GeoTerra

WHITEHAVEN COAL LIMITED – SUNNYSIDE COAL MINE MODIFICATION

POST MINING

GROUNDWATER ASSESSMENT

Gunnedah, New South Wales

SUN4-R1C

14 MAY, 2015

GeoTerra PTY LTD **ABN 82 117 674 941**

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SUN4 – R1C (14 May, 2015)

Whitehaven Coal Limited – Sunnyside Coal Mine
PO Box 600
GUNNEDAH NSW 2380

Attention: Jill Johnson

Jill,

RE: Sunnyside Coal Mine Modification Post Mining Groundwater Assessment

Please find enclosed a copy of the above mentioned report.

Yours faithfully

GeoTerra Pty Ltd

Andrew Dawkins (AuSIMM CP-Env)

Distribution: Original — GeoTerra Pty Ltd
1 electronic copy — Resource Strategies Pty Ltd

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Authorised on behalf of GeoTerra Pty Ltd:	
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Date	Rev	Comments
16.01.2015		Draft
26.02.2015	A	Incorporate Resource Strategies review
27.03.2015	B	Incorporate Whitehaven comments
14.05.2015	C	Incorporate Resource Strategies review

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1. INTRODUCTION

The Sunnyside Coal Mine is located approximately 15 kilometres (km) west of Gunnedah within the Gunnedah Coalfield, New South Wales.

In accordance with Condition 5, Schedule 2 of Project Approval 06_0308, mining operations may take place for 7 years from the grant of the mining lease for the Sunnyside Coal Project.

The Sunnyside mining lease (ML 1624) was granted on 5 November 2008, which means that mining operations are currently approved until 5 November 2015.

Due to unfavourable economic conditions, Whitehaven Coal Limited (Whitehaven) discontinued mining on the 29th November, 2012, with current activities limited to clearing of remaining ROM stockpiles, environmental monitoring, ongoing rehabilitation and care and maintenance of the site (including spontaneous combustion management).

The Sunnyside Coal Mine was approved to be up to 65m deep (to 305 metres Australian Height Datum [mAHD]) with the waste emplacement proposed to be up to 345mAHD.

A Groundwater Assessment was prepared for the Sunnyside Coal Project Environmental Assessment (EA) in March 2008. This assessment concluded that the combined groundwater seepage and post-rehabilitation in-pit rainfall catchment would not raise the backfilled pit water level above the 305 mAHD backfill level, and as a result, a pit void lake was not anticipated to occur (GeoTerra, 2008). Further details on this previous assessment are provided in Section 2.

Whitehaven wishes to obtain approval to extend the life of the Sunnyside Coal Mine beyond 2015 to potentially enable extraction of the remaining coal reserves approved to be mined for the Sunnyside Coal Mine.

In addition, Whitehaven is seeking approval for a revised final landform at the Sunnyside Coal Mine, which incorporates a reduction in the maximum depth of the final void to 330 mAHD.

The reduction in final void depth would be achieved by removing material from the existing out of pit waste rock emplacement (i.e. reducing its elevation by approximately 7 m of waste rock) and using this material to partially backfill the final void.

Accordingly, GeoTerra were commissioned to:

- summarise the key findings of the Sunnyside Coal Project EA Groundwater Assessment (GeoTerra, 2008);
- summarise the available groundwater monitoring data and compare to the 2008 EA predictions;
- briefly describe and review the Project Approval (06_0308) groundwater conditions and commitments; and
- provide an assessment of the potential groundwater impacts of the proposed Modification compared to the currently approved impacts.

2. SUMMARY OF PREVIOUS ASSESSMENT

A Groundwater Assessment was prepared for the Sunnyside Coal Project EA in March 2008.

A summary of the key findings of this previous assessment and a description of the existing environment is presented below.

2.1 Location and Local Features

The Sunnyside Coal Mine is located on the periphery of the Liverpool Plains within the Upper Namoi River Catchment Management Area, approximately 15km west of Gunnedah.

