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Environmental Assessment

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Our Ref: B1929

17 July 2012

The Director General  
Department of Planning and Infrastructure  
GPO Box 39  
**SYDNEY NSW 2000**

Dear Director-General,

**Modification to DA 250-09-01 (Mod 3)**  
**Lots 1 & 2, DP 547255**  
**Old Northern Road, Maroota**

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With reference to the responses to the exhibition of the Environmental Assessment for the subject modification, we provide the following information for your consideration.

**Transport Roads & Maritime Services**

By letter dated 16 January 2012, Transport Roads & Maritime Services indicated that:

*The RTA has reviewed the information provided and raises no objection to the development application as the proposal does not alter the quantity of production and the number of truck movements at the site.*

No response to the above submission is required.

**NSW Environment Protection Authority**

By letter dated 7 February 2012, the EPA made the following comments:

*The EPA has reviewed the proposed modification proposal to reinstate permission to extract from Lot 29 and 196 DP 752025 previously given by DC No.796/00/HE and now expired, and to deepen the approved extraction level on Lot 196 DP 752025 for extraction of additional material available on that Lot.*

*Based on the information provided by Nexus Environmental Planning in their groundwater investigation report for the site, EPA's main concern is protection of the groundwater in the extraction area. Although it has been stated in the modification proposal that the extraction on Lot 196 will not occur within 2m of the wet weather*

*highest groundwater level, but in the absence of sufficient knowledge of groundwater fluctuations it will be difficult to ensure extraction will not occur within 2m of wet weather high ground water level. However, if NSW Planning & Infrastructure wants to approve the deepened extraction level on Lot 196, it should make sure that there is enough safeguard in the DC to prevent any possible pollution of groundwater on the Lot.*

*Otherwise, EPA has no objection for the proposed modification and trust that the existing Environment Protection Licence (No.3916) conditions for the site will be sufficient for appropriate regulation of the site.*

The detail provided in the Environmental Assessment with regard to the impact of the proposed modification on groundwater, and the additional information contained in the 5 June 2012 letter from RPS Aquaterra to the NSW Office of Water (**Attachment 1**), is sufficient to ensure that the proposed depth of extraction on Lot 196 would not have any impact on the wet weather groundwater level on the site. Suitable conditions are in place to ensure that such extraction does not proceed to within 2m of the identified wet weather groundwater level.

### **The Hills Shire Council**

The Hills Shire Council, by letter dated 19 December 2011, made the following comments:

- (i) *Provide an assessment under Baulkham Hills Draft LEP 2010 which is currently with DOPI for gazettal.*
- (ii) *Provide a detailed assessment of the proposal against the provisions of Part D Section 6 - Extractive Industries.*
- (iii) *Ensure that consideration has been provided to any increased or additional impact to the Maroota Public School.*
- (iv) *The Statement indicates that Development Consent 796/2000/HE was valid until 22 March 2010. Detailed comments are required to be provided regarding any activities which have occurred on the site with no consent from that date until the current time.*
- (v) *You are requested to advise Council when Development Consent 796/2000/HE is surrendered as outlined within the Statement.*
- (vi) *Undertake a detailed assessment of the proposed additional depth of extraction on Lot 196 and whether this is appropriate to be considered as a modification application, particularly given the increase depth of extraction and that Development Consent 250-09-01 did not relate to extraction on Lots 29 and 196 DP 752025.*

Comment on (i): We have reviewed draft Baulkham Hills LEP 2010 as provided on the Council web site. The subject land is proposed to fall within the RU1 zone of that instrument and extractive industry is a use which is permitted with consent in that zone. There are no other provisions of the draft LEP

which are not already provided for in LEP 2005 which has been addressed in the Environmental Assessment.

- Comment on (ii): It is assumed that this comment relates to Part D Section 6 - Extractive Industries of the Baulkham Hills Development Control Plan. The Development Control Plan has been suitably addressed in Part 3.1.2 of the Environmental Assessment.
- Comment on (iii): The proposed development would result in an increased depth of extraction on Lot 196 as detailed in the Environmental Assessment. There would be no increase in truck movements, hours of operation or impacts such as acoustic impact to the Maroota Public School as part of the proposed modification. As such, there is no additional impact expected to the Maroota Public School.
- Comment on (iv): As detailed in Part 1 of the Environmental Assessment, Condition 3.1 of Development Consent 796/2000/HE states:

### **3.1 Life of Consent**

*Consent for the purposes of extraction of material and rehabilitation is limited to a period of ten (10) years effective from the endorsed date of this consent (operational consent is twenty-eight (28) days after consent is issued, i.e. consent lapses on 22 March 2010).*

*The continuation of extraction on the site is subject to review on an annual basis, in accordance with Part 6 of this consent.*

Dixon Sand has advised that Condition 3.1 has been complied with.

The Environmental Assessment also states that:

*Development Consent No.250-09-01 was issued by the Land and Environment Court on 24 May 2004 (refer Diamond v Minister for Planning New South Wales and Another (No 2) [2004] NSWLEC 254) for:*

*The operation of an extractive industry on Lots 1 and 2 DP 547255; the continued use of the existing central processing plant on Lot 196, DP 752025; and water management and rehabilitation operations over Lots 1 and 2, DP 547255, and Lots 29 and 196, DP 752025 ....*

Activity which has continued on Lot 196 and Lot 29 has been in accordance with Development Consent No.250-09-01.

- Comment on (v): The Council will be notified of the surrender of Development Consent 796/2000/HE as required by the relevant legislation.

Comment on (vi): As stated in Part 1.7 of the Environmental Assessment, the then Department of Planning has advised that the then s.75W modification provisions of the Environmental Planning and Assessment Act 1979 can be used to give effect to the proposed modification.

### **NSW Resources & Energy**

By letter dated 16 January 2012, NS Resources & Energy made the following comments:

*Sand (other than marine aggregate), loam, river gravel, and coarse aggregate materials such as basalt, sandstone, and granite and most other extractive materials are not prescribed minerals under the Mining Act, 1992. Therefore, DTIRIS–Mineral Resources Branch has no statutory role in authorising or regulating the extraction of these commodities, apart from its role under the Work Health & Safety Act 2011 and the Mine Health and Safety Act 2004 and associated regulations, for ensuring the safe operations of mines and quarries.*

*DTIRIS–Mineral Resources Branch has reviewed the subject Environmental Assessment and is satisfied that sufficient information has been provided to demonstrate the presence of a substantial resource of sand and sandstone. The community is likely to benefit from the exploitation of that resource, provided that appropriate operational and environmental standards can be satisfied.*

*DTIRIS - Mineral Resources Branch collects data on the quantity and value of construction materials produced annually throughout the State. Forms are sent to all operating quarries at the end of each financial year for this purpose. The statistical data thus collected is of great value to Government and industry in planning and resource management, particularly as a basis for analysing trends in production and for estimating future demand for particular commodities or in particular regions. In order to assist in the collection of construction material production data, it is requested that the proponent makes a commitment to provide annual production data to DTIRIS - Mineral Resources Branch.*

Dixon Sand currently provides data to DTIRIS - Mineral Resources as requested above. There would be no change to the reporting following the approval of the proposed modification.

### **NSW Department of Primary Industries Office of Water**

By letter dated 19 April 2012, the NSW Office of Water states:

*The documents supplied have been reviewed and the Office of Water advises that the proposal cannot be supported for the following reasons:*

- *The EA does not adequately consider the potential impacts or alteration of the hydrogeologic regime resulting from the proposal on groundwater dependent environmental receptors such as wetlands, or existing licensed and basic rights water users.*

- *The applicant has not reasonably demonstrated the likely impacts of the proposed development on groundwater, by not adequately investigating the extent of the gazetted Maroota Sand Groundwater Source or the implications of the quarry deepening on the shallow aquifer.*
- *The EA does not consider the requirements of the Water Sharing Plan for the Greater Metropolitan Groundwater Sources 2011, including the two gazetted groundwater sources that are located on the subject properties.*
- *The current development consents reflect the judgements of the Land and Environment Court and the NSW Office of Water respects the integrity of the Land and Environment Court judgement and does not believe that it is appropriate to seek to alter the conditions imposed by this jurisdiction.*
- *The proposal is not consistent with Baulkham Hills Local Environmental Plan 2005, nor the relevant part of the Baulkham Hills Development Control Plan 2007, in that the proposed deepening of quarrying will intersect and remove the groundwater system which to date has been protected by the provisions of those instruments.*

*In summary the NSW Office of Water does not agree that the groundwater intersected at shallow depth beneath the site is a 'localised perched aquifer' but considers that it is either part of, closely hydrogeologically connected to, the shallow aquifer that has been defined as the Maroota Sand Groundwater Source within the "Water Sharing Plan for the Greater Metropolitan Groundwater Sources 2011". Because of the significant impacts anticipated on the Maroota Sand Groundwater Source, existing licensed users and supported groundwater dependent ecosystems, as well as the conditions imposed by other jurisdictions, the modification application cannot be supported.*

A meeting was held with the NSW Office of Water to discuss the above comments. A detailed response has been prepared by RPS Aquaterra, a copy of which is at **Attachment 1**. The RPS Aquaterra response states:

*Further to a recent meeting with New South Wales Office of Water (NOW) on the 1 May 2012, this letter has been prepared to address the issues raised by NSW Office of Water in respect of the groundwater impact assessment for the Modification to Old Northern Road Quarry (RPS Aquaterra, 2011).*

*In summary we are of the view that NSW Office of Water's technical comments are generally addressed by our Groundwater Assessment. Many of NSW Office of Water's comments appear to stem from their concern that the EA does not explicitly consider the requirements for the Water Sharing Plan (WSP) for the Greater Metropolitan Groundwater Sources and in particular, groundwater related impacts to the Maroota Tertiary Sands Groundwater Source.*

