

MELBOURNE METRO RAIL PROJECT ENVIRONMENT EFFECTS STATEMENT
INQUIRY AND ADVISORY COMMITTEE

MMRA TECHNICAL NOTE

TECHNICAL NOTE NUMBER: 039

DATE: 19 August 2016

PRECINCT: All Precincts

EES/MAP BOOK REFERENCE: EES Chapter 20; Technical Appendix Q – Contaminated Land and Spoil Management

SUBJECT: Contaminated land and spoil management

Response to Section 14 of the ‘Preliminary Matters and Further Information’ Request.

NOTE:

1. This Technical Note has been prepared with assistance from AJM and responds to the matters identified in Section 14 of the ‘Preliminary and Further Information’ request made by the IAC on 25 July 2016 (**Request**).
2. For ease of reference, this Technical Note adopts the topic headings set out in the Request and reproduces the relevant ‘references’ and ‘requests’ prior to setting out MMRA’s response.

14.1 Re-use of excavated spoil (clean fill)

(i) Reference

Section 20.7.2: Re-use of Excavated Spoil (Clean Fill), p20-12 notes:

An estimated 2,033,500 m³ of spoil would be generated by the construction of Melbourne Metro (approximately 613,000 m³ from the tunnels, 104,200 m³ from the portals and 1,316,300 m³ from the stations). Of this, it is anticipated that 1,349,300 m³ would be clean fill.

During construction of Melbourne Metro, for all precincts, there would be limited opportunities to re-use excavated clean fill on-site. This spoil would have to be removed off-site as a waste or be directed for re-use at another site — a positive outcome from the project. Potential re-use would be subject to further testing to

determine the final waste classification and geotechnical suitability of this spoil, in accordance with EPA regulations and guidelines.

(ii) Request

The IAC requests:

81. how will the spoil be disposed of and where.

MMRA Response:

3. With respect to “how” the spoil will be disposed of:
 - a) Recommended Environmental Performance Requirements C1 and C2 govern the project’s spoil management approach.
 - b) MMRA’s Spoil Management Strategy (contained in Technical Appendix Q Contaminated Land and Spoil Management of the EES) describes the approach to spoil management, based on the excavation and removal to an off-site location in an expeditious manner following the waste disposal hierarchy. This hierarchy notes that avoidance is the most preferred option and disposal being the least preferred option. It is anticipated that there would be limited opportunities to reuse excavated clean fill onsite, and thus spoil would have to be removed off-site as a waste. However, as most of this waste would be natural and classified as clean fill, it could be directed for reuse at another site in accordance with EPA regulations and guidelines.
 - c) Spoil classified as prescribed industrial waste would be managed in accordance with the *Environment Protection (Industrial Waste Resource) Regulations 2009*. This requires wastes to be categorised and disposed of at facilities licensed to accept the waste or to a treatment facility that can reduce the concentrations of contaminants prior to disposal. Specific disposal locations will be determined by the appointed Contractor.
 - d) Acid sulfate soils would be managed in accordance with EPA guidelines and the *Industrial Waste Management Policy (Waste Acid Sulfate Soils)*. This would include implementing environmental management plans that identify the locations and extent of any acid sulfate rocks (primarily Fresh Melbourne Formation rock) within the proposed project boundary, assessment of the potential environmental risks of disturbance, and identification of suitable sites for the reuse or disposal of any acid sulfate rocks.
4. With respect to “where” the spoil will be disposed to, further investigations have determined that:
 - a) There is sufficient capacity at existing waste management facilities for prescribed industrial waste (**PIW**), fill material and waste acid sulfate soils (**WASS**) volumes anticipated to be generated. This also

includes allowance for material forecast from other concurrent projects.

- b) Fill material re-use options include re-use within construction projects, ports & coastal protection, land reclamation, land restoration and for landfill management. The most likely re-use option is as landfill management materials. All facilities that were contacted confirmed that they currently utilise fill materials for capping and covering landfills.
- c) The facilities that were contacted also confirmed that they will be able to receive, treat and dispose of all categories and volumes of PIW spoil material produced by Melbourne Metro.
- d) The disposal of WASS can be appropriately treated or disposed of at existing facilities. There is also scope for the Contractor to identify other re-use or reclamation options – particularly reclamation of old quarries – subject to these receiving facilities obtaining the necessary approvals.

14.2 Soil management – acid sulfate rock

(i) Reference

Section 20.10.1: Bulk Earthworks and Spoil Management, Page 20-24, Table 20-4 (Arden).

(ii) Request

The IAC requests clarification on:

- 82. *the apparent inconsistency between Table 20-4 (which does not suggest that fresh Melbourne Formation will be encountered that could be classified as Acid Sulfate Rock) and the lead-in text at the top of Page 20-24 which states :*

The base of the station box may extend into fresh Melbourne Formation rock, which is likely to be classified as potentially acid forming when exposed to air. The extraction and disposal of this material would be managed in accordance with EPA guidelines and the Acid Sulfate Soil and Rock Management Sub-Plan required by the recommended Environmental Performance Requirements (see Section 20.7.3).

MMRA Response:

- 5. The table is correct, the lead-in text is incorrect. The first paragraph at the top of Page 20-24 should be disregarded. That is, fresh Melbourne Formation that would be encountered at Arden would not be classified as acid sulfate rock. It would however be classified as acid sulfate soil.

