Submitter No.	664	Issue Reference:	9118
Submitter Type	Council	TOR Category	Water Resources
Name	Whitsunday Regional Council	Relevant EIS Section	

DETAILS OF THE ISSUE

The proponent should be required to provide contributions towards the use of Council's water and waste supply and services. Council has the ability to provide these services and supplies required, yet Council should be compensated by the proponent for the depletion of supply and pressure placed on services.

PROPONENT RESPONSE

Refer to *SIMP,* Sections 5.3 and 6.2, contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	1840	Issue Reference:	4124
Submitter Type	Council	TOR Category	Water Resources
Name	Barcaldine Regional Council	Relevant EIS Section	1.3.2

DETAILS OF THE ISSUE

Decommissioning of infrastructure such as water storages to be considered prior to commencement of operations including concept strategy e.g. water storages. This would include alternative or post LOM beneficial use options.

Request consideration of beneficial use as part of the offsets to impacts noted within the EIS and equity for services to community and mining activities.

PROPONENT RESPONSE

The process of stakeholder engagement required to achieve agreed final land use outcomes will ensure that beneficial uses and equity in services for downstream communities and ecological systems is considered, along with a number of other factors which will influence final land use outcomes.

See Volume 2, Chapter 1, Section 1.3 of the EIS for an overview of the proposed decommissioning strategies.

Submitter No.	419	Issue Reference:	4126
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Treatment of construction waters with aluminium sulphate (p130-132)

DETAILS OF THE ISSUE

On page 130 Implementation Strategies the EIS states that 'all construction water will be contained in ponds and treated before release downstream'. Also on page 132 Implementation Strategies the EIS states that 'Chemical flocculants can also be used to hasten settlement, especially when fine sediments are present. The use of flocculants (i.e. alum sulphate) will be managed in accordance with operating procedures including MSDS'.

Should flocculants be considered as a treatment option, appropriate management strategies should be proposed in the EIS. The EIS should discuss appropriate measures to ensure excess flocculants do not make its way into receiving waters and its proposed use will not pose risks to the relevant environmental values.

PROPONENT RESPONSE

Sediment basins will be designed to cater for a 1 in 10 year 24hr storm duration volume which is consistent with DERM requirements. Due to the large demand for water during construction for dust suppression purposes, these basins will not undergo controlled release and therefore will not require chemical addition. Water balance modelling also demonstrates the sizing methodology adopted is appropriate with discharge typically only occurring in less than 25% of years during periods of high stream flow. If during the detailed design phase of the project the soils are found to be highly dispersive and chemical addition is warranted, the associated management practices will be detailed in the erosion and sediment control management plan.

Submitter No.	**419**	Issue Reference:	**19107**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Sections 6.2 and 6.3, Potential Impacts (p6-2)

DETAILS OF THE ISSUE

The EIS identifies potential impacts to groundwater in association with the rail alignment and the coal terminal. There is no proposal for routine monitoring to determine the nature and extent of any impacts that may occur.

The EIS should develop monitoring programs to address the potential impacts on groundwater.

PROPONENT RESPONSE

Port components are no longer part of the scope of this EIS/SEIS process. As such, no monitoring requirements with reference to the coal terminal are necessary.

The draft EMP for the rail makes the following commitments with regards to groundwater monitoring.

- a groundwater monitoring program is to be developed and implemented to assess any changes in groundwater quality
- a monthly report is to be prepared and submitted to Waratah Coal and include details of monitoring results, audits, training and incidents, and
- incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.

See *Draft Rail EMP* contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**419**	Issue Reference:	**19110**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Volume 2, Mine – Chapter 9

DETAILS OF THE ISSUE

Section 1.10 of the Executive Summary of the EIS mentions the requirement for a riverine protection permit under the *Water Act 2000*.

The EIS does not describe activities to be carried out in a watercourse or activities that would require a riverine protection permit.

Activities in a water course that interfere with the flow of water by diversion or impoundment require a water licence under the *Water Act 2000* and a development permit under the *Sustainable Planning Act 2009* for operational works.