*This is because there was some misunderstanding that the modification also involved mining at the neighbouring 'Cornford' site (situated on Lot 1//204159) which is located inside the inferred boundary of the Maroota Tertiary Sands Groundwater Source..... This*

*is not the case, as the modification involves deepening of the existing NW pit on Lot 196//752025 only, which is in an area where the Maroota Tertiary Sands Groundwater Source has been confirmed by our study to be absent.*

*Furthermore, deepening of the NW pit on Lot 196//752025 will not intercept the regional groundwater table in the underlying Sydney Basin Central Groundwater Source, and therefore the proposal will not result in the taking of groundwater from either gazetted groundwater source.*

*As such, the proposed modification (250-09-01 Mod. 3) is in accordance with the provisions of the WSP for the Metropolitan Region Groundwater Sources.*

RPS Aquaterra concludes:

- *The Groundwater Assessment for Dixon Sand Operations Maroota has addressed, and taken into account, all the applicable rules as per the rules summary sheet for both the Maroota Tertiary Sands Groundwater Source, and the Sydney Basin Central Groundwater Source and therefore the Modification is in accordance with the provisions of the WSP for the Metropolitan Region Groundwater Sources.*
- *Many of NSW Office of Water's comments relating to the Maroota Tertiary Sands Groundwater Source appear to arise from a misunderstanding that the proposal includes development to the 'Cornford' site (Lot 1//204159) which is incorrectly mapped as being underlain with Maroota Tertiary Sands Groundwater Source. No development on that lot is included in the proposal.*
- *The only planned location of development is the north-western corner of Lot 196//752025, where our study has confirmed that no Maroota Tertiary Sands Groundwater deposits are present.*
- *Deepening of the NW pit will not intercept Maroota Tertiary Sands Groundwater Source.*
- *Deepening of the NW pit will not intercept the regional groundwater table in the underlying Sydney Basin Central Groundwater Source, and therefore the proposal will not result in the abstraction of groundwater from either gazetted groundwater source.*
- *Deepening of the NW pit will not abstract from, or intercept any groundwater source.*
- *The pit extension will remain in the unsaturated horizons and at least 16.5m above the regional groundwater level in the Sydney Basin Central Groundwater Source.*
- *The localised perched groundwater identified in the study is not hydrogeologically connected to the shallow Maroota Tertiary Sands*

*Groundwater Source, as this source is absent from the area.*

In response to the 5 June 2012 letter from RPS Aquaterra, the NSW Office of Water, by letter dated 9 July 2012 (refer **Attachment 2**) stated, among other things:

*The NSW Office of Water has reviewed the additional information provided in your recent letter and has subsequently determined that the application be permitted for the proposed deepening of the sand quarry in the north-western corner of the property only.*

In light of the above, there is now no impediment to the proposed development from and groundwater impact perspective.

We trust the above and attached information is satisfactory. If additional information is required, please contact Mr Neil Kennan of this office.

Yours faithfully,

**NEXUS ENVIRONMENTAL PLANNING PTY LTD**

per:



**Neil Kennan**

## **Attachment 1**



Our Ref: S95/036a  
Date: 5 June 2012

Jeremy Cork  
NSW Office of Water  
Department of Primary Industries  
Level 4  
2 to 6 Station Street  
Penrith NSW 2750

Dear Jeremy,

**RE: Modification to Old Northern Road Quarry (250-09-01 Mod 3) Exhibition of Environmental Assessment**

Further to a recent meeting with New South Wales Office of Water (NOW) on the 1 May 2012, this letter has been prepared to address the issues raised by NSW Office of Water in respect of the groundwater impact assessment for the Modification to Old Northern Road Quarry (RPS Aquaterra, 2011).

We have responded to the following issues put forward by NSW Office of Water as to why the proposed pit extension development at Dixon Sand Operations cannot be supported;

- *The EA does not adequately consider the potential impacts of alteration of the hydrogeologic regime resulting from the proposal on groundwater dependent environmental receptors such as wetlands, or existing licensed and basic rights water users.*
- *The applicant has not reasonably demonstrated the likely impacts of the proposed development on groundwater, by not adequately investigating the extent of the gazetted Maroota Sand Groundwater Source or the implications of the quarry deepening on the shallow aquifer.*
- *The EA does not consider the requirements of the Water Sharing Plan for the Greater Metropolitan Groundwater Sources 2011, including the two gazetted groundwater sources that are located on the subject properties.*
- *The current development consents reflect the judgements of the Land and Environment Court and the NSW Office of Water respects the integrity of the Land and Environment Court judgement and does not believe that it is appropriate to seek to alter the conditions imposed by this jurisdiction.*
- *The proposal is not consistent with Baulkham Hills Local Environmental Plan 2005, nor the relevant part of the Baulkham Hills Development Control Plan 2007, in that the proposed deepening of quarrying will intersect and remove the groundwater system which to date has been protected by the provisions of those instruments.*

In summary we are of the view that NSW Office of Water's technical comments are generally addressed by our Groundwater Assessment. Many of NSW Office of Water's comments appear to stem from their concern that the EA does not explicitly consider the requirements for the Water Sharing Plan (WSP) for the Greater Metropolitan Groundwater Sources and in particular, groundwater related impacts to the Maroota Tertiary Sands Groundwater Source.

This is because there was some misunderstanding that the modification also involved mining at the neighbouring 'Cornford' site (situated on Lot 1//204159) which is located inside the inferred boundary of the Maroota Tertiary Sands Groundwater Source (Figure 1). This is not the case, as the modification involves deepening of the existing NW pit on Lot 196//752025 only, which is in an area where the Maroota Tertiary Sands Groundwater Source has been confirmed by our study to be absent.

Furthermore, deepening of the NW pit on Lot 196//752025 will not intercept the regional groundwater table in the underlying Sydney Basin Central Groundwater Source, and therefore the proposal will not result in the taking of groundwater from either gazetted groundwater source.

As such, the proposed modification (250-09-01 Mod. 3) is in accordance with the provisions of the WSP for the Metropolitan Region Groundwater Sources.

Detailed responses to the reasons NSW Office of Water has advised why the proposal cannot be supported are presented overleaf.

## **1. RESPONSE TO THE ISSUES RAISED BY NSW Office of Water**

### **1.1 Response to Issue 1 and 2**

- *The EA does not adequately consider the potential impacts of alteration of the hydrogeologic regime resulting from the proposal on groundwater dependent environmental receptors such as wetlands, or existing licensed and basic rights water users.*
- *The applicant has not reasonably demonstrated the likely impacts of the proposed development on groundwater, by not adequately investigating the extent of the gazetted Maroota Sand Groundwater Source or the implications of the quarry deepening on the shallow aquifer.*

This suggestion by NSW Office of Water that the EA did not adequately investigate the extent of the shallow Maroota Tertiary Sands Groundwater Source, or the implications of the quarry deepening on the shallow aquifer shows that an incorrect assumption has been made as to the actual location of the proposed modification. The incorrect assumption is that the modification also involved quarrying at the neighbouring 'Cornford site' (Lot 1//204159) to the east of the existing Dixon Sand Site (Lot 196//752025). The extent of Maroota Tertiary Sands Groundwater Source, as shown in the WSP identified that the 'Cornford site' was underlain by the Maroota Tertiary Sands Groundwater Source (Figure 1). Further clarification was provided to NSW Office of Water at the meeting that no development whatsoever was currently planned for the 'Cornford site' where the Maroota Tertiary Sands Groundwater Source is thought to be present. The correct location where the only development is planned is to the north-western corner of Lot 196//752025 ('NW pit'), in an area where the Maroota Tertiary Sands Groundwater Source has been confirmed by our study to be absent (Figure 1). Furthermore, in the event that the Maroota Sands Groundwater Source was nearby, there would be no impact. The existing quarry is already deeper than the base of the Maroota Sands if it was present. There has been no reported inflow from the pit face which would suggest indirect drainage from the Maroota Sand. Hence, deepening would not cause any impact to the Maroota Sands.

The modification comprises the deepening of the NW pit on Lot 196//752025 into the unsaturated zone overlying the Sydney Basin Central Groundwater Source. The Sydney Basin Central Groundwater Source is the only groundwater source that underlies the NW pit. This groundwater source will not be impacted as the deepest planned extent of the pit - 127.5mAHD, is at least 16.5m above the elevation of the regional water table (Figure 2A & 2B). Neighbouring licensed users which target the Sydney Basin Central Groundwater Source are listed in Section 6.2 (and shown on Figure 3.1) of the Groundwater Assessment. These users will not be impacted as the NW pit will not intercept this source. Likewise there are no wetlands and Groundwater Dependent Ecosystems (GDE's) present in the area that could be impacted. This is because neither groundwater source will be intercepted by the deepening of the NW pit. The deepest level of the pit will remain in the unsaturated zone. Therefore the pit cannot possibly interfere with any flows discharging to or from any GDEs.

A number of boreholes (BH1, GW105047 and GW105044) have been drilled on Lot 196//752025, in close proximity to the location of NW pit. Bore GW10544 is located within the inferred boundary of the Maroota Tertiary Sands Groundwater Source and bores BH1 and GW105047 are located to the west of the Maroota Tertiary Sands Groundwater Source (Figure 1). A summary of the horizons encountered in these boreholes is shown in Table 1 below. Note that in all three boreholes no sand horizon was encountered. This site specific evidence confirms that the Maroota Tertiary Sands Groundwater Source does not underlie and is not situated close to the NW pit area. The full drilling logs of the boreholes (including the composite bore logs for BH1 to BH3 that were drilled as part of this study) are provided in Appendix A.

