



OUT16/25030

Mr Mick Fallon
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Dear Mr Fallon

**Sydney Metro (Chatswood to Sydenham) (SSI 7400)
Comment on the Environmental Impact Statement**

I refer to your letter dated 9 May 2016 to the Department of Primary Industries in respect to the above matter. Comment has been sought from relevant divisions of DPI. Any further referrals to DPI can be sent by email to landuse.enquiries@dpi.nsw.gov.au.

The Department has reviewed the Environmental Impact Statement and makes the following recommendations:

- The water quality targets relating to aquatic foods within the EIS (Table 18-8, 'Aquatic Foods' section) should be an objective for both the Cooks River and Sydney Harbour.

While commercial fishing does not occur within both waterways, recreational fishing is permitted in both waterways. The consumption of fish caught in the Cooks River and west of Sydney Harbour Bridge is not recommended due to potential contamination, however consumption of fish caught east of Sydney Harbour Bridge and Botany Bay is not discouraged. The 'aquatic foods' section of Table 18-8 should be amended to reflect this information, especially as fish in downstream waterways quite close to the Sydney Metro corridor can be captured for human consumption.

- Any activities carried out on waterfront land (as defined under the *Water Management Act 2000*) should be conducted in accordance with the DPI Water Guidelines for Controlled Activities (2012).
- The proponent should prepare a Groundwater Monitoring and Management Plan (GMMP) detailing the placement, installation, data measurement and reporting of and from monitoring bores for groundwater systems traversed by the project; reporting of data should commence as soon as possible and continue for 3 years after operations commence.
- The GMMP should include development of a Trigger Action Plan for adverse events and documentation of mitigation strategies to be employed in such circumstances, together with discussion about mitigation of impacts on water user's bores potentially impacted by the project.

- The Proponent should consult with DPI Water to discuss and plan the monitoring bore network and development of the GMMP.
- Measurement and reporting to DPI Water (which could be via another suitable regular reporting framework such as an annual report) of all groundwater inflows to drained project elements on an annual basis for the life of the project. The documentation of these matters in the EIS is to be clarified to separate construction and operational water take components, and the basis of the empirical calculations is to be presented.
- Consultation in respect of design and review, to DPI Water's satisfaction, of all numerical groundwater modelling developed for project elements.
- The data of Table 3.9 (Technical Paper 7) should be amended by inclusion of the date of measurement of the reported data, and related Figures 3.16 and 3.17 should be amended to show piezometric surface contours in mAHD.
- The proponent should state a conclusion about potential impacts on identified groundwater bores, particularly bores GW106192 and GW111164 which are within 200m of the project alignment

Yours sincerely



Mitchell Isaacs
Director, Planning Policy & Assessment Advice
1/7/2016

Attachment A

Project Name (Project Number) **Request for Input into Secretary's Environment Assessment Requirements** **Detailed comments**

The Department of Primary Industries, Water (DPI Water) has reviewed the Environmental Impact Statement (EIS) and provides the following comments:

Water licensing

The EIS indicates the project does not require a licence and/or approval under the *Water Management Act 2000* (see Section 17.4.7, page 716) and the Groundwater Assessment Report notes Transport for NSW is exempt from the requirement to hold an access licence under Clause 18(1) of the *Water Management (General) Regulation 2011* (section 2.1.1, page 13; 6.1.1, page 84). It is recommended that the proponent continue liaising with DPI Water to ensure that any licensing requirements are met.

DPI Water previously advised and repeats that the EIS should clarify the total volume of water required during construction and identify the source/s of the water supply.

Groundwater

(1) Monitoring Bores

The Proponent has nominated 14 former geotechnical bores installed for project investigations (Table 3.5, Technical Paper 7) for monitoring of groundwater levels: these have apparently been fitted with continuous water level loggers. Unfortunately, the sites chosen have an understandable bias to the construction and consequently are not orientated to on-going management of the potential impacts to groundwater sources by the project. The nominated sites were not chosen in consultation with DPI Water.