The site is located within cleared agricultural land previously used for rotation fodder, cropping and cattle grazing as shown in **Drawing 1**. The adjacent areas comprise:

- elevated, isolated, north-west trending hills that are mostly vegetated with scrub woodland and dry sclerophyll forest, with slopes ranging from 0.5^0 to 8.0^0;
- the undulating, north-west trending "lowland" valley of Coocooboonah Creek and its tributaries to the east of the pit, which has been cleared for sheep and cattle grazing, with scattered trees and minor forest remnants;
- an elevated “upland” northerly trending valley associated with Rock Well Creek, which is not cleared in its headwaters and becomes more cleared to the north; and
- a west-north-west trending valley along Native Cat Creek to the north of the pit into which both Coocooboonah Creek and Rock Well Creek drain, which has been cleared for sheep and cattle grazing, and has scattered trees and minor forest remnants.

Tertiary igneous capped hills are present to the west, east and south of “Sunnyside”, with “Sugarloaf Mountain”, “Pyramid Hill, “Coocooboonah Hill” and “Black Jack Mountain” being named features in the area.

The pit area is elevated above Native Cat Plains and lies on the north-eastern slopes of a pronounced knoll.

A lesser elevated ridge line of hills extends northward and to the west of “Sunnyside”, through to the corner of EL 5183 and the Namoi River is located approximately 12km east of the site.

The nearest significant local surface watercourses are the ephemeral channels of Coocooboonah Creek and Rock Well Creek, which, respectively are approximately 1.2km east and 2km west of the pit. Both Rock Well Creek and Coocooboonah Creek drain into Native Cat Creek approximately 4km north of the Sunnyside Coal Mine. Native Cat Creek flows into Collygra Creek and subsequently dissipates into undefined swales within the Quaternary Namoi River alluvium, approximately 13km north of the site.

Flow characteristics of watercourses traversing the site are variable and dependent on precipitation duration and intensity, as well as soil moisture, degree and type of vegetative cover, as well as the effects of evapo-transpiration, catchment aquifer baseflow and catchment modifications.

Runoff and stream flow are closely related to rainfall events, with the main creeks and tributaries being moderately steep in the headwaters to relatively flat in the main valley, with flows prone to rapid peaking and depletion and a tendency to no or low flow over extended periods. Flooding is restricted mainly to Coocooboonah Creek, which is approximately 1.2km east of the pit, with floods anticipated to be typically brief in extent in the valley floor.

2.2 Geology

The Sunnyside Coal Mine lies in the Mullaley sub-basin of the central Gunnedah Coalfield, with the mine extracting coal from the Late Permian Hoskissons Seam. The Hoskissons Seam subcrop under primarily transported colluvial cover on the eastern flanks of Coocooboonah Creek with an average dip of 2^{o} to 3^{o} to the southwest.

The following stratigraphy, from youngest to oldest, is present in the Sunnyside Coal Mine area:

Quaternary Alluvium – up to 50m thick (based on current data) sand, gravel and clay within the stream bed and alluvial flanks of Coocooboonah Creek and shallower, approximately 10m deep alluvium within the upper reaches of Rock Well Creek.

Black Jack Sill – Upper Jurassic sills located above the Black Jack Coal Measures.

Sylvandale A Sill – Lower Jurassic sills located above the Hoskissons Seam, which are highly weathered and altered to predominantly clay in the vicinity of the pit.

Sylvandale Sill – Lower Jurassic sills located within and below the Hoskissons Seam, which are highly weathered and altered to predominantly clay in the vicinity of the pit.

Digby Formation – the Lower Triassic Digby Formation conformably overlies the Black Jack Formation and consists of poorly sorted conglomerate ranging from 15m to 200m thick.

Tuffaceous Stony Coal Facies – is the upper unit of the Black Jack Formation and is characterised by stony coal irregularly inter-bedded with tuff and tuffaceous claystone, with stony coal seams containing tuffaceous bands.

Goran Conglomerate – variable thickness and similar lithology to the Digby Formation.

Upper Delta Plain Facies – this facies contains coal seams, including the ***Wandobah Seam***, which is between 20m and 30m above the Hoskissons Seam and comprises inter-bedded siltstones and sandstones, minor tuffaceous sediments. White quartz channel sandstone units are present, one of which is the ***Clare Sandstone***. A heavily bioturbated siltstone / mudstone is also present.

Hoskissons Coal Member – the member ranges from 2m to 18m thick and consists of coal, carbonaceous siltstones and mudstones. It contains the ***Hoskissons Seam***, which ranges from 7.5m to 9.5m thick in the Sunnyside Coal Mine area and is composed of up to 5 coal plies (A to E).

Shallow Marine Facies – shallow marine siltstone / sandstone laminates up to 15m thick, which in the upper section is a strongly bioturbated silty sandstone called the ***Arkarula Sandstone Member,*** which ranges from 1m to 15m thick.