**Table 1: Summary of horizons encountered in the vicinity of the NW pit**

BH1		GW105047		GW105044	
Horizon	Depth (mbgl)	Horizon	Depth (mbgl)	Horizon	Depth (mbgl)
Sands	Not encountered	Sands	Not encountered	Sands	Not encountered
Sandstone-	0 – 74.5	Fill	0 – 0.2	Soft sandstone	0 – 12.5
		Shale / Clay / Sandstone	0.2 – 5.5	Sandstone with intermittent quartz, shale, clay and ironstone horizons-	12.5 - 135-
		Sandstone with Ironstone bands	5.5 - 16		
		Sandstone with intermittent quartz, clay and shale horizons	16 – 156.8		

Furthermore, geological logs obtained from a large number of boreholes which have been drilled further to the east (BH2 and BH3) and south east of the NW pit extension area (GW048741, GW0834628, GW108133 etc) do not show any evidence of the Maroota Tertiary Sands Groundwater Source where it is shown in the WSP, suggesting that the extent of this source is incorrect and the boundary is probably much further south than the WSP indicates (Figure 1). This means that the Maroota Tertiary Sands Groundwater Source is at least 1.5km from the NW pit extension area, rather than 120m as the WSP indicates.

The drilling logs also indicate a number of clay and shale horizons present at depth in the Hawkesbury Sandstone. There is the possibility that small perched accumulations of groundwater may be present overlying these horizons. Occurrences of these perched groundwater lenses will be intermittent and small in volume. Due to the depth at which they are encountered, they cannot be hydrogeologically connected to the Maroota Tertiary Sands Groundwater Source.

In summary:

- The Maroota Tertiary Sands Groundwater Source does not underlie the proposed NW pit extension area (Lot 196).
- The deepening of the NW pit will proceed to a depth that is at least 16.5m above the underlying Sydney Basin Central Groundwater Source.
- The pit extension does not involve contact with, or the removal of groundwater from either of the two gazetted groundwater sources in the region, (Maroota Tertiary Sands Groundwater Source and the Sydney Basin Central Groundwater Source).
- The pit extension will remain in the unsaturated zone above the Sydney Basin Central Groundwater Source.
- Neighbouring licensed users whose bores target the Sydney Basin Central Groundwater Source will not be impacted as the NW pit will not intercept this source.
- There are no wetlands and GDEs present in the area that could be impacted, as neither groundwater source will be intercepted by the deepening of the NW pit which remains in unsaturated geology. Therefore no discharges to / from GDEs can possibly be effected.
- Site specific data has proven that the Maroota Tertiary Sands Groundwater Source is absent from Lot 196, and the boundary is at least 1.5km further to the south east from the NW pit extension than the WSP mapping indicates.
- The localised perched groundwater identified in the study is not hydrogeologically connected to the shallow Maroota Tertiary Sands Groundwater Source, as this aquifer is absent from the area.

## 1.2 Response to Issue 3

- *The EA does not consider the requirements of the Water Sharing Plan for the Greater Metropolitan Groundwater Sources 2011, including the two gazetted groundwater sources that are located on the subject properties.*

As discussed at the meeting and in the responses above, there is only one gazetted groundwater source underlying the development area - the Sydney Basin Central Groundwater Source. The requirements of the WSP, as outlined in the Rules summary sheet, were not addressed in the EA because the deepening of the NW pit does not involve contact with, or the removal of water from either the Sydney Basin Central Groundwater Source, or the Maroota Tertiary Sands Groundwater Source. The deepening of the NW pit only extends into unsaturated geology.

For further clarity, all of the rules and requirements of the Water Sharing Plan for both the Maroota Tertiary Sands Groundwater Source and the Sydney Basin Central Groundwater source are shown in Table 2 and Table 3 respectively below. Also detailed in these tables are explanations of the compliance by the proposal with the rules for each respective water sharing plan. The rules are not applicable to the proposed NW pit extension.

**Table 2: Rules summary sheet for the Maroota Tertiary Sands Groundwater Source**

Access Rules	Relevance for this development	Reason why rule is not applicable
Granting of access licences may be considered for a listed number of activities	Not applicable	<ul style="list-style-type: none"> <li>No application licence is being sought. This groundwater source is absent from Lot 196 and has been confirmed by our study to be at least 1.5km from Lot 196 and not present in the location shown by the WSP (<b>Figure 1</b>).</li> </ul>
Rules for managing water allocation accounts		
Carryover	Not applicable	<ul style="list-style-type: none"> <li>No application licence is being sought and therefore no water allocation accounts need to be amended;</li> <li>No interception whatsoever of the groundwater source will take place.</li> </ul>
Rules for managing access licences		
Managing surface and groundwater connectivity	Not applicable	<ul style="list-style-type: none"> <li>The existing pit is &gt;40m from the high bank of any river or creek;</li> <li>The extension of the pit will not intercept the groundwater source.</li> </ul>
Rules for granting or amending water supply works approvals		
To minimise interference between neighbouring water supply works	Not applicable	<p>The extent of the Maroota Tertiary Sands Groundwater Source is incorrectly shown in the WSP to be 120m from the NW pit. Our study has confirmed that this source is not present where it is shown in the WSP and that the NW pit is at least 1.5km from this source and any groundwater licenses that may associated with it. The closest bore (GW106261) which is located on another landholding, inside the inferred boundary of the Maroota Tertiary Sands Groundwater Source is ~1km from the NW Pit (<b>Figure 1</b>). However the bore depth (30m) and geological logs obtained from surrounding bores (such as GW048741 &amp; GW105192) confirm that this bore actually targets the Sydney Basin Central Groundwater Source as they do not show any evidence of Maroota Tertiary Sands in this area (<b>Appendix A</b>). It can therefore be said that the modification satisfies the following rules:</p> <ul style="list-style-type: none"> <li>The pit extension is &gt;100m from an aquifer access licence bore on another landholding;</li> <li>The pit extension is &gt;1000m from a local or major water utility bore;</li> <li>The pit extension is &gt;200m from a NSW Office of Water monitoring bore;</li> <li>The pit extension is 100m from the closest active groundwater licence. This bore is owned and utilised by Dixon Sand Operations Ltd and targets the underlying Sydney Basin Central Groundwater Source</li> </ul>
To protect bores located near contamination	Not applicable	<ul style="list-style-type: none"> <li>No application licence is being sought;</li> <li>No areas of contamination have been identified within 500m of the pit extension;</li> <li>The pit extension does not intercept or abstract groundwater and therefore will not impact hydraulic gradients, or facilitate the mobilization of any contamination in the vicinity;</li> <li>The pit extension remains entirely in the unsaturated zone.</li> </ul>
To protect bores located near sensitive environmental areas	Not applicable	<ul style="list-style-type: none"> <li>No water supply works are being carried out as part of the pit extension;</li> <li>No interception of the groundwater source will take place;</li> <li>The pit extension remains entirely in the unsaturated zone and therefore will not impact any discharges to / from sensitive environmental areas.</li> </ul>
To protect groundwater dependent culturally significant sites	Not applicable	<ul style="list-style-type: none"> <li>The pit extension is &gt;100m from existing bores abstracting from the aquifer;</li> <li>The pit extension does not intercept any groundwater source;</li> </ul>
Rules for replacement groundwater water supply works	Not applicable	<ul style="list-style-type: none"> <li>No replacement groundwater work is being applied for.</li> </ul>
Rules for the use of water supply works approvals		

Access Rules	Relevance for this development	Reason why rule is not applicable
To manage bores located near contaminated sites	Not applicable	<ul style="list-style-type: none"> <li>No groundwater source is being abstracted or intercepted for any purpose</li> </ul>
To manage the use of bores within restricted distances	Not applicable	<ul style="list-style-type: none"> <li>No groundwater source is being abstracted or intercepted for any purpose</li> </ul>
To manage the impacts of extraction	Not applicable	<ul style="list-style-type: none"> <li>No groundwater source is being abstracted or intercepted for any purpose</li> </ul>
Limits to the availability of water		
Available water determinations (AWDs)	Not applicable	<ul style="list-style-type: none"> <li>No groundwater source is being abstracted or intercepted for any purpose</li> </ul>

**Table 3: Rules summary sheet for the Sydney Basin Central Groundwater Source**

Access Rules	Relevance for this development	Reason why rule is not applicable
Granting of access licences may be considered for a listed number of activities	Not applicable	<ul style="list-style-type: none"> <li>No access licence is being sought as the pit development does not intercept the groundwater source;</li> <li>The deepest extent of the pit will remain at least 16.5m above the elevation of the regional water table level.</li> </ul>
Rules for managing water allocation accounts		
Carryover	Not applicable	<ul style="list-style-type: none"> <li>No access licence is being sought and therefore no carryover is needed;</li> <li>The pit extension does not intercept the regional water table level.</li> </ul>
Rules for managing access licences		
Managing surface and groundwater connectivity	Not applicable	<ul style="list-style-type: none"> <li>No access licence is being sought;</li> <li>The existing pit is &gt;40m from the high bank of any river or creek (See Figure 2A &amp; 2B);</li> <li>The extension of the pit will not intercept the groundwater source whatsoever (Figure 2A &amp; 2B).</li> </ul>
Rules for granting and amending water supply works approvals		
To minimise interference between neighbouring water supply works	Not applicable	<ul style="list-style-type: none"> <li>The pit &gt;100m from an aquifer access licence bore on another landholding. The closet licensed bore (GW100651) on another land holding is located 500m from the NW pit and its status is listed as Active-Current. Neighbouring bores with groundwater licences range from 83mbgl - 200mbgl and target the Sydney Basin Central Groundwater Source (Figure 1);</li> <li>The pit extension is &gt;1000m from a local or major water utility bore;</li> <li>The pit extension is &gt;200m from a NSW Office of Water monitoring bore;</li> </ul>
To protect bores located near contamination	Not applicable	<ul style="list-style-type: none"> <li>No application licence is being sought;</li> <li>No areas of contamination have been identified within 500m of the pit extension;</li> <li>The pit extension does not intercept or abstract the groundwater and therefore will not impact hydraulic gradients, or facilitate the mobilization of any contamination in the vicinity;</li> <li>The pit extension remains entirely in the unsaturated zone.</li> </ul>
To protect water quality	Not applicable	<ul style="list-style-type: none"> <li>The pit floor will be at least 16.5m above the regional groundwater level of the aquifer and therefore does not intercept it;</li> <li>The pit extension remains in the unsaturated zone and therefore cannot possibly initiate the onset of saline intrusion to the aquifer.</li> </ul>

