NELP TECHNICAL NOTE

TECHNICAL NOTE NUMBER: 47

DATE: 13 August 2019

LOCATION: Trench section between Blamey Road and Elder Street

EES/MAP BOOK REFERENCE: Map Book Horizontal Alignment Plans: Sheets 8-9 and 12-13

SUBJECT: The rationale for adopting a “trench plus land bridge” solution, north of Blamey Road, as opposed to a full cut and cover tunnel.

NOTE: 1. This Technical Note has been prepared to respond to a query raised by the Inquiry and Advisory Committee concerning the trench section of the Project.

REQUEST: 2. As understood by NELP, the query concerns the rationale for providing land bridges over the trench section rather than covering the trench completely as a cut and cover structure.

RESPONSE:

1. During development of the reference project the option of extending the cut and cover tunnel further north to approximately Elder Street was considered. This option was not progressed for a range of reasons including its additional cost, ventilation structure location, extended localised disruption, and longer construction period. This technical note provides a summary of these issues.

2. The reference project includes a trench extending between Blamey Road at Simpson Barracks (to the south) and near Nepean Street in Watsonia (to the north), partially covered by five separate land bridges between Blamey Road and Watsonia Road. The trench is primarily contained within the existing road reservation along Greensborough Road.

3. A key reason for the trench in this section is to ensure that the maximum allowable road gradient is not exceeded. The length of the trench is informed in part by the topographical conditions along this part of the alignment. Whilst not a design rationale in its own right, the trench would also provide noise attenuation benefits relative to a surface road configuration. The land bridges have been separated and proportioned to avoid the requirement for additional ventilation structures.

4. An alternative option was considered in the development of the reference project that covered the trench from Blamey Road to approximately Elder Street. The alignment would otherwise be similar to that of the reference project modified to accommodate the following –

   (a) Appropriate clearance to the existing gas transmission main and Hurstbridge Railway Line;

   (b) Deepening, as required, to ensure there is enough soil cover above the new tunnel roof to allow planting (noting that the proposed land bridges would also be able to be landscaped) – see Figure 1;

   (c) Widening, to allow for a central wall, columns and cross passages – see Figure 1. The effect of this additional widening would need to be assessed to determine any possible issues with current project boundaries, existing utilities, and other infrastructure.

5. The structural design would need to be materially different to the reference project to allow for the additional weight of the installed covers and the loading above, as well as any additional propping where
the alignment is deepened.

Figure 1 – Typical cut and cover tunnel alongside a typical trench section

6. Ventilation structures are typically required near the end of road tunnels, where traffic is exiting. This takes maximum advantage of the “piston effect” created as vehicles push the air through the tunnel. It also supports the most efficient compliance with “zero portal emissions” requirements and the efficient extraction of tunnel air from where it is most vitiated. In the case of the design considered by NELP, this placed the ventilation structure and associated plant adjacent to the Todman Street Community Centre and nearby residential land.

7. Covering the trench to near Elder Street would lengthen the tunnel to approximately 7.4km (compared to 6.1km in the case of the reference project). The additional 1.3km would require a material increase in the capacity of the ventilation system to achieve in-tunnel air quality and emissions requirements, resulting in a significant increase in the size (height and area) of the northern and southern ventilation structures. It would also be necessary to provide other ventilation infrastructure in the form of an emergency smoke extraction point (shown adjacent to the Barracks) and a fresh air intake/exchange point (probably at the same location).

8. The length of the land bridges in the reference project has been set at a nominal maximum of 60 metres. This allows these structures to be nominated as underpasses rather than tunnels. Discussions with the EPA have confirmed that all “tunnels” must adhere to the “zero portal emissions” requirement, regardless of their length. Designing for zero portal emissions effectively means that each “tunnel” must have at least one ventilation stack, which would in turn result in urban design and other environmental impacts.

9. NELP’s preliminary estimate is that the option of a cut and covered section, including ventilation structures, would take approximately 12 months longer than the reference project with a commensurate increase in the duration of disruption. This includes the area adjacent to the Watsonia Station, where temporary station access and parking, as well as a temporary bypass of Greensborough Road must be accommodated. There would be a comparable surface impact along the relevant parts of the alignment during construction in both scenarios.

10. The option would involve additional capital cost compared to the reference project. This is due to factors such as (but not limited to) the cost of covering the trench, associated structural requirements, deeper and wider excavations, the increased capacity of the ventilation infrastructure, and the additional mechanical, electrical and fire and life safety infrastructure that a tunnel requires compared to a trench. Based on estimates prepared at the time of developing the reference project, the additional cost to the State of undertaking these works relative to the cost of the reference project would be approximately $1 billion.

11. There would also be an additional cost in operation due to running a larger ventilation system, as well as additional ongoing costs for lighting, fire and life safety systems and other underground-specific infrastructure.
12. The option would provide a surface area of approximately 40,000 square metres, after allowance is made for the space required for the northern ventilation structure, substation and associated facilities. This compares to the land bridges in the reference project which provide a combined total of approximately 12,000 square metres. Noting that in both cases, we have not subtracted the areas required for roads and shared user paths, which are assumed to be the same for both.

CORRESPONDENCE: N/A

ATTACHMENTS: N/A