NSW GOVERNMENT | Department of Primary Industries

OUT15/22245

Mr Matthew Rosel
Metropolitan Projects
NSW Department of Planning and Environment
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21 AUG 2015

Dear Mr Rosel,

Crown Sydney Hotel Resort, Barangaroo (SSD_6957) and Stage 1C Remediation and Earthworks, Barangaroo (SSD6956) Response to exhibition of Environmental Impact Statements

I refer to your email dated 20 July 2015 requesting advice from the Department of Primary Industries (DPI) in respect to the above matter.

Comment by DPI Water - Crown Sydney Hotel Resort
DPI Water has reviewed the Environmental Impact Statement and provides the following comments and detailed comments in Attachment A,

The DPI Water recommends the proponent needs to clarify details of the calculations of the on-going seepage through the basement wall and describe the fresh and saline groundwater fluxes at the site.

Comment by DPI Water - Stage 1C Remediation and Earthworks
DPI Water has reviewed the Environmental Impact Statement and provides the following comments and detailed comments in Attachment B

1. A Groundwater Post-Cutoff System Monitoring and Management Plan should be developed. Consideration of any adverse impacts that might develop as a consequence of mounding caused by the cut off wall system is required.
2. The potential groundwater take as seepage through the groundwater retention wall must be clarified. The seepage rate needs to be tied to the area of wall and floor beneath the permanent saturated zone and that level to which the watertable may rise especially in response to mounding induced by the proposed construction. This volume may require on-going licensing, and the Proponent needs to liaise with DPI Water in this regard.

More comprehensive documentation of nearby bores to 1 km radius (on the landward side), and an evaluation of potential impacts on any bores used for

groundwater abstraction, consistent with the Aquifer Interference Policy, is requested.

For further information please contact Janne Grose, Planning and Assessment Coordinator (Penrith office) on 8838 7505 or at janne.grose@dpi.nsw.gov.au.

Fisheries NSW and Agriculture NSW advise no issues.

Yours sincerely

Kristian Holz
Director Policy, Legislation and Innovation

Attachment A

Crown Sydney Hotel Resort, Barangaroo (SSD_6957) and Response to exhibition of EIS Detailed comments by DPI Water

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The SEARs requirement for SSD-6957 (dated 2 April 2015), key issue (16) - Soil and Water includes that assessment must be made of impacts on surface- and ground-water hydrology and quality including mitigation and management measures. There are no additional requirements to those already listed and considered for the enabling SSD-6956 (Barangaroo South – Stage 1C Remediation and Earthworks).

Groundwater will be encountered during excavation for the construction and operation of the development, and is specifically discussed in Section 3.3 of Appendix T of the EIS for SSD-6957 (Stormwater Management and Infrastructure Assessment Project Application) for Barangaroo South Stage 1C, Crown Sydney Hotel Resort project, prepared for Crown Resorts Ltd by Cardno (NSW/ACT) Pty Ltd and dated 7 July 2015.

> **3.3 Groundwater**
> Due to the excavation associated with the basement construction, groundwater water will be encountered during both the construction and operational phases of the development. Groundwater will need to be discharged in accordance with authority guidelines.
>
> **3.3.1 Operational Phase**
> The basement will be subject to inflows from two sources, including:
>
> - Groundwater Infiltration; and
> - Car park drainage water.
>
> Although the basement construction will be water-tight, it will not be water proof and groundwater infiltration may occur within the basement at an estimated 1kL per day. The basement will be subject to both groundwater and tidal influences. The EPA have advised that on-going discharge to the harbour would not be approved therefore a trade waste agreement with Sydney Water is recommended to discharge to the sewer system within Hickson Road.
>
> Runoff water that enters the basement via the basement ramp and incoming cars will also not be permitted to discharge to the harbour and will need to be included on the trade waste agreement.