Access Rules	Relevance for this development	Reason why rule is not applicable
To protect bores located near sensitive environmental areas	Not applicable	<ul style="list-style-type: none"> <li>• No water supply works are being carried out as part of the pit extension;</li> <li>• No interception of the groundwater source will take place;</li> <li>• The pit extension remains entirely in the unsaturated zone and therefore will not impact any discharges to / from sensitive environmental areas.</li> </ul>
To protect groundwater dependent culturally significant sites	Not applicable	<ul style="list-style-type: none"> <li>• The pit extension is &gt;500m from existing bores abstracting from the aquifer;</li> <li>• The pit extension does not intercept the groundwater source ;</li> <li>• The pit extension remains entirely in the unsaturated zone and does not impact any discharges to / from groundwater dependent culturally significant sites.</li> </ul>
Rules for replacement groundwater works	Not applicable	<ul style="list-style-type: none"> <li>• No replacement groundwater work is being applied for;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
Rules for the use of water supply works approvals		
To manage bores located near contaminated sites	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought and therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
To manage the use of bores within restricted distances	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought and therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
To manage the impacts of extraction	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought and therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
Limits to the availability of water		
Available water determinations (AWDs)	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought and therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
Trading Rules		
INTO groundwater source	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
WITHIN groundwater source	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>
Conversion to another category of access licence	Not applicable	<ul style="list-style-type: none"> <li>• No application licence is being sought therefore no groundwater abstraction will take place;</li> <li>• The pit extension does not intercept the groundwater source.</li> </ul>



### 1.3 Response to Issue 4 and 5

- *The current development consents reflect the judgements of the Land and Environment Court and the NSW Office of Water respects the integrity of the Land and Environment Court judgement and does not believe that it is appropriate to seek to alter the conditions imposed by this jurisdiction.*
- *The proposal is not consistent with Baulkham Hills Local Environmental Plan 2005, nor the relevant part of the Baulkham Hills Development Control Plan 2007, in that the proposed deepening of quarrying will intersect and remove the groundwater system which to date has been protected by the provisions of those instruments.*

Both of these points are no longer valid as the deepening of the pit will not intercept or take water from any groundwater source. We believe that the above issues have been addressed by the responses to NSW Office of Water comments detailed in this letter above.

## 2. CONCLUSIONS

In summary:

- The Groundwater Assessment for Dixon Sand Operations Maroota has addressed, and taken into account, all the applicable rules as per the rules summary sheet for both the Maroota Tertiary Sands Groundwater Source, and the Sydney Basin Central Groundwater Source and therefore the Modification is in accordance with the provisions of the WSP for the Metropolitan Region Groundwater Sources.
- Many of NSW Office of Water's comments relating to the Maroota Tertiary Sands Groundwater Source appear to arise from a misunderstanding that the proposal includes development to the 'Cornford' site (Lot 1//204159) which is incorrectly mapped as being underlain with Maroota Tertiary Sands Groundwater Source. No development on that lot is included in the proposal.
- The only planned location of development is the north-western corner of Lot 196//752025, where our study has confirmed that no Maroota Tertiary Sands Groundwater deposits are present.
- Deepening of the NW pit will not intercept Maroota Tertiary Sands Groundwater Source.
- Deepening of the NW pit will not intercept the regional groundwater table in the underlying Sydney Basin Central Groundwater Source, and therefore the proposal will not result in the abstraction of groundwater from either gazetted groundwater source.
- Deepening of the NW pit will not abstract from, or intercept any groundwater source.
- The pit extension will remain in the unsaturated horizons and at least 16.5m above the regional groundwater level in the Sydney Basin Central Groundwater Source.
- The localised perched groundwater identified in the study is not hydrogeologically connected to the shallow Maroota Tertiary Sands Groundwater Source, as this source is absent from the area.

## 3. REFERENCE

RPS Aquaterra, 2011. Groundwater Assessment for Dixon Sand operations, Lot 196 DP752025, Maroota NSW.

We trust this information is sufficient for your purposes, however should you require any further details or clarification, please do not hesitate to contact our office.