Lower Delta Plain Facies – comprises siltstone, carbonaceous claystones, inter-bedded siltstone / sandstone and coal seams. Quartz lithic sandstone is common. It contains the ***Upper and Lower Melville Seam***, which is from 35m to 50m underneath the Hoskissons Seam.

2.2.1 Geological Structures

The strata is affected primarily to the south and west of the pit by at least two generations of faulting, with the faults essentially divided into an east west striking set that has been dislocated by a north-east south-west series. The faults dip to both the north and south, with throws measured within the Gunnedah No.5 Entry underground workings of up to 11m.

A detailed description of geological structures is provided in the 2008 Groundwater Assessment, with these features incorporated into the groundwater modelling where relevant.

2.3 Hydrogeology

2.3.1 Water Sharing Plan

A Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003 (DNR, 2003) was gazetted under the *Water Management Act 2000*.

The Sunnyside Coal Mine is located within the exposed Triassic and Permian basement on the periphery of the Quaternary alluvial Zone 4 - Groundwater Management Area 4 (GWMA4) of the Upper and Lower Namoi Groundwater Source (DNR, 2003).

2.3.2 Mine Hydrogeology

The pit is located within the Permian “Black Jack Formation” Fractured Sedimentary Rock aquifer, which stratigraphically underlies the Triassic Digby and Napperby Formations that form the major scarps in the area. The outcropping basement is a recharge source for the mid catchment sedimentary rock and lower catchment consolidated rock aquifers.

No substantial aquifers are known within the pit area other than groundwater of very limited yield and moderate salinity within the Hoskissons Coal Member.

2.3.3 Private Bores

The 2008 Groundwater Assessment assessed potential impacts to 27 registered within a 3km radius of Sunnyside. This included 24 stock and domestic bores, one irrigation bore and two piezometers**,** with yields ranging up to 0.63L/sec. Three bores (GW27356, 45097 and 45098) are on the “Sunnyside” property and are owned by Whitehaven.

The stock and domestic bores were estimated to range from 12.2m to 85.3m deep.

The registered bores directly west and southwest of the pit have their water supply intakes located stratigraphically above the Hoskissons Seam in the Upper Permian / Triassic lithologies. Bores to the west of and down dip of the north-northwest trending subcropping Hoskissons Seam generally obtain supplies from either or both the Hoskissons and Melville Seams, whilst bores to the east of the Hoskissons Seam Subcrop generally obtain water from the Upper and or Lower Melville Seam(s).

No registered bores obtain their water supply from Quaternary Alluvium within the Sunnyside Coal Mine area.

2.3.4 Groundwater Levels

The majority of groundwater in the Rock Well Creek catchment is obtained from basement fractured rocks rather than valley fill alluvium, with supplies obtained from the igneous intrusives, the Goran Conglomerate or the overlying Tuffaceous Stony Coal Facies and Digby Formation. NOW data indicates standing water levels ranged from 4.9 - 28.7m below surface.

Measured standing water levels in the Hoskissons Seam range from 12.5m to 60.5m below surface in the vicinity of the pit, with a limited yield of less than approximately 0.38L/sec.

Overburden to the west and south of the pit is affected by significant east-west and east-northeast trending faulting with throws of up to at least 11m. The Hoskissons Seam ranges from shallow subcrop under the alluvium of Coocooboonah Creek to approximately 86m below surface to the top of the seam, west of and outside the pit boundary. The seam continues down dip to the west and south of the pit. Groundwater in overburden within the pit boundary is limited to a very low yielding, thin (< 2m) perched aquifer in the Wondobah Seam, whilst the overburden above the Hoskissons Seam in the vicinity of the pit is essentially dry.

Overburden above the Hoskissons Seam, down dip and to the west of the pit provides limited groundwater supplies in private bores of up to 0.51L/sec in bores up to 53.3m deep and standing water levels between 6.4m and 28.7m below surface.

The Old Gunnedah No. 5 underground bord and pillar workings are mostly dry, with an isolated pocket of 31.2ML within the overall 1,523ML of open void space downgradient of the open cut.

Groundwater flow in the overburden, Hoskissons Seam and Shallow Marine Facies / Lower Delta Plain Facies / Melville Seams is from south-west in the hills to the Quaternary alluvium of Coocooboonah Creek in the north-east and then to the north-northwest along the valley floor of Coocooboonah Creek.

