

**Stamford Property Services Pty Ltd**  
**PO Box R685**  
**Royal Exchange NSW 1225**

Project 72138.00  
7 April 2011  
GRB

Attention: Mr Anthony Ciappara / Mr Mark Louw

Email: [AnthonyCiappara@stamford.com.au](mailto:AnthonyCiappara@stamford.com.au) / [Mark.Louw@architectsajc.com](mailto:Mark.Louw@architectsajc.com)

Dear Sirs,

**SUPPLEMENTARY COMMENTS ON GROUNDWATER ISSUES**  
**PROPOSED MACQUARIE VILLAGE**  
**110 - 114 HERRING ROAD, MACQUARIE PARK**

**1.0 Introduction**

This letter provides supplementary comments on the expected groundwater conditions on the site of the proposed development at 110 – 114 Herring Road, Macquarie Park. In particular, this letter addresses issues raised by the NSW Office of Water (NOW - letter dated 7 October 2010 Ref ER21211) and referred to by the NSW Department of Planning (letter dated 23 March 2011 relating to groundwater and licensing together with comment on requirements for a drained basement.

It is understood that comments relating to the Groundwater Dependent Ecosystems have been provided separately by Total Earth Care, a copy of which is attached to this report.

The development of the site will include the construction of seven new multi-storey buildings, ranging in height from four to twenty residential storeys, a common basement to depths ranging from 7 m to 13 m (RL58.3 – 61.4 relative to Australian Height Datum) and access driveways.

**2.0 Results of Investigation**

Douglas Partners Pty Ltd (DP) has prepared a geotechnical report (Project 72138, dated 31 January 2011) for the proposed development on the site. The project included sixteen diamond cored boreholes to depths ranging from 10.0 m to 17.55 m and the installation of three groundwater monitoring wells. The groundwater levels within the standpipes installed in Bores 103, 110 and 116 were measured by DP during December 2010 and January 2011. The results of these measurements are detailed in Table 1.

**Table 1: Results of Groundwater Levels**

Test Bore	Surface RL	Water Levels					
		20/12/2010		22/12/2010		11/1/2011	
		Depth (m)	RL	Depth (m)	RL	Depth (m)	RL
103	72.3	4.3	68.0	4.7	67.6	4.6	67.7
110	74.0	11.5	62.5	11.7	62.3	- <sup>1</sup>	-
116	66.8	2.4	64.4	2.6	64.2	2.7	64.1

Note 1: Standpipe appeared to have been damaged– object stuck in pipe. Water level could not be measured

The measured water levels are assessed as being associated with perched seepage flows near the interface of residual clay and bedrock and also minor seepage through fractures and joints in the rock. The water levels and seepage flows are likely to fluctuate with climatic conditions and would be expected to rise following periods of extended wet weather and to fall during periods of dry weather.

A groundwater bore search of the NOW website database was conducted. Within a 1.5 km radius of the site, there are three registered bores to the north east of the site (used for monitoring purposes) and two registered bores to the west of the site (used for irrigation and recreational purposes). The two bores used for irrigation and recreational purposes were installed to depths of 67 m and 81 m and are located more than 500 m away from the site.

### 3.0 Comments

Specific comments addressing the relating to the groundwater issues are attached. DP also provides the following general comments relating to groundwater issues and the need for licensing. DP has reviewed and considered the NSW Office of Water Draft Water Sharing Plan for the Greater Metropolitan Region in preparing this response.

The NOW letter states:

- “if the proposal (the basement excavation) is likely to intercept or use groundwater, the need for a water licence under Part 5 of the Water Act 1912 may be required from the NSW Office of Water”; and,
- “If during basement construction, groundwater is likely to be intercepted then a licence for temporary construction dewatering together with specific construction methods may be required.”

The issues associated with “groundwater” and “dewatering” vary significantly between sites underlain by sandy soils with high permeability and sites underlain by clay and rock with relatively low permeability. Across Sydney, drained basements are commonly adopted on elevated sites underlain by clay and rock profiles. The seepage flows are collected and disposed of intermittently over the life of the basement.

Groundwater in a broad sense is all water that occurs below the land surface, however, in terms of groundwater management only part of the water profile contains the resource known as “groundwater”. An aquifer is a geological formation (either soil or rock) that can store and transmit



groundwater in useable quantities such that water can be extracted economically. These aquifers generally occur within alluvial and coastal sand deposits or porous and fractured rocks. Perched aquifers are a type of aquifer of generally limited extent that occur where an impermeable layer prevents the downward infiltration of groundwater. It is assessed that the measured water levels on this site are probably associated with perched seepage flows near the interface of residual clay and bedrock. Perched aquifers are generally of minor importance with regard to groundwater management and do not ordinarily retain significant quantities of groundwater in storage (refer *Groundwater Management Handbook, Sydney Coastal Councils Group Inc, 2006*).