Yours sincerely  
RPS Aquaterra

***Jason***

Jason van den Akker  
Senior Hydrogeologist

***Peter***

Peter Dundon  
Senior Principal Hydrogeologist

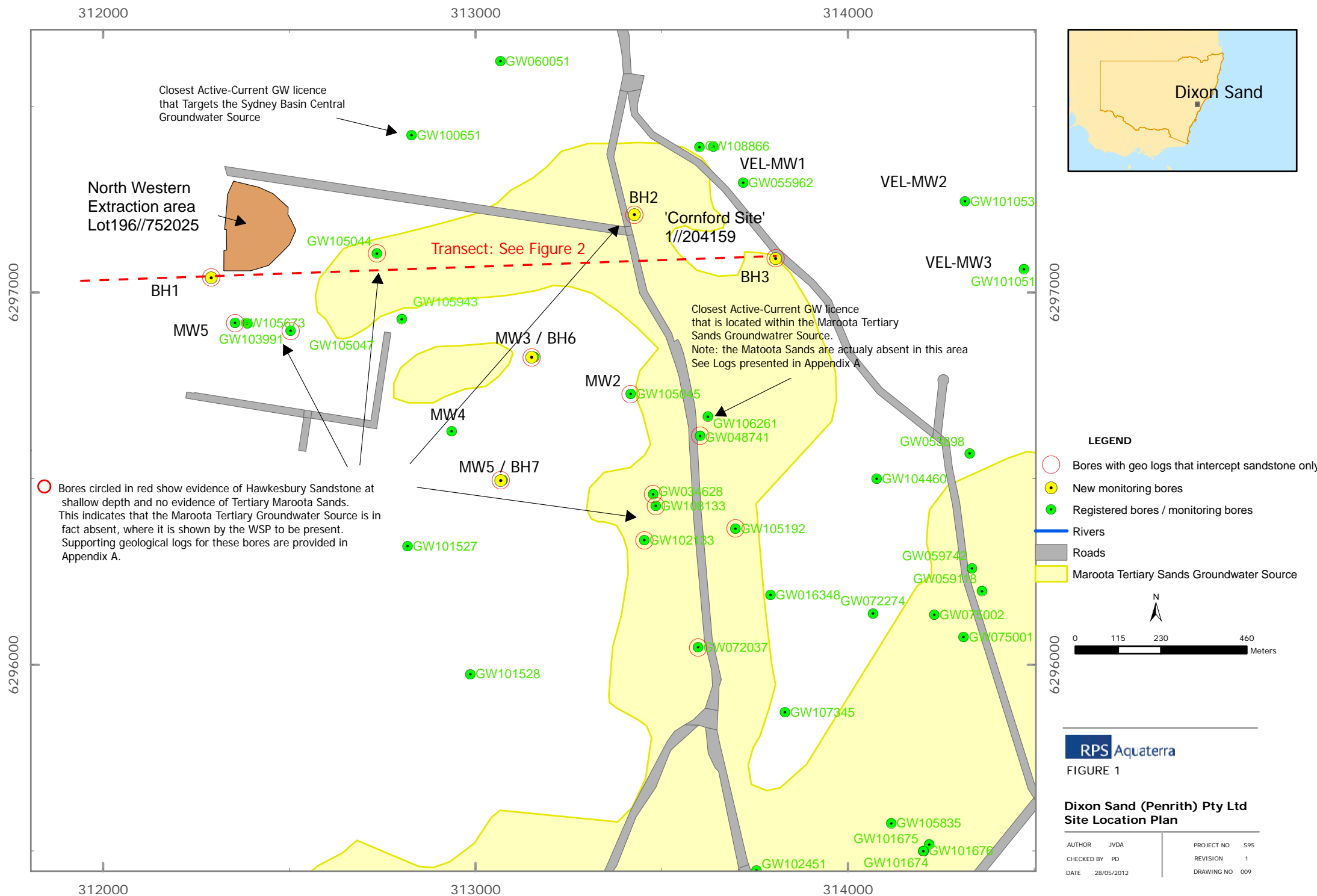


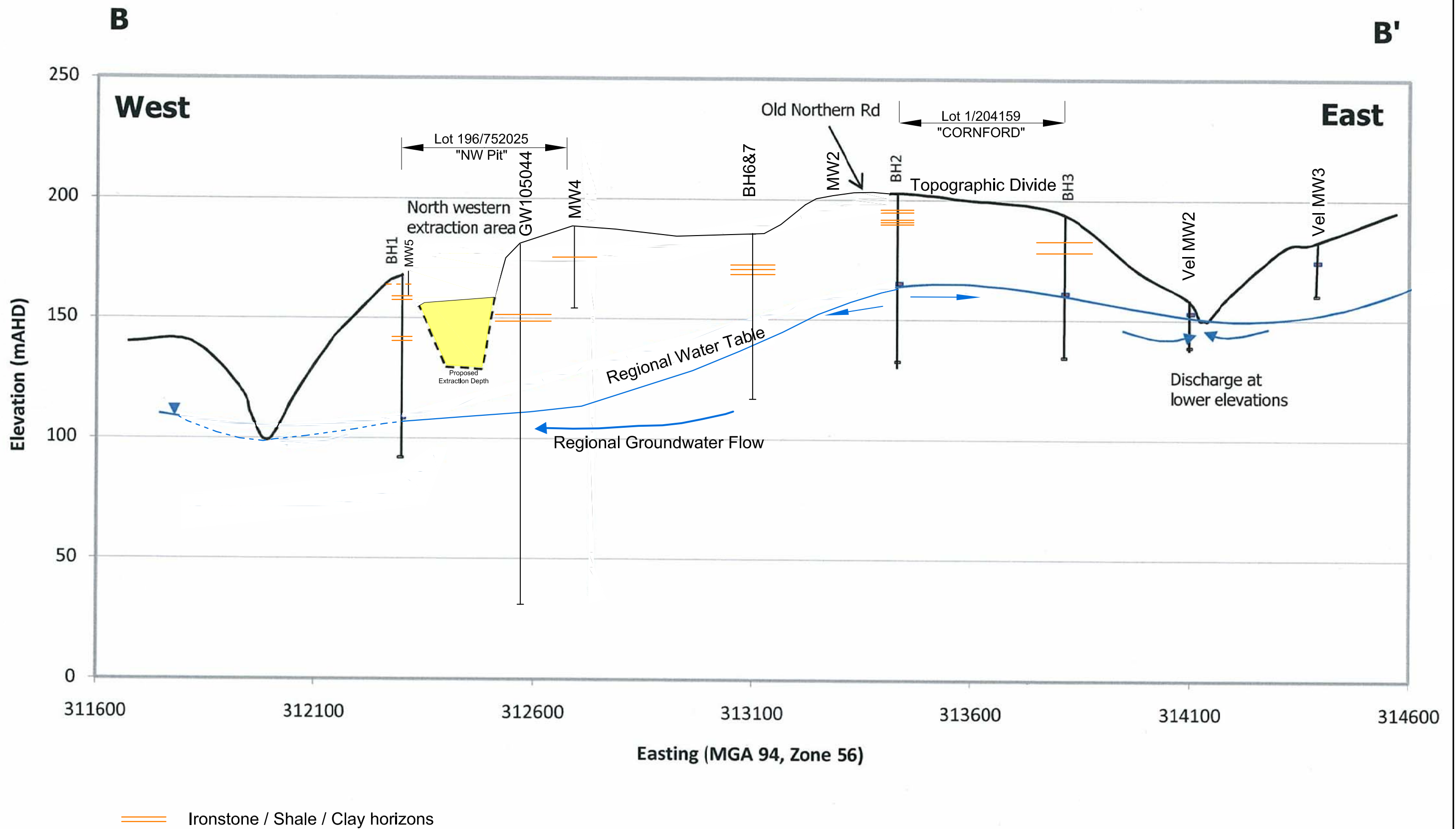
## **FIGURES:**

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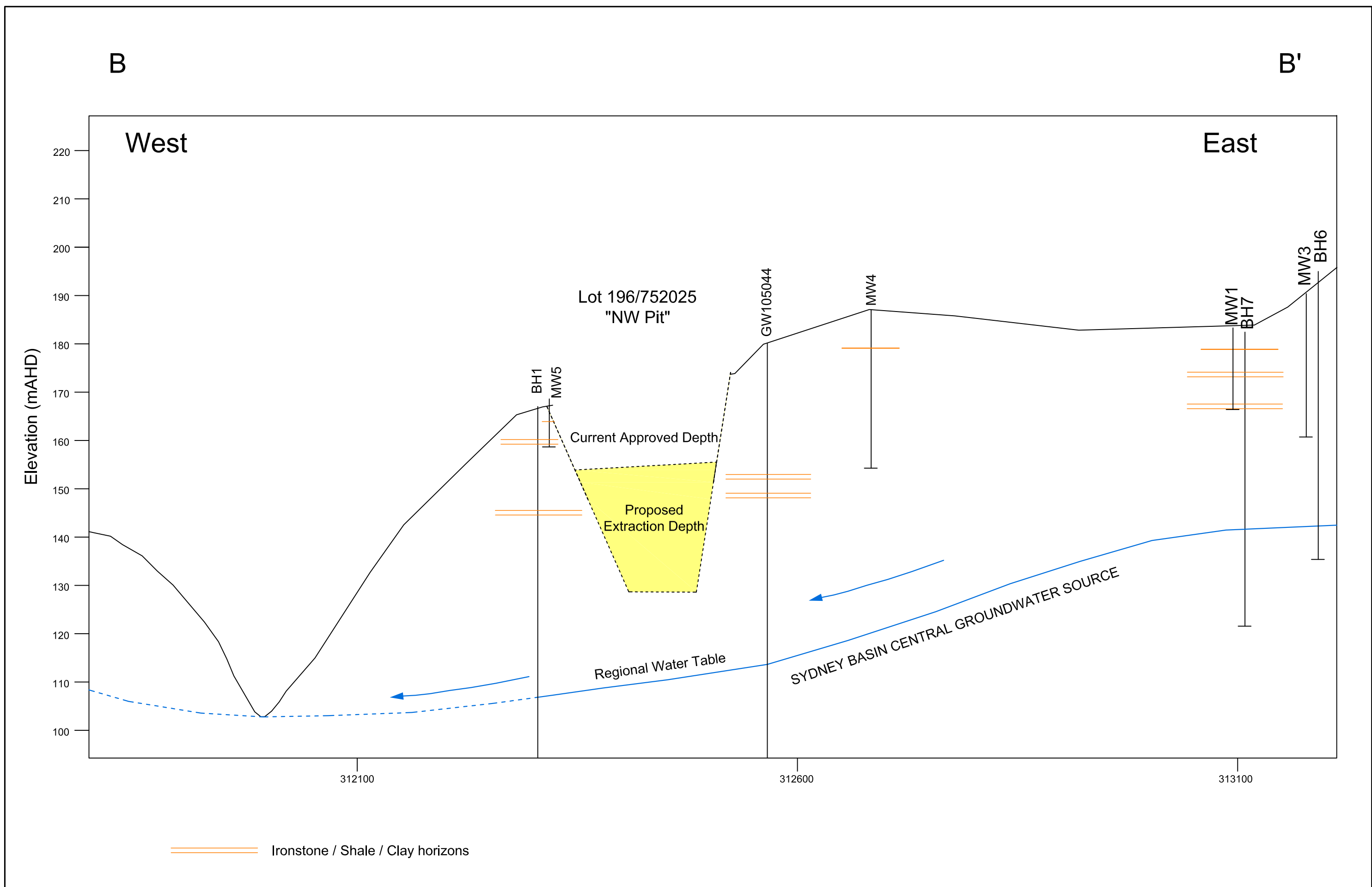
Figure 1: Site location plan showing the extent of the Maroota Tertiary Sands Groundwater Source and registered bores



Figure 2A, 2B: Hydrogeological cross sections of the study area





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			GENERAL NOTES:	DESIGNED: R.WRIGHT	PROJECT APPROVAL: R.WRIGHT	 NORTH	 Suit 902, Level 9, North Tower 1-5 Railway Street, Chatswood New South Wales, Australia, 2067 Telephone: (02) 9412 4630 Facsimile: (08) 9412 4805	Dixon Sand (Penrith) Pty Ltd				
				DESIGN CHECK: D.MONAGHAN	CAD REFERENCE: S95-003a			Hydrogeological Conceptual Model				
				DRAWN: HZ	DATE: 25/05/2012							
				DRAWING CHECK: JVDA	SCALE: As Shown							
REV.	DESCRIPTION	DATE						SIZE: A3	SCALE: As Shown	JOB No.: S95	DRAWING No.: FIGURE 2B	REV.: A

**APPENDIX A:  
BORE LOGS OF  
REGISTERED BORES AND  
COMPOSITE BORE LOGS OF  
INVESTIGATION STANDPIPE  
PIEZOMETERS**

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## Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW105044	0	12.5	SANDSTONE SOFT	SDSN	Sandstone
GW105044	12.5	21.8	SANDSTONE/QUARTZ	SDSN	Sandstone
GW105044	21.8	22.8	SANDSTONE/IRONSTONE BANDS	SDSN	Sandstone
GW105044	22.8	24.8	SANDSTONE	SDSN	Sandstone
GW105044	24.8	25.5	SHALE	SHLE	Shale
GW105044	25.5	25.8	CLAY	CLAY	Clay
GW105044	25.8	30.5	SHALE	SHLE	Shale
GW105044	30.5	38	SANDSTONE	SDSN	Sandstone
GW105044	38	39	SANDSTONE/IRONSTONE BANDS	SDSN	Sandstone
GW105044	39	52.6	SANDSTONE LIGHT GREY	SDSN	Sandstone
GW105044	52.6	55.7	SHALE	SHLE	Shale
GW105044	55.7	57	SANDSTONE L/GREY/CLAY BANDS	SDSN	Sandstone
GW105044	57	68.6	SANDSTONE/QUARTZ	SDSN	Sandstone
GW105044	68.6	69	CLAY	CLAY	Clay
GW105044	69	73.6	SANDSTONE/QUARTZ	SDSN	Sandstone
GW105044	73.6	89	SANDSTONE DARK GREY	SDSN	Sandstone
GW105044	89	112.5	SANDSTONE L/GREY	SDSN	Sandstone
GW105044	112.5	120.5	SANDSTONE/QUARTZ	SDSN	Sandstone
GW105044	120.5	127.8	SANDSTONE L/GREY	SDSN	Sandstone
GW105044	127.8	135	SANDSTONE/QUARTZ	SDSN	Sandstone
GW105044	135	144.5	SANDSTONE L/GREY	SDSN	Sandstone

## Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW105047	0	0.2	FILL	FILL	Fill
GW105047	0.2	5.5	SHALE/CLAY/SANDSTONE	SHLE	Shale
GW105047	5.5	16	SANDSTONE WITH IRONSTONE BANDS	SDSN	Sandstone
GW105047	16	19.3	SANDSTONE HARDER	SDSN	Sandstone
GW105047	19.3	24.3	SHALE	SHLE	Shale
GW105047	24.3	26.5	SANDSTONE AND QUARTZ	SDSN	Sandstone
GW105047	26.5	28	SHALE	SHLE	Shale
GW105047	28	31.5	SANDSTONE	SDSN	Sandstone
GW105047	31.5	32.5	SANDSTONE AND CLAY BANDS	SDSN	Sandstone
GW105047	32.5	33	SANDSTONE AND CLAY FRACTURED	SDSN	Sandstone
GW105047	33	35.5	SANDSTONE	SDSN	Sandstone
GW105047	35.5	35.9	IRONSTONE	IRSN	Ironstone
GW105047	35.9	51.5	SANDSTONE L/GREY	SDSN	Sandstone
GW105047	51.5	52.5	SHALE FRACTURED	SHLE	Shale
GW105047	52.5	65.5	SANDSTONE L/GREY	SDSN	Sandstone
GW105047	65.5	81	SANDSTONE DARK GREY	SDSN	Sandstone
GW105047	81	82.5	SANDSTONE L/GREY	SDSN	Sandstone
GW105047	82.5	84.5	SANDSTONE FRACTURED	SDSN	Sandstone
GW105047	84.5	111.6	SANDSTONE AND QUARTZ	SDSN	Sandstone
GW105047	111.6	111.7	SANDSTONE FRACTURED	SDSN	Sandstone
GW105047	111.7	131	SANDSTONE AND QUARTZ	SDSN	Sandstone
GW105047	131	132.8	SANDSTONE AND QUARTZ FRACTURED	SDSN	Sandstone
GW105047	132.8	152.3	SANDSTONE L/GREY	SDSN	Sandstone
GW105047	152.3	153.8	SANDSTONE AND QUARTZ FRACTURED	SDSN	Sandstone
GW105047	153.8	154.8	SANDSTONE AND QUARTZ	SDSN	Sandstone
GW105047	154.8	155.1	CAVITY	CVTY	Cavity
GW105047	155.1	156.8	SANDSTONE L/GREY	SDSN	Sandstone

## Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW105192	0	0.8	SANDSTONE SOFT IRONSTONE BANDS	SDSN	Sandstone
GW105192	0.8	8.5	CLAY WHITE	CLAY	Clay
GW105192	8.5	18	SANDSTONE FIRM LT BROWN	SDSN	Sandstone
GW105192	18	22	SANDSTONE IRONSTONE BANDS	SDSN	Sandstone
GW105192	22	22.5	CLAY	CLAY	Clay
GW105192	22.5	39	SANDSTONE LT GREY	SDSN	Sandstone
GW105192	39	42	SHALE AND CLAY	SHLE	Shale
GW105192	42	56.5	SANDSTONE AND QUARTZ	SDSN	Sandstone
GW105192	56.5	57	CLAY AND SANDSTONE LT BROWN	CLAY	Clay
GW105192	57	58.5	SHALE	SHLE	Shale
GW105192	58.5	82.5	SANDSTONE LT GREY	SDSN	Sandstone
GW105192	82.5	124.5	AND QUARTZ	SDSN	Sandstone
GW105192	124.5	147.5	SANDSTONE GREY	SDSN	Sandstone
GW105192	147.5	150	QUARTZ	15	Invalid Code
GW105192	150	175	SANDSTONE HARD LT GREY	SDSN	Sandstone
GW105192	175	177	SHALE	SHLE	Shale
GW105192	177	198	SANDSTONE GREY	SDSN	Sandstone
GW105192	198	201	SANDSTONE AND QUARTZ	SDSN	Sandstone
GW105192	201	234	SANDSTONE GREY/LT GREY	SDSN	Sandstone



## Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW101527	0	0.3	SANDY LOAM	20	Invalid Code
GW101527	0.3	48.5	SANDSTONE, RED AND GREEN	SDSN	Sandstone
GW101527	48.5	49	IRONSTONE	IRSN	Ironstone
GW101527	49	50.5	SHALE	SHLE	Shale
GW101527	50.5	56.5	SANDSTONE, GREY, M. GRAIN	SDSN	Sandstone
GW101527	56.5	57.2	SANDSTONE AND QUARTZ, FRACTURED (WATER)	SDSN	Sandstone
GW101527	57.2	58.5	SANDSTONE, GREY, M. GRAIN	SDSN	Sandstone
GW101527	58.5	60	SHALE	SHLE	Shale
GW101527	60	74	SANDSTONE, GREY. M. GRAIN	SDSN	Sandstone
GW101527	74	75.5	SANDSTONE, QUARTZ (WATER)	SDSN	Sandstone
GW101527	75.5	92	SANDSTONE, GREY. M. GRAIN	SDSN	Sandstone
GW101527	92	138	SANDSTONE,GREY. M. GRAIN	SDSN	Sandstone

### Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW108133	0	1.5	SANDY CLAY, L/BROWN	20	Invalid Code
GW108133	1.5	3.6	BROWN SANDSTONE WEATHERED	BNST	Invalid Code
GW108133	3.6	5.2	L/BROWN CLAY	CLAY	Clay
GW108133	5.2	5.8	RED CLAY	CLAY	Clay
GW108133	5.8	42.8	BROWN SANDSTONE	BNST	Invalid Code
GW108133	42.8	43.1	L/GREY SHALE	LBIL	Invalid Code
GW108133	43.1	44.5	D/BROWN SANDSTONE WEATHERED	DCIT	Dacite(Tonalite)
GW108133	44.5	49.4	PINK SANDSTONE	PKST	Invalid Code
GW108133	49.4	49.7	GREY CLAY	CLAY	Clay
GW108133	49.7	53.6	GREY SANDSTONE	GYST	Invalid Code
GW108133	53.6	53.9	D/GREY SHALE	DCIT	Dacite(Tonalite)
GW108133	53.9	75.6	L/BROWN SANDSTONE	LBIL	Invalid Code
GW108133	75.6	76	L/GREY SANDSTONE FRACTURED	LBIL	Invalid Code
GW108133	76	78	L/GREY SANDSTONE	LBIL	Invalid Code
GW108133	78	79.2	GREY SHALE	GYST	Invalid Code
GW108133	79.2	87.8	BROWN SANDSTONE	BNST	Invalid Code
GW108133	87.8	89.7	IRONSTONE AND QUARTZ	IGVL	Ironstone Gravel
GW108133	89.7	101.2	L/GREY SANDSTONE	LBIL	Invalid Code
GW108133	101.2	101.5	GREY SANDSTONE AND QUARTZ	GYST	Invalid Code
GW108133	101.5	101.7	RED SHALE	RDST	Invalid Code
GW108133	101.7	105.7	BROWN SANDSTONE	BNST	Invalid Code
GW108133	105.7	105.8	QUARTZ	15	Invalid Code
GW108133	105.8	108.5	D/GREY SANDSTONE	DCIT	Dacite(Tonalite)
GW108133	108.5	109.3	DARK GREY SHALE SOFT	DGRY	Invalid Code
GW108133	109.3	139.9	L/GREY SANDSTONE	LBIL	Invalid Code
GW108133	139.9	149.9	L/GREY SANDSTONE AND QUARTZ	LBIL	Invalid Code
GW108133	149.9	150.6	L/GREY SANDSTONE	LBIL	Invalid Code

## Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW034628	0	1.22	Topsoil Sandy	TPSL	Topsoil
GW034628	1.22	3.35	Sandstone Yellow	SDSN	Sandstone
GW034628	3.35	12.8	Sandstone Dark Yellow Water Supply	SDSN	Sandstone
GW034628	12.8	15.85	Sandstone White	SDSN	Sandstone
GW034628	15.85	27.43	Sandstone Yellow	SDSN	Sandstone
GW034628	27.43	38.4	Sandstone White	SDSN	Sandstone
GW034628	38.4	42.67	Sandstone Yellow	SDSN	Sandstone
GW034628	42.67	48.77	Sandstone Dark Yellow	SDSN	Sandstone
GW034628	48.77	60.96	Sandstone Grey	SDSN	Sandstone
GW034628	60.96	77.72	Sandstone White	SDSN	Sandstone
GW034628	77.72	82.3	Sandstone Yellow	SDSN	Sandstone
GW034628	82.3	83.52	Sandstone Yellow Open Water Supply	SDSN	Sandstone
GW034628	83.52	91.44	Sandstone Yellow	SDSN	Sandstone
Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW048741	0	0.9	Soil Sandy	SOIL	Soil
GW048741	0.9	2.4	Shale Clay	SHLE	Shale
GW048741	2.4	5.6	Sandstone Yellow Silty	SDSN	Sandstone
GW048741	5.6	6	Pipe Clay White	CLAY	Clay
GW048741	6	8.1	Clay White Some Fine Gravel Water Supply	CLAY	Clay
GW048741	8.1	11.8	Clay	CLAY	Clay
GW048741	11.8	30	Sandstone Silty Water Supply	SDSN	Sandstone
GW048741	11.8	30	Clay Bands	CLAY	Clay

## Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW102133	0	6.5	Brown Clay	CLAY	Clay
GW102133	6.5	10	Weathered Sandstone	SDSN	Sandstone
GW102133	10	18.5	Grey Sandstone M.G.	SDSN	Sandstone
GW102133	18.5	19	Grey Clay	CLAY	Clay
GW102133	19	28	White Sandstone M.G.	SDSN	Sandstone
GW102133	28	29.5	Ironstone	IRSN	Ironstone
GW102133	29.5	43	White Sandstone M.G.	SDSN	Sandstone
GW102133	43	45.5	Claystone	CLSN	Claystone
GW102133	45.5	47	Brown Sandstone M.G.	SDSN	Sandstone
GW102133	47	49.5	Claystone	CLSN	Claystone
GW102133	49.5	54	Black Shale	SHLE	Shale
GW102133	54	76	Grey Sandstone M.G.	SDSN	Sandstone
GW102133	76	78	Ironstone	IRSN	Ironstone
GW102133	78	84	Brown Sandstone M.G.	SDSN	Sandstone
GW102133	84	86.5	Ironstone	IRSN	Ironstone
GW102133	86.5	114	Grey Sandstone M.G.	SDSN	Sandstone
GW102133	114	118.5	Sandstone and Quartz	SDSN	Sandstone
GW102133	118.5	130	Grey Sandstone M.G.	SDSN	Sandstone
GW102133	130	132	Sandstone and Quartz, fractured	SDSN	Sandstone
GW102133	132	150.5	Grey Sandstone M.G.	SDSN	Sandstone