The flow pattern represents a combination of:

- recharge within the hills to the southwest of the open cut, with gravity driven flow from the hills to the valleys;
- flow down dip in confined lithologies to the southwest, with modification for topographical effects; and
- unconfined flow to the north-east then north northwest along the Coocooboonah Creek Rock Well Creek valleys.

Flow within the area would also be modified by the effect of:

- strata dislocation from faulting;
- possible flow along higher permeability faults; as well as
- the reduction in Hoskissons Seam and overburden permeability due to the presence of weathered doleritic sills and dykes.

Hydraulic conductivity of 0.1 – 4.0 m/day and transmissivity ranging from 1.6m^2/day to 5.2m^2/day was measured for the Hoskissons Seam, whilst the Shallow Marine Facies / Lower Delta Plain Facies/ Melville Seams units had a hydraulic conductivity of 0.7 to 2.1m/day.

2.4 Groundwater Modelling for the 2008 Environmental Assessment

A groundwater model was used to assess the potential effects of the Sunnyside Coal Mine on the local hydrogeological system.

The local stratigraphy at the Sunnyside Coal Mine was sub-divided into 4 layers of essentially dry overburden in the pit area, migrating into low yielding overburden with depth down dip to the west of the pit. This overlies the low yielding, low permeability, unconfined Hoskissons Seam in the east to confined Hoskissons Seam in the west of the pit and down dip of the pit (GeoTerra, 2008).

The spatial extent of the model was constrained by Collygra Creek to the west and south-west, and by a surface water divide north-west to the Coocooboonah Creek (GeoTerra, 2008).

The modelling simulated 5 years of mining and 5 years of post-closure conditions.

2.5 Summary of Key Impacts from Environmental Assessment

2.5.1 Predicted Drawdown Impacts

Regional groundwater drawdown in strata overlying the Hoskissons Seam was not interpreted to extend into the drawing area of private bores located outside of the mine vicinity, down dip to the west and north of the pit (**Figure 1**). As bores in this group are stratigraphically above the Hoskissons Seam, and do not obtain water from the Hoskissons Seam, their groundwater supply was not anticipated to be affected by mining.

In addition, given the limited drawdown predicted, the Sunnyside Coal Mine was not anticipated to impact flows in local creeks (e.g. Coocooboonah Creek or Rock Well Creek) or the Namoi River and associated alluvium. No groundwater dependent ecosystems (GDEs) were identified in the study area, and therefore, no impact to GDEs were predicted.