Based on DP's experience with previous similar projects, it is our understanding that the comments from NOW are generally targeted at sites that require temporary dewatering to lower and control the groundwater table. This temporary dewatering is generally required to allow construction of a tanked basement on low lying, relatively level sites, with deep permeable soils and a shallow permanent groundwater table (basements extending into unconfined aquifers). This site, however, is located on gentle sloping ground at an elevation of approximately RL 65 - 74 and is underlain by stiff clay soil and rock with relatively low permeability. Seepage inflows along the rock surface and through the rock mass would be significantly less than groundwater inflows from a permanent groundwater table in say, highly permeable sandy soils. Seepage along the rock surface would be expected to vary with weather and be relatively minor or absent during periods of dry weather, with seepage flows temporarily increasing during periods of wet weather.

For this site, groundwater seepage during construction and in the long-term should be readily controlled by "sump-and-intermittent pump" systems within a drained basement.

It is understood that a drained basement is the preferred option for the development. As indicated in Section 8.3 of DP geotechnical report, it is anticipated that groundwater seepage should be readily controlled by perimeter drains connected to a "sump-and-intermittent pump" system which is used to collect seepage for disposal via the stormwater drainage system. This type of system does not involve pumping to extract groundwater or lowering of a permanent water table at this site.

It would be prudent to monitor the seepage flows during the excavation works to confirm and/or re-assess the proposed sump and pump system capacity and to assess water quality. Pressure grout injection techniques could be used in areas where higher flows occur, if encountered, to reduce inflow rates.

#### **4.0 Conclusion**

It is considered that the temporary or long-term collection and disposal of seepage associated with a drained basement should be possible on this site and should not have a significant impact on groundwater flows or licensed groundwater users surrounding the site.

We consider that a Temporary Dewatering Licence under Part V of the Water Act 1912 is not necessarily applicable for this site and the proposed development, which will involve management of perched seepage flows. It will be necessary, however, to obtain approval from Council or the relevant consent authority prior to disposal of the collected seepage to the stormwater system or creek.

We trust the above satisfies your present requirements. Please contact the undersigned if you have any further questions or wish to discuss these issues further.

Yours faithfully

**Douglas Partners Pty Ltd**



**Gavin Boyd**

Geotechnical Engineer

Reviewed by



**Grahame Wilson**

Principal

Attachments: Responses to the Specific Comments raised by the NSW Department of Water  
Total Earth Care Report

### Specific Comments raised by NSW Office of Water – Attachment A

Item	DP Response
The predicted highest groundwater table at the site	Refer to Table 1 of Section 5 of DP's geotechnical report
Any works likely to intercept, connect or infiltrate the groundwater sources	Refer to comments provided in letter above
Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes	Groundwater extraction is not proposed on site
A description of the flow directions and rates and physical and chemical characteristics of the groundwater source	Groundwater seepage flow and rates are generally expected to be dependent on the characteristics and orientation of fractures within the bedrock on site. However, the seepage will generally flow within these fractures in a direction following the natural landform gradients. The physical and chemical characteristics of the seepage water to be determined during excavation for disposal purposes.
The predicted impacts of any final landform on the groundwater regime	The excavation will act as a localised drainage point for groundwater seepage on-site. Given the presence of the existing development on-site (eg existing buildings and excavations largely covering the proposed development footprint) the total effect on the groundwater regime is likely to be minimal.
The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts	Existing groundwater licence users are considered too far away to be adversely affected by this proposed development.
An assessment of the quality of the groundwater for the local groundwater catchment	Refer to Total Earth Cares report for comments on the ecological impacts in the area.  The quality of the groundwater in the local catchment was not assessed as the nature of the proposed development is not likely to adversely affect groundwater quality, either on-site or regionally.
How the proposed development will not potentially diminish the current quality of groundwater, both in the short and long term	Groundwater seepage, flowing into the excavation is not likely to diminish the quality of the groundwater in the short or long-term
Measures for preventing groundwater pollution so that remediation is not required	Groundwater seepage will flow into the excavation and be collected in a sump pit. Water will be tested for appropriate disposal upon excavation.
Protective measures for any groundwater dependent ecosystems	Refer to Total Earth Care's Report
Proposed methods of the disposal of waste water and approval from the relevant authority	Approval will need to be obtained from the relevant authority for the disposal of rainwater and groundwater seepage collected in the excavation
The results of any models or predictive tools used	NA





6<sup>th</sup> April 2011

Stamford Property Services  
PO Box R685 Royal Exchange  
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Attention: Mr Anthony Rice

Subject: Groundwater Dependent Ecosystems

Dear Mr. Rice,

The purpose of this letter is to provide additional information related to the potential for impact to Groundwater Dependent Ecosystems (GDEs) from the proposed development at 110-114 Herring Rd Macquarie Park (MP 10\_0112 & 10\_0113).as raised in the letter from NSW Planning dated 23 March 2011. Specifically, the letter requests that the Environmental Assessment for the project further consider the issues raised by the NSW Office of Water at item 11 of the Director General's Requirements. The DGRs in turn refer to Attachment A provided by the NSW Office of Water dated 7 October 2010 which sets out the groundwater management issues to be addressed, and the section related to GDEs is considered below.