The installation of crossings within the mining lease area that do not interfere with the flow of water can be undertaken without a permit or licence if done so in accordance with the DERM guideline 'Guideline – activities in a watercourse, lake or spring associated with mining operations'.

The EIS should include maps at a suitable scale that clearly show the location of any new infrastructure which will be in the bed and banks of a watercourse.

The EIS should clearly state to which activities these guidelines apply and which activities require a riverine protection permit.

Should quarry material be taken from a watercourse, an allocation will be required under the *Water Act 2000*. Development permits under the *Sustainable Planning Act 2009* will be required to authorise the removal of the quarry material.

PROPONENT RESPONSE

There are approximately four crossings of waterways within the mine lease area associated with haul roads and rail. The locations of these crossings will be over the constructed diversions of Lagoon Creek and Malcolm Creek. Therefore there will be additional diversion requirements to facilitate crossings. These proposed diversions have been designed in accordance with the recommended guidelines.

Detail on the location of diversions on the mining lease is outlined in the *Mine Site Creek Diversion and Flooding Report* contained in *Appendices – Volume 2* of this SEIS, and the location of waterway crossings for the rail alignment are tabulated in Appendix A of the *Rail Concept Design Report* and shown in the *Rail Concept Design Drawings*, both contained in *Appendices – Volume 2* of this SEIS.

A full determination of the permits, licenses and approvals required will be undertaken prior to the EA being issued, and all relevant approvals will be in place prior to construction commencing. Discussions and liaison with the relevant government departments (e.g. DEHP) will be held to ensure the correct permit and licensing scope has been developed, and this will be included in the EM Plan.

Based on the definition of a watercourse under the *Water Act 2000*, there are expected to be a total of six watercourses traversing the MLA that will be impacted upon by mine operations. Waratah Coal will liaise with the DNRM on the determination of these, and other potentially relevant classification of relevant watercourses, under the *Water Act 2000*.

Submitter No.	**419**	Issue Reference:	**19111**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	

DETAILS OF THE ISSUE

Crossings located outside the mining lease that do not interfere with the flow of water will require a Riverine Protection Permit unless the proponent is the owner of the land, and the activity can be carried out in accordance with DERM guideline '*Guideline – Activities in a watercourse, lake or spring carried out by a landowner*'.

There is no indication of the location where the rail infrastructure or associated works will take place within the bed and banks of a watercourse.

PROPONENT RESPONSE

The location of waterway crossings for the rail alignment are tabulated in Appendix A of the *Rail Concept Design Report* and shown in the *Rail Concept Design Drawings*, both contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**419**	Issue Reference:	**19112**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Volume 3 Rail, Chapter 9

DETAILS OF THE ISSUE

Section 1.10 of the Executive Summary mentions the requirement for a riverine protection permit under the *Water Act 2000*.

The EIS does not describe any activities that will be carried out in a watercourse or require authorisation.

There is no indication of the location of where the rail infrastructure or associated works will intercept or occur within the bed and banks of a watercourse.

The EIS should provide maps at a suitable scale to show the location of any new infrastructure which will be in the bed and banks of a watercourse.

Activities in a water course that interfere with the flow of water by diversion or impoundment require a water licence under the *Water Act 2000* and a development approval under the *Sustainable Planning Act 2009* to authorise the operational works.

The installation of crossings within the mining lease area that do not interfere with the flow of water can be undertaken without a permit or licence if in accordance with the DERM guideline 'Guideline – activities in a watercourse, lake or spring associated with mining operations'.

Crossings located outside the mining lease that do not interfere with the flow of water will require a riverine protection permit unless the proponent is the owner of the land, and the activity can be carried out in accordance with the DERM guideline 'Guideline – Activities in a watercourse, lake or spring carried out by a landowner'.

Where these guidelines do not apply the EIS must state the requirement to apply for a riverine protection permit.

Should quarry material be taken from a watercourse, an allocation will be required under the *Water Act 2000*. Development permits under the *Sustainable Planning Act 2009* will be required to authorise the removal of the quarry material.