Consequently, the only significant matter relating to groundwater is as described in DPI Water's advice on SSD-6957, namely – the ongoing take of an unquantified volume of groundwater.

The EIS for SSD-6956 (Stage 1C Remediation) described planning hydraulic conductivity values and seepage criteria as a maximum 0.75 L/min across the whole basement wall area. This review notes from the above that the volume of water take in the basement is quantified as an estimated 1kL/day. If this is true, it will be below a level at which DPI Water has concerns with respect to resource management for this groundwater source. The basis of these calculations needs to be disclosed.

Recommendation

DPI Water recommends the proponent needs to clarify details of the calculations of the on-going seepage through the basement wall and describe the fresh and saline groundwater fluxes at the site.

End Attachment A

Attachment B

Stage 1C Remediation and Earthworks, Barangaroo (SSD6956)
Response to exhibition of EIS
Detailed comments by DPI Water

Background & context

The SEARs requirement for SSD-6956 (dated 2 April 2015) key issue (5) – Soil and Water includes that assessment must be made of impacts on surface- and ground-water hydrology and quality including management, mitigation and monitoring; as well as potential impacts on groundwater flow paths and discharge flows; determination of appropriate licensing approvals and any effects on GDEs. Key Issue (18) requires that a Stormwater and Drainage Assessment (SDA) be undertaken to assess impacts of the proposals on groundwater hydrology and quality. Key Issue (22) requires that an Environmental and Construction Management Plan (ECMP) will include attention to water quality management.

Section 5.2.3 of the EIS refers to the Remediation Action Plan and its Addendum (RAP). The original document noted following (Ref) is the main source of relevant information for geology, hydrogeology, contamination, and excavation/development matters related thereto; and is the basis of discussion and quotation in this review.

Ref: Remedial Action Plan, Crown Hotel Development (part of ORWN Area), Barangaroo South, report # 60310752_RPT02 by AECOM and dated 11 April 2015).

Groundwater will be encountered during excavation for the construction and operational phases of the development. Testing shows no contamination to the Stage 1C area but there is known contamination to the adjacent 1B site. During the construction phase, groundwater will be treated and discharged to Darling Harbour in accordance with the guidelines established for Stage 1A.

The area of land and volume of material needing specific remediation is quite small – about 225 m^2 and about 2 mbgl. The remainder of the site/s will be subject to excavation and classification of materials as appropriate for disposal.

The groundwater table (1.8 – 2.9 mbgl (RAP Section 6.5)) is shallow and has been shown to be strongly influenced (from 14% to 100%) by tidal fluctuations in other nearby parts of the Barangaroo complex, at least up to 40m inland from the harbour wall.

In a significant portion of the site the existing fill and natural materials will be left in place so that the basement construction will be subject to saline groundwater fluctuations on the harbour side and fresh groundwater on the Hickson St side and here also over a greater depth of excavation. Typically the basement carparks will be founded at -9.45 mAHD.

The surrounding unexcavated materials will remain in hydraulic connection with Darling Harbour. The hydrogeological context has been summarised based on previous investigations focussed on the Site 4.

The site and its hydrogeological context seem well understood and described. There is no indication that excavated and final conditions will be significantly different to that described. The location of the site, its contamination (and subsequent clean-up), and its interaction with the tidally fluctuating marine waters are of little concern to DPI Water in terms of management of the groundwater source. There are unlikely to be any adverse impacts on other users (although this needs to be re-visited, see following), and there are no identified GDEs.

Groundwater hydrology and flows

A reported study by AECOM in 2010, and subsequent contaminant modelling in 2010 and 2013 investigated the groundwater flux at the site and its interaction with the Harbour water. Once

again the site seems to have been adequately characterised and groundwater flows and interactions satisfactorily understood.

Ongoing Take and Monitoring

If the groundwater retention system on the eastern side of the site generally seeps then the seepage will need to be quantified and volumes described. If the ongoing take of water is greater than 3ML per year then a water access licence is likely to be required in the Sydney Basin Central Groundwater Source of the *Water Sharing Plan for the Greater Metropolitan Sydney Groundwater Sources 2011*.