14.3 Ingress of gases/soil vapour – TBM disturbance

(i) Reference

Section 20.7.7: Gases and Vapour/Construction, p20-16, first two paragraphs notes:

Gas and vapour risks would also be managed in accordance with EPA guidelines and SEPP (AQM). Specific mitigation measures incorporated into the contractor's CEMP — such as the method of drilling selected and the provision of air ventilation — would mitigate the risks to workers.

Risks to buildings would be mitigated by following the British Standards Institute's 2015 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BSI Code of Practice). Using the terminology from this code of practice, the risk to infrastructure would be characterised as low or very low and mitigation would largely be achieved by the use of structural concrete. Further mitigation measures could be required around the shafts, cross passages and other underground infrastructure and could include incorporating pressure relief blankets or low permeable strips around any structural concrete.

(ii) Request

The IAC requests clarification on:

83. how gases or vapours from tunnel boring operations (and tunnel face pressurisation) may be proactively managed.

MMRA Response:

6. Environmental Performance Requirement (**EPR**) AQ3 provides for the management of air quality during construction and operation of Melbourne Metro.
7. The tunnels would be ventilated in accordance with best practice noted in *BS6164:2011: British Standard – Code of Practice for Health and Safety in Tunnelling Works in the Construction Industry* to ensure any vapours and gases are diluted to acceptable levels and removed from the tunnels. The Tunnel Boring Machines (**TBMs**) will be equipped with gas monitoring instruments designed to detect various types of gases. Trigger levels based on acceptable concentrations of gases will be established in advance, and alarms raised automatically in an event the triggers are exceeded. In this rare scenario, the tunnels will be evacuated until the ventilation system has removed the excess gases. Real time monitoring will be adopted with inbuilt audio visual alarms, which would include a complete tunnel monitoring system. Monitoring can be conducted in the TBM operator cabins and the central control room. Monitoring stations can also be included along the completed length of the tunnel (and stations) and not just at the excavation face or the TBM.

14.4 Ingress of gases/soil vapour – specific gas sources

(i) Reference

Section 20.7.7: Gases and Vapours, p20-15:

As noted in Section 20.5.4, site investigations indicate the presence of natural methane in Coode Island Silt at the western portal and Arden station sites, with some methane also likely to be present beneath the Yarra River (CBD South station to Domain station).

Site investigations have confirmed the presence of volatile organic compounds (VOCs) in soil and groundwater at Arden, Parkville and CBD North stations. There is potential for VOCs to be present at all station precincts based on historic land uses.

(ii) Request

The IAC requests advice on:

- 84. the measures proposed for the constructors and operators to follow, to manage potential risks from natural methane (CH₄) or volatile organic compounds (VOCs)*
- 85. as well as considering the soft organic sediments within the Paleo-valleys as potential generators of natural methane (CH₄) carbon dioxide (CO₂) and hydrogen sulphide gas (H₂S), whether there has been any consideration to the potential for ground-gas ingress or egress/displacement to surrounding sensitive receptors where there are either:
 - old/large Sewer Mains in close proximity (CH₄ and H₂S producing) – North and South Yarra Sewer mains, or others*
 - in-filled sites.**

MMRA Response:

8. With respect to request 84, measures are described in the EES and are summarised as follows:
 - a) In the first instance, risks to constructors will be mitigated as described in the response to request 83 (ventilation).
 - b) Risks will be further assessed and mitigated by the Contractor in accordance with EPRs C3 and C4.
 - c) If required, risks to operators and other sensitive receptors associated with the tunnel and station infrastructure built as part of the Project would be mitigated by following the British Standards Institute's 2015 Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings (BSI Code of Practice), and also the appropriate health and safety occupational air exposure guidelines.
9. With respect to request 85 and "sewers":

- a) The North Yarra Main Sewer and the South Yarra Main Sewer are the two main large sewers located close to the route of the Melbourne Metro. North Yarra Main Sewer crosses above a tunneled section near Lloyd Street, Kensington. The South Yarra Main Sewer crosses St Kilda Road in the close vicinity of Domain Station. Both sewers are known to be leaking, with the sewers influencing local groundwater flow patterns.
 - b) “Sewer gas” has similar constituents and properties as landfill gas. Hazardous gases from sewers or any gassing fills will be assessed and managed by the Contractor in accordance with EPRs C3 and C4.
10. With respect to request 85 and “infilled sites”:
- a) There are no landfills along or near the route. However, circumstances where gaseous fill is encountered will be managed by the Contractor in accordance with EPRs C3 and C4.

14.5 Ingress of contaminated groundwater – tunnel liner segment seals

(i) Reference

Section 20.7.8: Durability of structures and buildings, p20-17 notes:

As discussed in Section 20.7.7, vapours and gases may degrade some building materials. Therefore, the choice of materials and construction design and engineering measures would need to take these risks into account.

(ii) Request

The IAC requests advice on:

86. what tunnel lining joint seals are planned to be used for contaminated site areas.

MMRA Response:

11. The waterproofing systems used in the tunnel construction will require a design life of 100 years, including for sections of tunnel in ground water restricted use zones where there is existing contamination. The segmental tunnel linings will be equipped with ethylene propylene diene monomer (EPDM) gaskets. The cast *in-situ* or sprayed shotcrete lining will be provided with sheet or sprayed waterproofing membranes to ensure water tightness of the linings.

CORRESPONDENCE:

No correspondence.

ATTACHMENTS:

No attachments.