PROPONENT RESPONSE

Refer to Issue Reference 19110.

Submitter No.	1840	Issue Reference:	19116
Submitter Type	Council	TOR Category	Water Resources (Surface Water)
Name	Barcaldine Regional Council	Relevant EIS Section	2.1.4

DETAILS OF THE ISSUE

Stormwater management also a requirement of the mine. DES, (drainage, erosion and then sedimentation) is the appropriate order?

To date all information to manage the site is generic. This is inadequate knowing the soils are so erosive.

The impact of the erodible soils on the management of the site stormwater during, construction, operations and post mining land form is required.

PROPONENT RESPONSE

Soils prone to erosion and dispersion have been discussed in Section 2 of the *Soils and Land Suitability SEIS Report* (contained in *Appendices – Volume 2* of this SEIS), with commitments for further work discussed in Section 6. Appendix B of the *Soils and Land Suitability SEIS Report* provides a list of the susceptibility of different soils to water and wind erosion. This information is mapped in Figures 2.4 and 2.5 of the report in the Appendices.

Submitter No.	877	Issue Reference:	8014
Submitter Type	Individual	TOR Category	Water Resources (Groundwater)
Name	Name withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

- Required comprehensive analysis of impacts (short and long term on mine and land owners.)
- Use of saline water for dust suppression should be assessed.

PROPONENT RESPONSE

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

The EIS foreshadowed consideration of mine water for dust suppression. Salinity is not an issue for runoff to waterways since runoff from dust suppression on haul roads and stockpiles will be contained in sediment dams and managed in the site water management system. Details of the amounts of water required for dust suppression are provided in response to Issue Reference 12008 in Part C – 06 – Air Quality of this SEIS.

Water to be used for dust suppression will be of a quality such that salinity or dispersion will not be induced in affected soils. This will be defined once the soil investigation works have been completed, and the spatial extent and level of salinity and sodic soils are understood, and a target water salinity and character will be adopted to minimise soil structural decline on the site. This will be incorporated into the EM Plan.

Submitter No.	1840	Issue Reference:	8015
Submitter Type	Council	TOR Category	Water Resources (Groundwater)
Name	Barcaldine Regional Council	Relevant EIS Section	

DETAILS OF THE ISSUE

Specific information regarding the seams and relationship with groundwater aquifers and aquitards is required.

PROPONENT RESPONSE

The additional exploration drilling that has occurred since publication of the EIS has led to a higher-resolution geological model that has provided an updated structure for the new groundwater model that has been developed. The target coal seams are included in the model as distinct layers that are separated by interburden layers. The hydraulic conductivities of the model layers, based on field measurements and model calibration, define the relative aquifer/aquitard status of each layer.

See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS, for more information.

Submitter No.	417	Issue Reference:	8021
Submitter Type	Council	TOR Category	Water Resources
Name	Isaac Regional Council	Relevant EIS Section	

DETAILS OF THE ISSUE

The EIS should establish an analysis of managing and protecting aquifers in the area. The present document does not reflect the on-going sustainable management of this finite water resource. Dewatering of the operation will impact significantly on the local hydrology near and around the site for a considerable time period. Limited information is available on the interaction between the perched riparian water sources and the long term at depth aquifers. Given the extensive dewatering to occur and the significant impacts on the lower water table more reliable analysis needs to be undertaken on the effects this will have on the surface and perched water tables.

PROPONENT RESPONSE

The evidence to date is that there is a substantial head difference between perched aquifer water levels and the regional water table. This means they are distinct systems and lowering of the regional water table will not have an effect on the perched systems.

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

It is probable that riparian wetlands are associated with perched groundwater conditions, as the depth to the regional (not perched) water table is generally a minimum of about 10 m along the drainages, increasing to the order of 100m beneath the Clematis Sandstone ridge. Across the project site the range is generally 20-60m. The deeper regional water table is too deep for evapotranspiration and vegetation dependence to be active. The new groundwater model has analysed the expected drawdown of the regional water table beneath the perched systems to assess if any risk is

likely. More importantly, monitoring bores will record the behaviour of the perched and regional water tables during mining operations to see if there is any effect on either system.