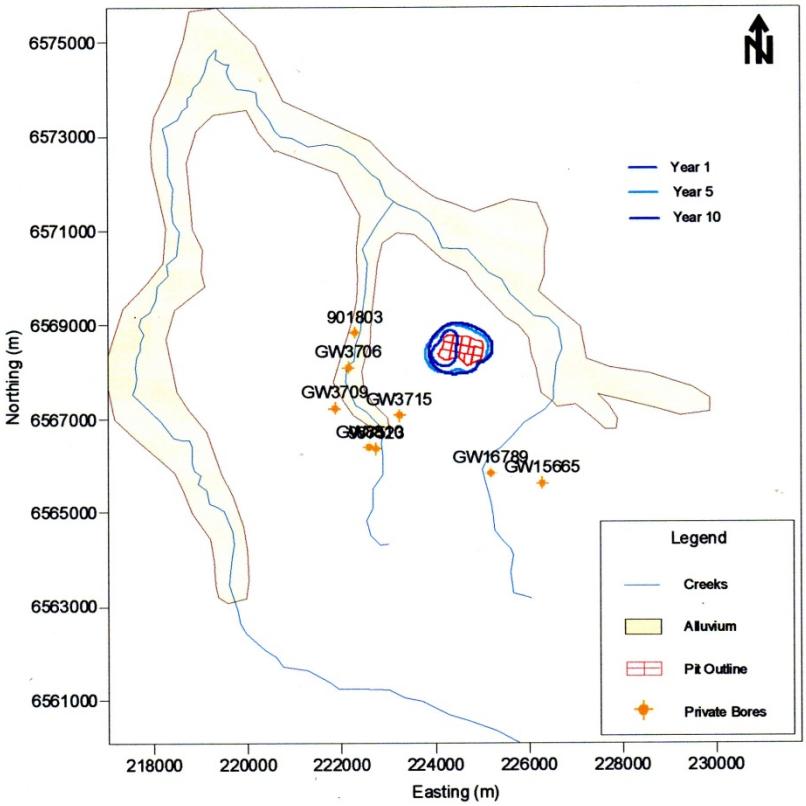

Figure 1 Predicted Drawdown <5 years in Hoskissons Seam Overburden

2.5.2 Predicted Pit Inflows

Groundwater modelling undertaken for the EA indicated the Sunnyside pit may initially generate low to moderate groundwater inflows with an increasing annual inflow up to approximately Year 2.5 as the pit deepened, then would experience a reduction to Year 5 as the pit progressed toward the mostly dry underground.

Inflows range from 64 - 106ML/year as shown in **Table 1** and **Figure 2**. Note that the values do not incorporate the loss of water from the pit due to evaporation.

Table 1 Modelled Pit Inflows (Without Evaporation)

End of Mining Year	Modelled	Inflow	Rates
	L/sec	m^3/day	ML/year
1	3.01	260	79
2	3.13	270	102
3	3.30	285	106
4	2.55	220	67
5	2.20	190	64

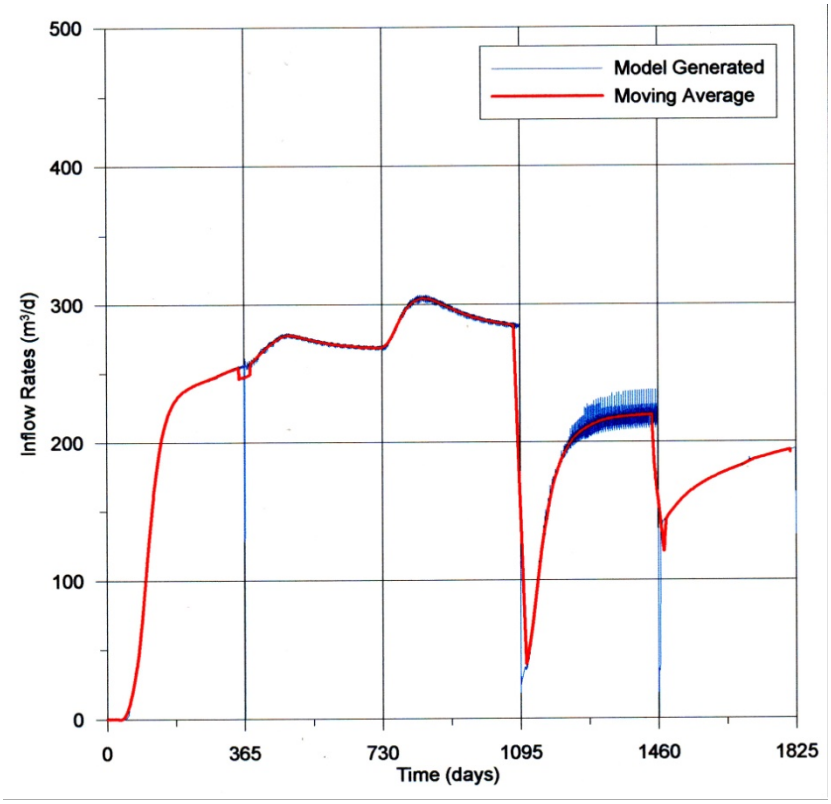

Figure 2 Modelled Pit Groundwater Inflow

2.5.3 Predicted Final Void Water Level

The pit void filling process involves groundwater as well as surface water inflow and losses due to evaporation in the pit.

Note that the pit water level recovery only included groundwater seepage, and did not account for surface water inflow or evaporation.

The modelled groundwater recovery indicated the water levels would return to 293m AHD following rehabilitation works, excluding the effect of evaporation.

3. DESCRIPTION OF THE APPROVED SUNNYSIDE COAL MINE

Approval for the Sunnyside Coal Mine was granted by the NSW Minister for Planning under Part 3A of the EP&A Act on 24 September 2008 (PA 06_0308). A description of the approved operations at the Sunnyside Coal Mine is provided below.

3.1 Approved Sunnyside Coal Mine

The Sunnyside Coal Mine is currently approved to extract up to 1 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal. The Sunnyside Coal Mine is a conventional open cut operation, with associated mine-related infrastructure including a ROM coal stockpile, on-site primary crushing facility, conveyor, coal load-out bin, and ancillary surface facilities including offices and a workshop. The product ROM coal is transported from the mine site to Whitehaven's Gunnedah coal handling and preparation plant (CHPP), which is located approximately 8 km to the east-northeast (approximately 16 km by road).

