

WASS / PASS PROJECT UPDATE

Waste acid sulfate soil and rock (WASS) can be either potential acid sulfate soil (PASS) or actual acid sulphate soil and rock (AASS). PASS exists below the water table and, if it is excavated and then stored above ground, it naturally oxidises into AASS with attendant acid drainage environmental issues. Best practice management of PASS is to store it under water, preventing oxidation and acid formation.

Total WASS in the Metro Rail, West Gate Tunnel and North East Link projects that will require management is approximately 8.2 million tonnes.

Nagambie Resources has an EPA-approved Environment Management Plan (EMP) to store PASS in the legacy water-filled pits at the Nagambie Mine as part of the proposed rehabilitation of those pits. PASS capacity of the pits is around 5.0 million tonnes.

EPA Clarification of Levy on WASS Disposed to Landfill

Nagambie Resources had become concerned that the Landfill Levy was not being consistently applied to WASS taken to Melbourne landfills and a detailed enquiry was sent to the EPA seeking clarification.

A response has been received from the EPA and the Company is greatly encouraged as it supports Nagambie Resources' reasoning in establishing the infrastructure to store PASS underwater in the legacy pits at the Nagambie Mine.

The EPA has confirmed that the Landfill Levy is being charged on the disposal of WASS to all licensed landfills in Victoria. Further, it has confirmed that this WASS is often contaminated by other pollutants, requiring it to be deposited in a landfill cell.

A logical conclusion of the EPA clarification is that landfills, while the only possible sites for contaminated WASS, are not cost competitive in regards to the management of clean, uncontaminated WASS. This is because the Landfill Levy, currently \$65.90 per tonne, greatly exceeds the trucking costs to the alternative "lime treatment" and "underwater storage" sites which have EPA-approved EMPs and are not subject to the Landfill Levy.

Nagambie Resources therefore concludes that the only real competitors to the best practice PASS underwater storage sites such as the Nagambie Mine are the lime treatment sites.

Melbourne Landfill Levy

Infrastructure Victoria (IV) is conducting a review of the waste industry and required infrastructure for the Victorian Government. It has presented an interim report with its final advice due in February 2020.

IV has already flagged that: *"The landfill levy settings need to be changed to encourage uses higher up the waste hierarchy than landfilling. The current cost of landfilling in Metropolitan Melbourne is significantly lower than many other Australian and European jurisdictions."*

Notably, the current Landfill Levy in Melbourne of \$65.90 per tonne is less than half that in Sydney of \$143.60 per tonne.

NAGAMBIE RESOURCES

Exploration for Fosterville-style, structural-controlled, high grade sulphide-gold underground deposits within 2,000 sq km of Waranga Domain tenements is being methodically carried out using geophysical targeting techniques, diamond drilling and analysis for hydrothermal alteration of the sediments.

Underwater storage of sulphidic excavation material (WASS / PASS) in the two legacy gold pits at the Nagambie Mine is an excellent environmental fit with major infrastructure projects for Melbourne such as Metro Rail, West Gate Tunnel and North-East Link.

Recycling of the tailings and overburden dumps can produce aggregates for concrete and gravel products respectively.

Quarrying and screening of sand deposits at the mine to produce various sand and quartz aggregate products is planned.

The first landfill site is planned to take advantage of the 17 Ha of engineered black plastic under the mine tailings pad.

SHARES ON ISSUE

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WASS Categories and Management Options

As previously reported by the Company, approximate WASS soil and rock figures for the major committed infrastructure projects are shown in Table 1 and total 8.3 million tonnes. With future projects under consideration such as the very large Suburban Rail Loop, Metro Rail 2 and a variation on the original East-West Link, total WASS requiring management over the next 10 to 15 years may exceed 20.0 million tonnes.

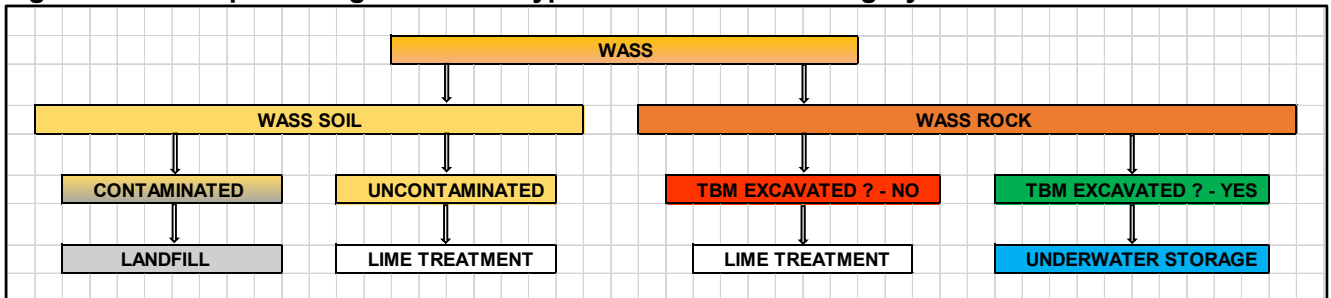
Table 1 WASS Summary for Major Melbourne Infrastructure Projects Committed to Date