As a matter of course, the Stage 2 groundwater model conducted a recovery simulation for 200 years to assess the timeframe for equilibration of groundwater levels, and whether they return to pre-mining levels.

Submitter No.	**419**	Issue Reference:	**8022**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Vol 2, Mine, Chapter 8, Groundwater Resources, section 8.7 Commitments (p248)

DETAILS OF THE ISSUE

In this section of the EIS Waratah Coal commits to: "Implementation of the groundwater monitoring program". It is assumed that this program is the one detailed in Appendix 14, table 7-2, although it is not clear in the EIS itself.

The wording of this section should be amended to state: "Implementation of the groundwater monitoring program as detailed in Volume 5 Appendix 14, Groundwater, table 7-2".

PROPONENT RESPONSE

Noted.

The monitoring network has been expanded from that which existed at the time the EIS was published (see the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS) and an additional five sites have been recommended for future installation

Seven new sites have been added to the monitoring network for the SEIS. All sites are equipped with continuously datalogged vibrating wire piezometers. In all, there are 25 piezometers at the 7 sites, designed to monitor the full stratigraphic section down to the deepest coal seam to be mined. Four of the new sites are situated close to the mining footprint, with two upgradient of the open cut pits in the vicinity of Lagoon Creek, and two downgradient of the open cut pits overlying and adjacent to the underground mines. There are three far-field monitoring sites. The first is a single-piezometer at Alpha airport to monitor groundwater responses close to the Alpha township. The second is a 5-piezometer hole close to Jericho township. The third has two piezometers in the Clematis Sandstone and Rewan Formation strata of the Great Artesian Basin, as a check on whether mining effects reach the GAB.

Submitter No.	**419**	Issue Reference:	**8023**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Vol 2 Mine, Chapter 8 – Section 8.1.1.1: Declared Groundwater Area for Mine site (p227)

DETAILS OF THE ISSUE

The section currently states that:

'Within the Highlands GMU an entitlement is required for all extraction purposes other than stock or domestic.'

This is correct but it appears that there may be a misconception that dewatering from a sump in a mine does not require an entitlement (water licence) when in fact it does in this scenario.

This section should be reworded as follows:

"Within the Highlands GMU an entitlement is required for all extraction purposes other than stock or domestic. An entitlement will be required for the take of groundwater for dewatering by the mining operation".

PROPONENT RESPONSE

Noted, and will be referred to correctly in any future documentation that addresses this issue.

Submitter No.	**419**	Issue Reference:	8024
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Table 7-2 Monitoring Program (p7-4)

DETAILS OF THE ISSUE

Drawdown of groundwater levels/head, associated with taking water from the mine is predicted to extend to 15-30km from the mine by Year 25. It is anticipated that the impact will be greater to the east of the mine. The bore survey did not include any private bores to the east of the mine lease area although the DERM groundwater database indicates that a number of private bores are located in this area.

There needs to be a comprehensive bore survey to include these private bores and identify which aquifer they are currently taking groundwater from.

PROPONENT RESPONSE

The desktop bore census has already been extended in all directions. However, it is not always clear from database records which aquifer is being tapped.

We now regard the EIS estimate of 15-30km to the east as an overestimate because the target coal seams outcrop not far to the east of the mine footprint. The extent is more likely to be about 5km from the mine lease.

The modelling predicts a broad water table drawdown extent that extends about 20km from the area of active mining to the north (for 1m drawdown), 10km to the south, and 15km to the east. The western extent (towards the GAB) does not leave the mine lease and the 1m drawdown contour aligns with the GAB geological boundary. (See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS, for more information).

Submitter No.	**419**	Issue Reference:	8025
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Table 7-2 Monitoring Program (p7-4)

DETAILS OF THE ISSUE

The program in Table 7-2 of the EIS states that an undefined number of bores will be located radially around the mine, approximately 5 km and 10 km from the mine in aquifers intersected by farm bores.