### Geological Logs of Registered Bores

Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW105493	0	1	SANDY TOPSOIL	20	Invalid Code
GW105493	1	12	FINE YELLOW SANDSTONE	FINE	Invalid Code
GW105493	12	34	COARSE ORANGE SANDSTONE	CRSE	Invalid Code
GW105493	34	37	SILTSTONE	SLSN	Siltstone
Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW105673	0	0.5	TOPSOIL	TPSL	Topsoil
GW105673	0.5	1.6	WEATHERED SANDSTONE	WRCK	Invalid Code
GW105673	8.5	10	SANDSTONE L/GREY	SDSN	Sandstone
GW105673	1.6	8.5	SANDSTONE L/BROWN	SDSN	Sandstone
Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW105673	0	0.5	TOPSOIL	TPSL	Topsoil
GW105673	8.5	10	SANDSTONE L/GREY	SDSN	Sandstone
GW105673	1.6	8.5	SANDSTONE L/BROWN	SDSN	Sandstone
Work No	From Depth	To Depth	Drillers Description	Rock Type Code	Rock Type
GW072037	0	1.2	SOIL	SOIL	Soil
GW072037	1.2	9.1	SOFT SANDSTONE	SFBD	Invalid Code
GW072037	9.1	48.5	SANDSTONE	SDSN	Sandstone
GW072037	48.5	54.5	SHALE	SHLE	Shale
GW072037	54.5	99	SANDSTONE	SDSN	Sandstone

Level 9, North Tower  
1-5 Railway St, Chatswood  
NSW 2067  
Tel: (+61) (02) 9412 4630  
Fax: (+61) (02) 9412 4805  
www.aquaterra.com.au

**Client:** Dixon Sand (Penrith) Pty Ltd

**Project:** S95

**Commenced:**

**Completed:** 22/10/10

**Drilled:** Terratest

**Logged By:**

**Method:** Rotary Air

**Fluid:**

**Bit Record:**

**Area:** Maroota

**East:** 312290.45

**North:** 6297040.00

**Collar (RL):** 166.18

**Static Water Level:** 57.94

**Date:** 15/11/2010

Depth (mbgl)	Geology	Graphic Log	Lithological Description	Field Notes	Well Completion	
					Diagram	Notes
0	Sandstone		Sandstone: Sandstone white			
	Sandstone		Sandstone: Sandstone brown/white			
	Sandstone		Sandstone: Sandstone yellow brown			
	Sandstone		Sandstone: Sandstone white brown gray yellow some clay bands. 7.8 m water 1 l/m, 10 m water 10 l/m			
	Sandstone		Sandstone: Sandstone gray some large grains			
	Sandstone		Sandstone: Sandstone very hard			
	Sandstone		Siltstone: Siltstone shale			
	Sandstone		Sandstone: Sandstone very hard. 23.8 m water 2 l/m			
	Sandstone		Sandstone: Sandstone brown to gray. 37.7 m water 1 l/m			
	Sandstone		Sandstone: Sandstone gray dry			
	Sandstone		Sandstone: Sandstone coarse grain some shale			Bentonite Seal 58 to 63 m
	Sandstone		Sandstone: Sandstone gray. 59.8 m water 13 l/m. 75 m EOH			2mm sand gravel pack 63 m to 75 m
						50 mm slotted PVC from 68 to 74 m
						1m sump

**Area:** Maroota  
**East:** 313426.48  
**North:** 6297209.18  
**Collar (RL):** 201.88

**Date:** 15/11/2010

Sheet 1 of 1

*Level 9, North Tower  
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Fax: (+61) (02) 9412 4805  
[www.aquaterterra.com.au](http://www.aquaterterra.com.au)*