3.2 Project Approval Conditions Relevant to Groundwater Management and Monitoring

Project approval for the Sunnyside Coal Mine was granted, subject to conditions relating to groundwater management and monitoring measures, including the development of a Groundwater Monitoring Program including:

The Site Water Management Plan for the Sunnyside Coal Mine was approved in 2008 and incorporates a site water balance, erosion and sediment control, surface water monitoring program, groundwater monitoring program. The Site Water Management Plan also includes a groundwater contingency plan, which involves monitoring for changes in groundwater levels at private bore locations, and contingency measures (e.g. make good provisions) should drawdown exceed specified trigger levels.

3.3 Licenses Held by Whitehaven

Whitehaven holds several leases, licences and approvals for the Sunnyside Coal Mine. These licences are presented in **Table 2**.

Whitehaven would continue to hold licences to account for any potential groundwater take for the life of the mine.

Table 2 Water Licences held by Whitehaven

Issuing Authority	Type of Lease, Approval, License	Date of Issue	Date of Expiry
Department of Water and Energy (now the NSW Office of Water)	90WA822534 (Mining)	27 April 2009	17 January 2025
	90BL253767 (Test)	9 February 2007	Perpetuity
	90BL253768 (Test)	9 February 2007	Perpetuity
	90BL253769 (Test)	9 February 2007	Perpetuity
	90BL254686 (Monitoring)	26 March 2008	Perpetuity
	90BL254687 (Monitoring)	26 March 2008	Perpetuity
	90BL254688 (Monitoring)	26 March 2008	Perpetuity
	90BL254689 (Monitoring)	26 March 2008	Perpetuity
	90BL254690 (Monitoring)	26 March 2008	Perpetuity

4. GROUNDWATER MONITORING DURING OPERATIONS

4.1.1 Monitoring Locations

Groundwater monitoring activities were undertaken during mining operations to assess any potential of impacts of the mine on groundwater availability for surrounding users.

Groundwater level and chemistry monitoring was undertaken at a series of piezometers and bores within ML 1624 and extending to adjacent properties, where practicable. These locations are presented in **Drawing 1**.

It is noted that groundwater monitoring activities are still undertaken at the Sunnyside Coal Mine as a component of the ongoing care and maintenance of the site.

4.1.2 Monitoring Results

A review of the groundwater monitoring results indicates that groundwater levels have remained relatively consistent across all monitoring locations, including at bore locations located in close proximity to the open pit (e.g. P3) (Namoi Mining Pty Ltd, 2013).

The observed water levels (recorded during ongoing groundwater monitoring activities) shown in **Figure 3** generally correlate with the predicted changes due to extraction of the Sunnyside pit.