The design of the groundwater retention system has not been considered here (or sighted) and few details are known about it, however is has been described as minimum 800 mm wide (Section 4.3 RAP) and socketed into weathered rock and extending around the perimeter of the approved basement footprint. The system will be designed to prevent all groundwater migration from up-gradient sources into the basement area.

It can be anticipated that some small amount of mounding along the eastern boundary may be possible and this matter will need to be addressed by the design, probably by appropriate drainage around the system.

RAP Section 7.2.2 discusses the matter of ongoing seepage through the groundwater retention wall system and its association with future basement usage. Although the report discloses planning hydraulic conductivity values and seepage criteria as a maximum 0.75 L/min across the whole basement wall area, this value is not fully documented spatially (ie if the total area has been considered, or, if the rate is per lineal metre of perimeter) and does not seem to include floor seepage. Further the effect of seaward-facing construction and effects of saline water do not appear to have been separated out from landward-facing construction and fresh groundwater seepage. This matter needs to be clarified.

Monitoring and Further Mitigation

Given the hydrogeological setting of the proposed development and the substantial effort that will be made to deal with remnant contamination in a difficult, modified environment, there seems to be no need to impose further groundwater quality monitoring or groundwater mitigation constraints: in this context their value for the community and environment would be very limited and marginal at best.

There is a need to ensure that the groundwater retention wall system does not induce excessive mounding which might then impact on neighbouring development or the community, and the potential to flood to the east should be also assessed and eliminated. When groundwater flows are interrupted by the retention system the flow dynamics and setting will change; for example, tidal influence on up-gradient flows will be entirely eliminated, or almost so; and saline mixing will cease. Provision for fresh groundwater drainage around the structure should be made.

Continuous monitoring of groundwater levels up-gradient of the cutoff wall for an extended period – say 3 years after it is built, should be undertaken. This should be accompanied by a developed response program in case adverse impacts are detected, and incorporated into an appropriate management plan.

Effects on other groundwater users

In Section 6.5 ("Hydrogeology", RAP) there is a *limited* discussion of the presence of other users' bores within a 4 km radius of the site. This bore census is a typical component of hydrogeological assessment but is an important aspect of examination under the NSW Aquifer Interference Policy (AIP). Considerations of a 4 km radius for this study seem excessive given the urban context and the foreshore locality, however a more comprehensive documentation of

nearby bores to 1 km should be provided, and an evaluation of potential impacts on them, with reference to the NSW Aquifer Interference Policy.

Recommendation

The site is well characterised and understood hydrogeologically. However, DPI Water has some specific recommendations relating to the on-going management of groundwater for the development.

1. A Groundwater Post-Cutoff System Monitoring and Management Plan should be developed. Consideration of any adverse impacts that might develop as a consequence of mounding caused by the cut off wall system is required.
    a. Continuous monitoring (level loggers) of groundwater levels up-gradient of the groundwater retention wall system should be undertaken for an extended period – 3 years after it is built.
    b. Records of levels are to be maintained by the Proponent and regularly compared to baseline monitoring applicable to the situation prior to construction of the wall.
    c. Reporting required with this plan is required under the relevant broader reporting framework under any development consent.
2. The potential groundwater take as seepage through the groundwater retention wall has to be clarified. The seepage rate needs to be tied to the area of wall and floor beneath the permanent saturated zone and that level to which the watertable may rise especially in response to mounding induced by the proposed construction. This volume may require on-going licensing, and the Proponent needs to liaise with DPI Water in this regard.
3. A more comprehensive documentation of nearby bores to 1 km radius, and an evaluation of potential impacts on any bores used for groundwater abstraction, consistent with the Aquifer Interference Policy, is to be developed.

End Attachment B