**Client:** Dixon Sand (Penrith) Pty Ltd

**Project:** S95

**Commenced:**

**Completed:** 28/10/2010

**Drilled:** Terratest

**Logged By:**

**Static Water Level: 32.58**

**Method:** Rotary Air

**Fluid:**

**Bit Record:**

Area: Maroota

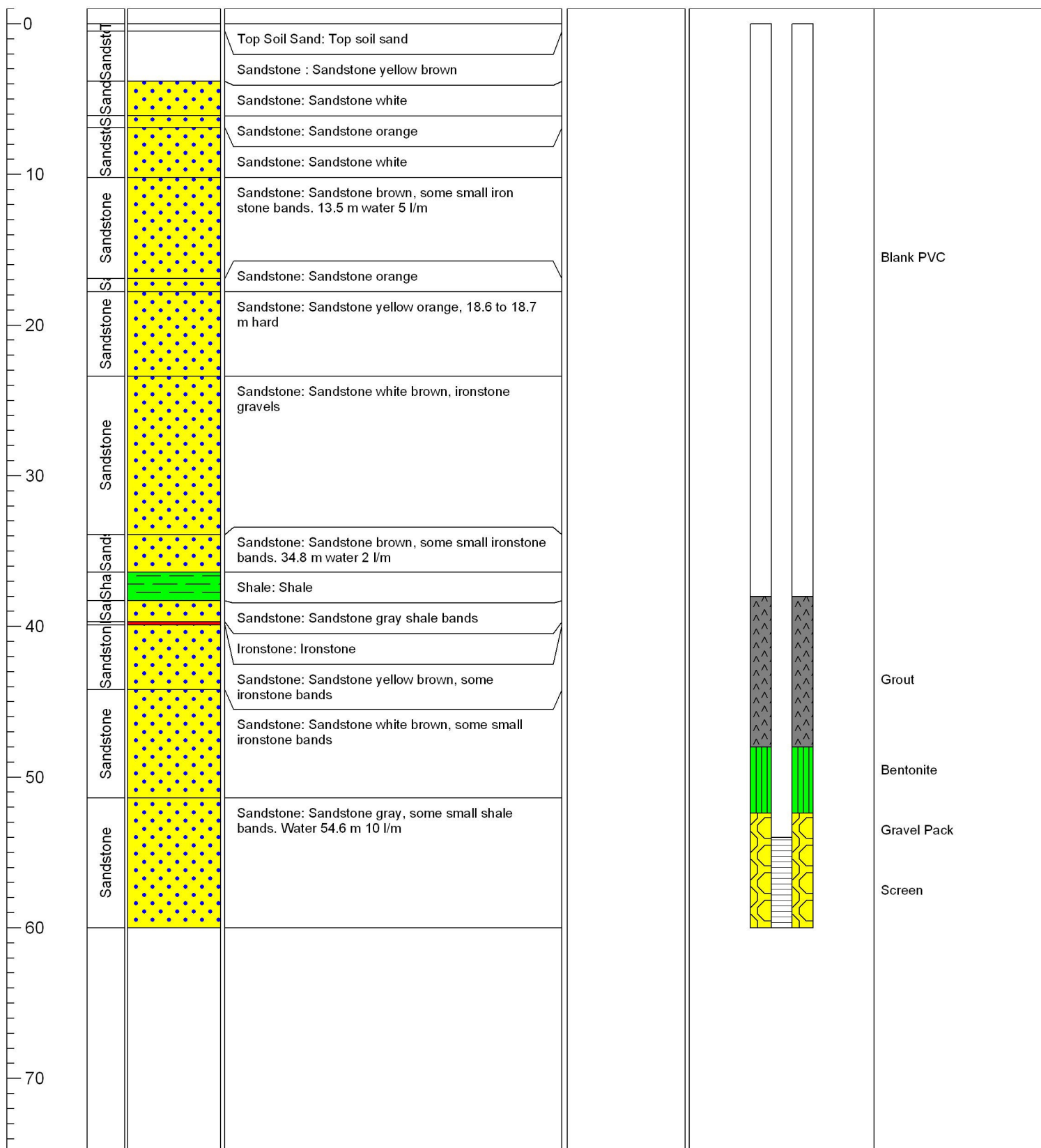
**East:** 313805.95

North: 6297091.59

Collar (RL):193.54

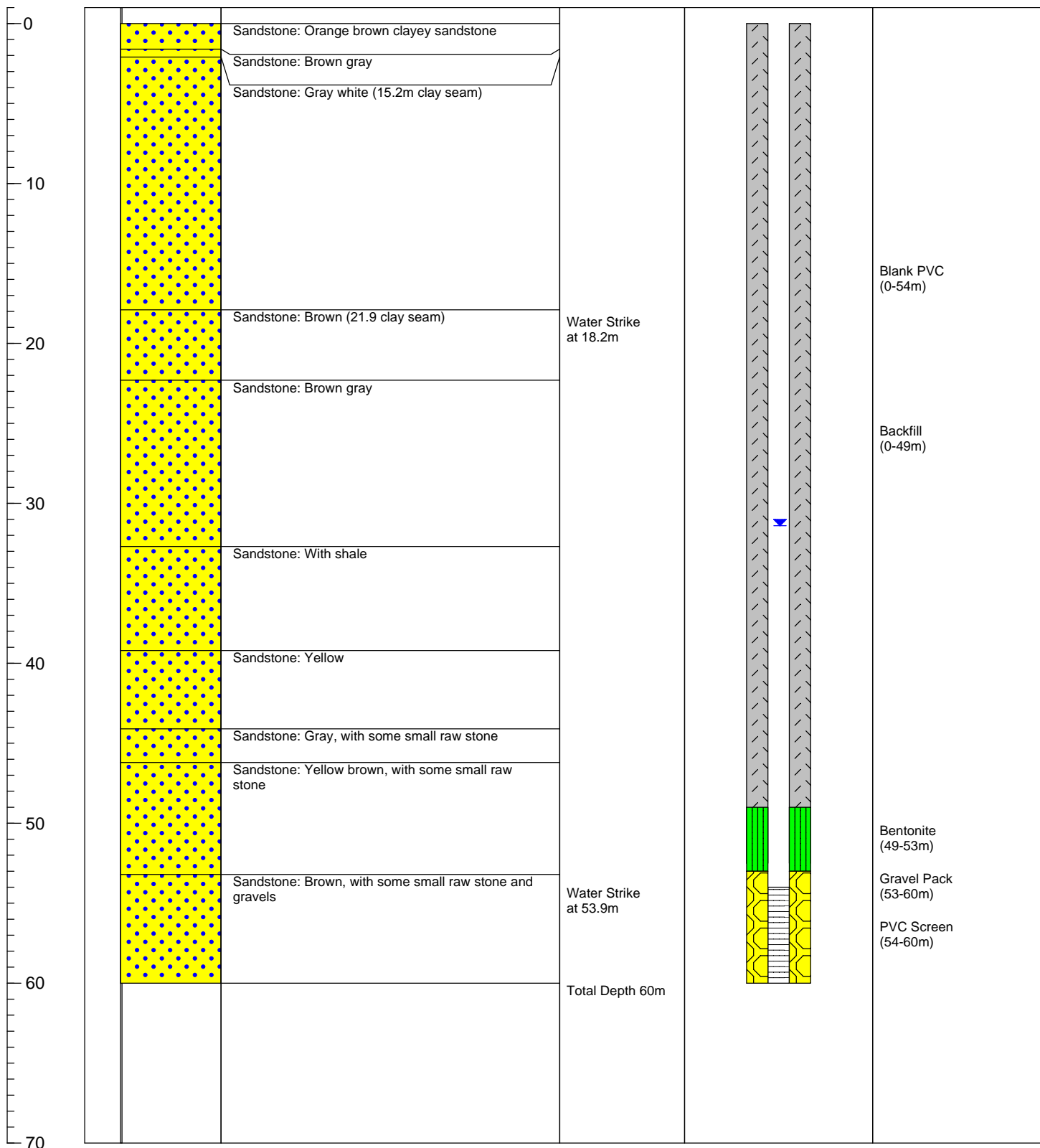
Date: 15/11/2010

Depth (mbgl)	Geology	Graphic Log	Lithological Description	Field Notes	Well Completion	
					Diagram	Notes

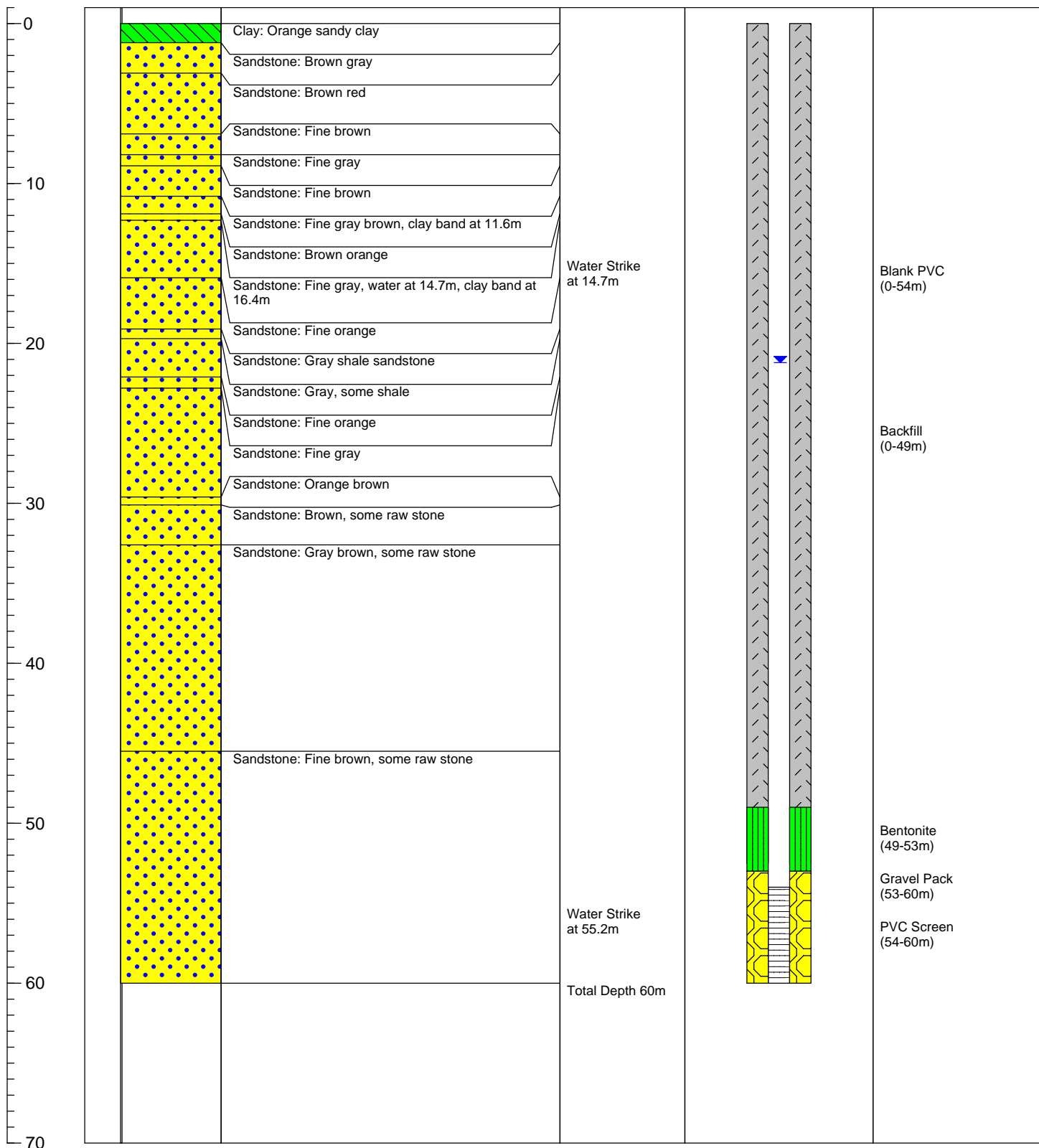




<div><div>RPS</div><div>Aquaterra</div></div> <p>Suit 902, Level 9, North Tower 1-5 Railway Street, Chatswood NSW, 2067 Australia Tel: (+61) (02) 9412 4630 Fax: (+61) (02) 9412 4805</p>			COMPOSITE WELL LOG			Well No: BH6		
			Client: Dixon Sand (Penrith) Pty Ltd				Project: S95	
			Commenced: 31/01/2011		Method: Rotary Air		Area: Maroota	
			Completed: 01/02/2011		Fluid:		East:	
			Drilled: Terratest		Bit Record:		North:	
Logged By:				Collar (RL):				
Static Water Level: 31.4mbgl				Date: 01/02/2011				
Depth (mbgl)	Geology	Graphic Log	Lithological Description	Field Notes	Well Completion			
					Diagram	Notes		



<div><div>RPS</div><div>Aquaterra</div></div> <p>Suit 902, Level 9, North Tower 1-5 Railway Street, Chatswood NSW, 2067 Australia Tel: (+61) (02) 9412 4630 Fax: (+61) (02) 9412 4805</p>			COMPOSITE WELL LOG			Well No: BH7		
			Client: Dixon Sand (Penrith) Pty Ltd			Project: S95		
			Commenced: 02/02/2011		Method: Rotary Air		Area: Maroota	
			Completed: 03/02/2011		Fluid:		East:	
			Drilled: Terratest		Bit Record:		North:	
			Logged By:		Collar (RL):			
			Static Water Level: 21.2mbgl				Date: 03/02/2011	
Depth (mbgl)	Geology	Graphic Log	Lithological Description	Field Notes	Well Completion			
					Diagram	Notes		



## **Attachment 2**



**Department of  
Primary Industries**  
Office of Water

Jason van den Akker  
Senior Hydrogeologist  
RPS Aquaterra  
Suite 902, Level 9 North Tower  
1-5 Railway Street  
CHATSWOOD NSW 2067

Contact Richard Nevill  
Phone 02 8838 7570  
Mobile 0428 263 023  
Fax 02 8838 7555  
Email [Richard.Nevill@water.nsw.gov.au](mailto:Richard.Nevill@water.nsw.gov.au)  
Our ref 10BL162932  
Your ref S95/036a

Dear Jason

**Modification to Old Northern Road Quarry (250-09-01 Mod 3) Exhibition of  
Environmental Assessment**

I refer to discussions at our meeting on 1 May 2012 and to your resulting letter dated 5 June 2012 in relation to the above matter.

The NSW Office of Water has reviewed the additional information provided in your recent letter and has subsequently determined that the application be permitted for the proposed deepening of the sand quarry in the north-western corner of the property only.

This decision was reached on the following basis:

1. that this area is identified as being outside the mapped extent of the Maroota Sands Groundwater Source (shallow groundwater system); and
2. that this area is not apparently likely to intersect groundwater within the Sydney Basin Central Groundwater Source; and
3. that the current proposal relates solely to the north-western corner of the property (being Lot 196 DP752025) and not to any other cadastral parcels that are identified within the Environmental Assessment.

The NSW Office of Water will also require the applicant to develop and implement a Groundwater Management Plan to the satisfaction of the NSW Office of Water, which includes rigorous monitoring and reporting requirements.

Should you have any further queries in relation to the above advice or this matter generally, please contact me on telephone (02) 8838 7570 or email [Richard.Nevill@water.nsw.gov.au](mailto:Richard.Nevill@water.nsw.gov.au)

Yours sincerely

**Richard Nevill**  
Licensing Manager (Coastal Southern)  
9 July 2012