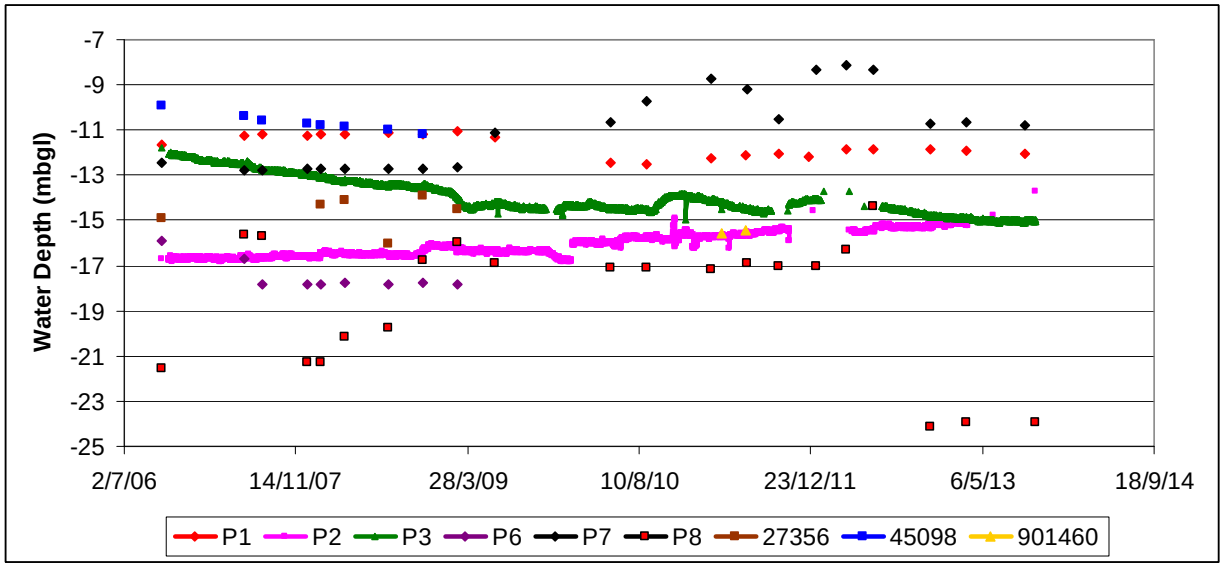

Figure 3 Observed Water Level Change

4.1.3 Observed Groundwater Level Recovery

The current observed water level in the pit is 296.3mAHD, however the water level has been observed to be relatively sensitive to rainfall indicating the standing water is more likely to be sourced from in pit rainfall runoff capture.

5. THE PROPOSED MODIFICATION

5.1.1 Description of the Modification

Whitehaven wishes to maintain a current Development Consent at the Sunnyside Coal Mine to enable the extraction of the remaining coal within the approved open cut footprint should current adverse economic conditions change.

The proposal would extend the life of the Sunnyside Coal Mine beyond the currently approved 2015 date.

Further, Whitehaven wishes to obtain approval for a revised final landform at the Sunnyside Coal Mine, which involves a reduction to the maximum depth of the final void.

Accordingly, Whitehaven requires a modification to Project Approval (06_0308) to authorise the continuation of mining of the approved coal reserves from the existing open pit area after November 2015 for a period of 5 years (i.e. until the end of 2020) and to approve the proposed revised final landform.

The Modification would not change other aspects of the approved Sunnyside Coal Mine, including (but not limited to) the following:

- Disturbance area (i.e. open cut mining and waste rock emplacement would continue within the approved mining areas).
- Mining method.
- Coal reserves (i.e. extraction of coal from the Hoskissons coal seam).
- Maximum annual rate of ROM coal or waste rock extraction.
- Total coal production.
- Water demand, supply and management.
- Rehabilitation objectives and final land use.

5.1.2 Potential Impacts of the Modification on Groundwater Resources

The Modification involves the potential continuation of mining of coal reserves approved to be mined at the Sunnyside Coal Mine.

The 2008 Groundwater Assessment predicted the potential impacts to groundwater associated with the mining of this coal.

Groundwater monitoring conducted at the Sunnyside Coal Mine supports the predictions of the 2008 Groundwater Assessment. On this basis, it is expected potential impacts associated with the Modification are expected to be consistent with those previously predicted for the Sunnyside Coal Mine (i.e. no predicted impacts to private bores, surface water flows or GDEs).

5.1.3 Potential Impacts on Groundwater Level Recovery

The 2008 Groundwater Assessment estimated pit inflows and surface runoff would be insufficient to raise the standing water level in the base of the rehabilitated pit above the backfill RL of 305m AHD, assuming a waste rock void space of 20%.

As described in **Section 4.1.2**, the current observed water level in the pit is 296.3 mAHD.

On this basis, the combined groundwater inflow and surface water capture in the pit would not generate a pit void lake as there is insufficient inflow to raise the pit water level above the waste rock backfill height. If the ponded water becomes exposed at an isolated location in a low backfill area, the water body would be subject to the high local evaporation rate which would subsequently lower the stored water level in the void and significantly reduce the extent or presence of an in-pit lake.

For the Modification, it is proposed to partially backfill the final void to 330mAHD, meaning that the current groundwater level (296.3mAHD) would be covered by a further 33.7m of backfill.

Backfilling the pit would reduce the influence of evaporation, without reducing the amount of rainfall captured in the pit. As a result of rainfall, the water level within the backfill waste rock voids may rise due to infiltration in the 33.7m of backfill overlying the current groundwater level of 296.3m AHD.

However, this would result in excess head pressure in relation to the surrounding groundwater system, and therefore a flow out of this backfill into the surrounding groundwater system would be generated to balance the “steady state” water level at around the previously predicted (293mAHD) and observed (296mAHD) range.

