and new marina locator and pen piles. Potential sediment disturbance from these activities is detailed in Section 4.1.2 of the Aquatic Ecology Assessment Report (Appendix 11):

- Removal of slipway rails will not disturb any seabed sediments and removal of Mooring blocks plus Slipway rail support beams will only disturb thin seabed surface layers which are in direct contact with overlaying oxygenated tidal waters and are thus not acidic. Accordingly, there are no potential ASS disturbance issues for this part of the reconfiguration.
- Removal and placement of piles is from or into deeper sub-surface sediments that are not well oxygenated and could have some residual PASS. Piles are generally driven to around 4m depth on average in Parramatta River 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 significant PASS remaining in this upper layer.
- Whilst these piles have been driven into sub-surface PASS sediments during construction, when they are subsequently removed (generally by direct extraction from the ground), this is almost always done using barge 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 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.
- All the new piles are to be driven into inter-tidal or shallow sub-tidal sediments 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 Canada Bay LEP 2013 Clause 6.1

In sum, no soil is to be excavated for the project, there is no groundwater interaction with adjacent Class 2 ASS lands and there will be less than 1 tonne of PASS disturbed for the project. The small incremental amounts of PASS that would be disturbed and brought from the seabed surface during 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 CBLEP 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 Parramatta River, 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.

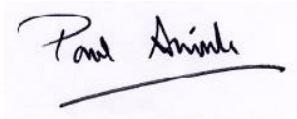
3.5 Recommended Pile Removal Management Plan

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

1. Pile removal works are to be enclosed using a floating short-skirt silt curtain to facilitate rapid dispersal of disturbed sediments back to the seabed.
2. Piling works in shallow waters are to be undertaken at or around high tide to facilitate dispersal of sediments from pile pulling operations.
3. Seabed sedimental material on removed piles is to be hosed off piles prior to piles leaving the silt curtain area, preferably as each pile is being pulled.

4. 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 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.
5. For any pile or other demolition material with adhered sediment that cannot be cleaned immediately, the operator/contractor must keep a log book entry of the time of extraction out of the water, the manner and place of storage of the material and the time, manner and placement of hosed off material (in accordance with point 4 above).

Yours Sincerely,

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

Paul Anink
Managing Director
Marine Pollution Research Pty Ltd