A careful review has been made of the implications of the project's interaction with the groundwater sources through which it traverses. The primary groundwater source – Sydney Basin Central – is interrupted by Sydney Harbour. Further, this source hosts a range of surface recharge regions from – moderately-sized residential dwelling blocks to intensely distributed low-rise manufacturing buildings, high-rise commercial buildings, inner-city dwelling houses and units; major infrastructure corridors and limited parkland and open-space. Towards its southern end, the project underlies the margin of the Botany Sands Groundwater Source which overlies the Sydney Basin Central Source. Consequently, the impacts on recharge areas, and otherwise on potentiometric pressures throughout the various parts of the aquifer system, are not evenly distributed.

DPI Water considers that the 14 nominated monitoring piezometers are not adequate to assist with on-going monitoring of the groundwater sources during Project construction and operation. It is recommended that up to 20 piezometers are required for better characterisation of any impacts resulting from the project. It is anticipated, that although there will be short-term effects during construction, the most important potential impacts to the groundwater sources will occur during the operational phase.

Only 3 of the Proponent's existing piezometers (including two associated with the dive structures) are considered suitable, with the possibility that 3 others may be able to substitute for a preferred installation. It is recommended that the Proponent should discuss this matter with DPI Water. It is expected that groundwater level monitoring in each piezometer will occur continuously for 3 years after operations commence. Monitoring bores should be established as soon as possible so that baseline data over the wider footprint of the project is gathered for as long timeframe as possible. Raw water level data should be reported to DPI Water at six monthly intervals; alternatively this might be expeditiously achieved via a project website.

DPI Water requested that a Groundwater Monitoring and Management Plan (GMMP) including a Trigger Action Response Plan be prepared for the monitoring, and that this be done in consultation. The GMMP has not been prepared; there has been no consultation with DPI Water.

The requirements relating to time length of monitoring and for the preparation of a GMMP were referred to the DPE by DPI Water in a letter dated 7 March 2016.

(2) Groundwater Inflows & Take

During construction, unexpected groundwater inflows may occur; and during construction and operations groundwater take will occur in untanked station shafts. The reporting to DPI Water for groundwater levels should be accompanied by a considered hydrogeological report that describes measured flows in station shaft structures and reports any unusual groundwater ingress or flow events.

DPI Water recommends that the take of groundwater at all locations be recorded and reported annually and that this matter should be included in the GMMP.

Table 4.4 "Estimated groundwater inflows" (Technical Paper 7) and Table 17-7 (Chapter 17) present a considered estimate, derived from empirical predictions, of likely groundwater inflows to various project elements as if each was drained (untanked). The predictions provide design guidance for the project's water treatment system and serve to indicate how the elements might have a maximum impact on the groundwater sources.

In Table 17-7 the estimated groundwater inflows for both the construction and operational phases of the project have been combined. These data indicate that a take of about 372 ML/yr could occur from the Sydney Basin Central Groundwater Source over the period of construction at least: the data presentation is confusing as it includes an allowance for Barangaroo Station and Waterloo Station which are elsewhere identified as being "tanked". Clarification is needed in this table. Elsewhere this information is stated differently:

The annual inflow from the Sydney Basin Central Groundwater Source has been conservatively estimated (assuming drained conditions for all project elements) at 372 megalitres per year.
(extract from p713, Chapter 17, Section 17.4.3 "Groundwater inflows").

Further clarification is required to separate estimates of on-going take from construction activities, and to be differentiated for exact project elements. In addition, the relevant assessments here draw upon experience of other tunnel projects in Sydney for an indication of likely groundwater take. The discussion is confusing and hard to discern without presentation of supporting information. For example, the documents do not provide the methods of calculation or explain how these estimates were developed; it is considered that this supporting information should be broadly conveyed so as to add transparency to the published values.

In other parts of the documents (specifically - Section 3.4.2. "Hydrogeological properties", Section 4.2 "Target change to groundwater levels" of Technical Paper 7), there is comment that numerical groundwater modelling is likely to be required for groundwater inflow assessment to certain station shafts. This modelling will be completed during the on-going design phase. Any numerical modelling should rely on the baseline groundwater data currently being gathered for the project and should be submitted to DPI Water for review prior to its use.