Waste Acid Sulfate Soil and Rock (WASS)													
m ³ ex-situ = m ³ in-situ x 1.3 bulking factor													
Soil and Rock splits for West Gate, Metro Rail and North East Link based on EES Data													
	Soil		Rock		Total	Total	SG Soil	SG Soil	SG Rock	SG Rock	Soil	Rock	Total
	m ³ in-situ	m ³ in-situ	m ³ ex-situ	m ³ ex-situ	m ³ in-situ	m ³ ex-situ	in-situ	ex-situ	in-situ	ex-situ	tonnes	tonnes	tonnes
West Gate Tunnel	85,000	0	110,500	0	85,000	110,500	2.00	1.54	2.65	2.04	170,000	0	170,000
Metro Rail	37,000	514,000	48,100	668,200	551,000	716,300	2.00	1.54	2.65	2.04	74,000	1,362,100	1,436,100
North East Link	594,000	2,036,000	772,200	2,646,800	2,630,000	3,419,000	2.00	1.54	2.65	2.04	1,188,000	5,395,400	6,583,400
2 x Road/Rail Crossings	39,900	0	51,870	0	39,900	51,870	2.00	1.54	2.65	2.04	79,800	0	79,800
Total WASS	755,900	2,550,000	982,670	3,315,000	3,305,900	4,297,670	2.00	1.54	2.65	2.04	1,511,800	6,757,500	8,269,300

In and around Melbourne, WASS rock typically doesn't occur less than 25m below the surface and is unlikely to have suffered from anthropological (human) contamination. All WASS within around 25m of surface will therefore most likely be WASS soil and could be contaminated or uncontaminated.

The West Gate Tunnel and the two large road/rail crossing projects will only generate WASS soil (refer Table 1). WASS soil generated from Metro Rail and North East Link will represent approximately 5% and 18% respectively of total WASS for those projects. All contaminated WASS soil will require disposal to Melbourne landfills, such as Ravenhall (refer Figure 1). Nagambie Resources expects that all the clean, uncontaminated WASS soil will continue to go to lime-treatment sites in Melbourne (refer Figure 1) and be managed in accordance with their EPA-approved EMPs.

Figure 1 Principal Management Site Type for Each WASS Category



Total WASS rock (PASS) to be generated from Metro Rail will be approximately 1.4 million tonnes, the majority of it from tunnelling to be carried out by four Tunnel Boring Machines (TBMs). The balance will be generated from additional excavation of the underground stations using roadheaders. "Early Works" WASS rock generated intermittently, and in relatively small quantities, by roadheaders has been taken to lime-treatment sites in Melbourne. Nagambie Resources expects that this will continue to be the case for the roadheader-generated WASS rock from Metro Rail underground station development (refer Figure 1).

Total WASS rock to be generated from North East Link will be approximately 5.4 million tonnes, all of it from tunnelling by TBMs. In September 2019, the Victorian Government announced the three consortiums that will be bidding for the construction of North East Link, with tenders to close in mid 2020.

Total TBM-generated WASS rock (PASS) from the Metro Rail and North East Link tunnels will therefore be over 6.0 million tonnes or, on average, around 1.0 million tonnes per year. It is envisaged that all the TBMs on these two projects will be operating continuously 24/7 as the tunnelling is the major critical path activity.

At any particular time, all the TBMs could be tunnelling through PASS which would create significant operational issues in terms of PASS management.

When all the TBMs are simultaneously excavating PASS 24/7, the PASS will need to be trucked away continuously and managed 24/7 in accordance with the EMP procedures that apply at the receiving sites.

Nagambie Resources considers that only underwater storage sites can accommodate such a large-scale 24/7 requirement by the project managers.

Lime treatment on a continuous 24/7 basis would have to cope with issues such as rainfall, rainfall runoff, consistent lime blending, and effective pH testing of all the product heaps as they progress through treatment.

Another significant issue is that lime treatment sites in Melbourne produce more than four times the total equivalent carbon emissions than an underwater storage site such as the Nagambie Mine. The equivalent carbon emissions from the production of lime needed to treat the PASS, and the lime blending process itself, are more than five times greater than the additional emissions resulting from the longer trucking distance to Nagambie.



James Earle
Chief Executive Officer