As such, and consistent with the predictions of the 2008 Groundwater Assessment, no pit lake is predicted for the revised final landform associated with the Modification, and therefore, no outflow of water captured in the final void is anticipated given;

- no groundwater inflow to the final void is predicted as the “steady state” groundwater level is expected to be some 33.7m below the base of the final void, and;
- rainfall runoff captured in the final void is not expected to result in outflow from the void as:
  - the catchment area of the void would be minimised, meaning the void would capture direct rainfall only;
  - temporary rainfall capture in the final void would be expected to infiltrate the underlying backfill; and
  - any pooling of water that may occur in the base of the void would be subject to evaporation, the rate of which (approximately 1,500mm/yr) is approximately three times greater than annual rainfall (approximately 600mm/yr)

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6. CONLUSIONS AND RECOMMENDATIONS

Whitehaven is seeking approval to modify the Sunnyside Coal Mine project approval to extend the approved mine life beyond 2015 to enable extraction of the remaining coal reserves approved to be mined for the Sunnyside Coal Mine, and to revise the final landform (including partial backfill of the final void to reduce its maximum depth).

GeoTerra has been commissioned to assess potential impacts to groundwater associated with the Modification.

In 2008, Geoterra prepared a Groundwater Assessment for the Sunnyside Coal Mine. Key conclusions of the 2008 Groundwater Assessment were:

- No impacts to private bore users, surface water flows or GDEs were anticipated due to predicted drawdown associate with the Sunnyside Coal Mine.
- Groundwater levels were predicted to recover to approximately 293mAHD, and as this was below the maximum depth of the final void, no pit lake was predicted.

Groundwater monitoring conducted since 2008 during the operational life of the Sunnyside Coal Mine supports the predictions of the 2008 Groundwater Assessment (e.g. limited change in groundwater levels and no impacts at private bores).

As the Modification involves mining of coal reserves approved to be mined at the Sunnyside Coal Mine, potential impacts associated with the Modification are expected to be consistent with those previously predicted for the Sunnyside Coal Mine (i.e. no predicted impacts to private bores, surface water flows or GDEs).

Consistent with the predictions of the 2008 Groundwater Assessment, no pit lake is predicted for the revised final landform associated with the Modification, and therefore, no outflow of water captured in the final void is anticipated.

It is recommended that groundwater monitoring continue to be undertaken at the Sunnyside Coal Mine during mining operations and beyond the active mine life, in order to assess the potential long term changes in groundwater re-pressurisation and water quality.

Monitoring and management would continue in accordance with the Site Water Management Plan, inclusive of the groundwater assessment criteria and associated contingency measures.

7. REFERENCES

Broughton, A, 1994, Upper Eastern Mooki River Catchment Hydrogeological Investigation and Dryland Salinity Studies, Liverpool Plains, NSW, Vol 1, 2, Department of Water Resources Tech Serv Div TS94.013

DNR, 2003 Water Sharing Plan for the Upper and Lower Namoi Groundwater Sources 2003

GeoTerra, 2008, Sunnyside Coal Project Groundwater Assessment. Report prepared for Olsen Environmental Consulting Pty Ltd.

Namoi Mining Pty Ltd, 2013, Annual Environmental Management Report for the Sunnyside Coal Mine 01 December 2012 – 30 November 2013.

8. LIMITATIONS

This report was prepared in accordance with the scope of services set out in the contract between GeoTerra Pty Ltd (GeoTerra) and the client, or where no contract has been finalised, the proposal agreed to by the client. To the best of our knowledge the report presented herein accurately reflects the clients requirements when it was printed. However, the application of conditions of approval or impacts of unanticipated future events could modify the outcomes described in this document.

In preparing this report, GeoTerra has relied upon information and documentation provided by the client and / or third parties. GeoTerra did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions and recommendations in this report are based in whole or in part on such information, they are contingent on its validity. GeoTerra assume the client will make their own enquiries in regard to conclusions and recommendations made in this document. GeoTerra accept no responsibility for any consequences arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to GeoTerra.

The findings contained in this report are the result of discrete / specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site in question. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

Interpretations and recommendations provided in this report are opinions provided for our Client's sole use in accordance with the specified brief. As such they do not necessarily address all aspects of water, soil or rock conditions on the subject site. The responsibility of GeoTerra is solely to its client and it is not intended that this report be relied upon by any third party. This report shall not be reproduced either wholly or in part without the prior written consent of GeoTerra.