This letter has been prepared by Robert Blackall with the assistance of Lachlan Laurie, Project Officer within the TEC Environmental Consulting Division. The following information has been consulted in the preparation of this letter:

- The NSW State Groundwater Dependent Ecosystems Policy (DLWC 2002);

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- Relevant sections of the Report on Geotechnical Investigations (Douglas Partners 2011); and
- The Flora & Fauna Assessment (TEC 2010).

As part of the geotechnical investigations three standpipes were installed to depths of 14.0m, 16.0m and 11.8m to monitor groundwater levels, with groundwater levels measured on three occasions (Douglas Partners 2011). Table 1 of the Douglas Partners report shows the water level results for December 2010 and January 2011, indicating an average water depth from the existing surface of 4.5m, 11.6m and 2.6m in Bores 103, 110 and 116 respectively. The report notes that groundwater levels were variable and appear to be either groundwater seepage flowing over or near the soil/rock interface (Bore 116) or through fractures in the rock, particularly after wet weather. The water levels are within high strength sandstone at depth in bores 103 and 110, and are therefore not considered to be significant as part of the lifecycle of groundwater dependent surface terrestrial plants and fauna.

The locality of the subject site has been mapped for the current proposal as Sydney Turpentine Ironbark Forest (STIF) (TEC 2010). While this is an Endangered Ecological Community (EEC), it has not been identified as part of the EEC nomination as a Groundwater Dependent Ecosystem (GDE). Terrestrial vegetation may depend to varying degrees on the diffuse discharge of shallow groundwater, to sustain transpiration and growth through a dry season. However, all characteristic plant species for this community are not wholly or partly seasonally dependent upon groundwater, nor are the presumed ecological processes for STIF, or communities that STIF is representative of (as per The Groundwater Dependent Ecosystems Policy, Department of Land & Water Conservation 2002).

GDEs do occur in the broader locality, including the EECs Swamp Oak Floodplain Forest, Swamp Sclerophyll Forest, Sydney Freshwater Wetlands and Coastal Saltmarsh, however, the current proposal is considered unlikely to significantly affect the immediate ecological communities or those in the locality. The subject site does not occur on a floodplain, does

not sit upon shallow bed-rock, does not show evidence of a high water table, is not traversed by streams and occurs at the edge of a shallow spur defining two sub-catchments.

The Groundwater Dependent Ecosystems Policy (Department of Land & Water Conservation 2002) recommends the Rapid Assessment Process for Groundwater Dependent Ecosystems as a tool for identifying and valuing GDEs. The results of these steps, when applied to ecosystems tested against this rapid assessment process in the locality, are described below.

- The subject site occurs in the sub-catchment of University Creek, Macquarie Park. This sub-catchment drains into the Lane Cove River. The Lane Cove River in the locality runs through Lane Cove National Park, which does contain ecosystems that can be assessed as GDEs. These GDEs include wetlands, ecosystems in streams fed by groundwater, springs and hanging swamps. The immediate subject site contains STIF which is not considered an ecosystem that is a GDE, and any changes in the groundwater level will not impact this community significantly. STIF remnants also occur scattered throughout the locality, and again the impact to these as a result of groundwater interception at varying depths is not thought to be significant.
- The subject site and study area's natural vegetation remnants are representative of STIF, which is not considered a vegetation community that is a GDE. To the north, north-east and east of the subject site, in the broader locality, vegetation communities occur in the Lane Cove River valley that to varying degrees are GDEs. In addition to the EECs listed above, GDEs in the locality include terrestrial cliffsoaks, hanging swamps and base flow communities associated with streams.
- These GDEs occur as part of a larger contiguous area of bushland that is found approximately 1 km away from the subject site. The GDEs found in this nearest area of contiguous bushland are limited to non-EECs that are likely to be somewhat seasonally dependent upon groundwater, albeit generally restricted to dry times. While these communities could be dependent upon alluvial and



sedimentary rock groundwater systems, the effect on groundwater flow, level and quality from the project located some distance from these communities is not considered likely to significantly affect the function of GDEs.

While not quantified here, any potential change as a result of the project on the recharge of groundwater systems and groundwater quality is not considered likely to significantly impact GDEs in the vicinity of the site. The rate and extent of seepage expected during excavation, although not possible to be estimated, is anticipated to be low (Douglas Partners 2011). The identified Bulk Excavation Levels near to these three bore locations is below the average measured water level, indicating that groundwater seepage will be intercepted.

As discussed above, the potential impact to GDEs in the vicinity of the site as a result of the project is not considered to be significant, and therefore no specific safeguard measures for the protection of GDEs are required.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'R Blackall', written in a cursive style.

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