(3) Other Aquifer Interference

The Proponent has adequately assessed the project in terms of the Aquifer Interference Policy, with one area of exception: in Section 3.3.3 "Groundwater users" (Technical Paper 7) and equivalent parts of the AIP assessment in Appendix A – Table 5 (Alluvial Aquifer – Highly Productive) and Table 6 (Proposed Remedial Actions), potential impacts on identified bores have not been specifically addressed.

Section 3.3.3 contains a narrative of identified groundwater bores, however, it contains no or limited analysis on what impacts, if any, the project will have on these bores. The Proponent should state a conclusion about potential impacts and especially in respect of groundwater bores GW106192 and GW111164 which are all within 200m of the project alignment. There are minor other references to potential user bore impacts (without any quantification) in several documents.

In other parts of the documentation e.g. Chapter 27 – “Mitigation Measures”, Chapter 28 – “Risk Analysis (ID: GWG1, SCW1, SCW2, “Groundwater and geology”); and Chapter 17, Section 17.5 “Mitigation measures”, the Proponent indicates that a geotechnical model, which includes a groundwater analytical aspect, will “be developed and then progressively updated during design and construction”. Given the high level of tanked construction and the limited amount of groundwater users with a potential to be affected by the project, this is a reasonable approach.

There are no known or other identified GDEs that will be impacted by the project as the tunnels traverse beneath highly developed areas of Sydney City District.

(4) Presentation of Groundwater Data

Section 3.4.3 “Groundwater levels” discusses a large amount of data derived from several previous geotechnical investigation programs. Table 3.9 “Collated groundwater levels (mAHD)” summarises these data but is considered to be incomplete because it does not reference the measurement to a date when obtained. This information needs to be added to the Table.

These data are also represented in Figures 3.16 and 3.17. However, such representations can be misleading because they automatically mix water table and potentiometric pressure measurements. It would be better if the data were represented as potentiometric contours in mAHD for an applicable date or date range; this matter needs to be addressed for clarity.

(5) Minor Editorial Matters

(a) Nominated project piezometers (Table 3.5, Technical Paper 7) are largely shown on the accompanying geological long sections (15 sheets). However, there is no obvious text to indicate that this is so, and it would be beneficial to add information to the effect that the bores of Table 3.5 are plotted. In addition, BH026 and BH043 are not shown on the plans and BH023 and BH008 are not projected onto the sections.

(b) Some of the data listed in Table 3.7 (“Estimated hydraulic conductivity”) contains a superscript “a”. This notation has not been explained. In addition the data is listed without any reference (including in the accompanying text) to the date or time frame when it was obtained. For completeness the date information should be included.

Conclusions

1) The EIS has substantially addressed the SEARs (which are listed in Attachment B attached) except for:

- extent of drawdown and impacts on other users (2(b)) – not fully assessed for station shafts and users in the Botany Sands
- matters of groundwater take (2(f)) - not correctly quantified for the whole project in terms of construction and operational phases
- baseline monitoring (3) – for the whole project.

2) The requirements of DPI Water in the letter of 7 March 2016 have not been adequately addressed, in respect of:

- development of a groundwater model (if necessary) and certainly in respect of non-tanked structures – this is to be done in some manner in the future
- identification of monitoring bores - this matter needs further consideration and consultation with DPI Water
- development of a Groundwater Monitoring and Management Plan (GMMP).

3) There are no GDEs likely to be impacted by the Project.

The project is likely to have limited impacts on the groundwater systems through which it traverses. The assessment of risks and discussion of the project and its hydrogeological context has largely been completed adequately in the EIS documents.

However, there are some specific matters relating to the monitoring bores for assessment of construction phase and operational phase impacts; as well as the correct reporting and assessment of groundwater take that have not been adequately addressed. A GMMP requested by DPI Water has not been included. Such a plan would involve a more considered evaluation of monitoring sites, reporting of potentiometric pressures, water table levels and related matters.

Further, in the few relevant instances, potential impacts on other users' bores have not been adequately addressed. It is suggested that the Proponent meet with DPI Water to discuss the development of the GMMP and the location of suitable monitoring bores.

End Attachment A