The EIS does not state the number of monitoring bores.

PROPONENT RESPONSE

A provisional expanded monitoring network is in place. Five additional sites have been recommended for the long-term monitoring network following the results of the new groundwater model predictions. Seven new sites have been equipped with continuously datalogged vibrating wire piezometers. In all, there are 25 piezometers at the seven sites, designed to monitor the full stratigraphic section down to the deepest coal seam to be mined. Four of the new sites are situated close to the mining footprint, with two upgradient of the open cut pits in the vicinity of Lagoon Creek, and two downgradient of the open cut pits overlying and adjacent to the underground mines. There are three far-field monitoring sites. The first is a single-piezometer at Alpha airport to monitor groundwater responses close to the Alpha township. The second is a 5-piezometer hole close to Jericho township. The third has two piezometers in the Clematis Sandstone and Rewan Formation strata of the Great Artesian Basin, as a check on whether mining effects reach the GAB.

Waratah Coal are conscious of the need to monitor at multiple depths, as evidenced by our current expansion of the monitoring network using strings of vibrating wire piezometers down to the depth of the deepest target seam. See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS, for more information on the monitoring network.

Submitter No.	**419**	Issue Reference:	8026
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Table 7-1 Mitigation Measures (p7-1)

DETAILS OF THE ISSUE

The EIS identifies the potential impact on farm bores.

In this table a management requirement of 'Impacts on farm bores' has been identified. The management measure has been identified as follows:

- Where drawdown impacts farm bores, replacement bores and pumps should be drilled to either intersect deeper areas of the aquifers currently being used or to access deeper aquifers below the level of mining. Waratah Coal may enter into agreements with the landowners regarding these options prior to mining
- Where impacts are predicted, the proponent should enter into contracts with those landowners prior to commencement of mining.

The EIS should provide clarification of groundwater replacement, i.e. the replacement should be of the same (or better) quantity and quality.

The EIS also needs to recognise that some farm bores may be impacted after mining ceases and suitable mitigation measures should be detailed.

PROPONENT RESPONSE

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

The "make good" commitments are articulated in the *Groundwater Assessment* report and in the *Draft Mine EM Plan* (both contained in *Appendices – Volume 2* of this SEIS).

Submitter No.	**419**	Issue Reference:	**8027**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Section 2.4, Modelling (page 2-13)

DETAILS OF THE ISSUE

The general description of the coal seams indicates a dip from east to west. Figure 3.1, while it does not show the mine area, provides this representation. It also suggests that coal seams A and B do not exist on the eastern side of the modelled area.

However the model geometry shown in Volume 5, Appendix 14, Groundwater, section 2.4, figure 2-5 shows horizontal coal seams with coal seam B extending right across the modelled area.

It is considered that the model geometry does not accurately reflect underlying aquifers and this is likely to affect its predictive capacity.

PROPONENT RESPONSE

The additional exploration drilling since the EIS has led to a higher-resolution geological model has provided an updated structure for the new groundwater model that is being developed.

It is recognised that the coal seam geometry that was implemented in the EIS groundwater model was not correct. This will be remedied in the new groundwater model. See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS for more information.

Submitter No.	**419**	Issue Reference:	**8028**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Section 2.3.4, Water Level Monitoring (p2-6)

DETAILS OF THE ISSUE

In Volume 5, Appendix 14, Section 3.6.2 of the EIS states that 'recharge around the bores installed occurs locally by horizontal flow rather than vertical recharge as no disturbance of overlying water levels in bores was reported.' This statement is not supported by sufficient data.

No hydrographs (water levels versus time) are included in the EIS for any of the monitored bores. Hydrographs would provide a better understanding of the relative water levels or head in each aquifer.

The only data presented about relative head of water in each aquifer is in Table 2.9 of the EIS as part of the model calibration results. This data relates to a single point in time and it is not clear what that point in time is.

The EIS should provide hydrographs of all bores that form part of the monitoring network. Where nests of bores exist, each hydrograph should include water level elevations for all bores in a nest.

PROPONENT RESPONSE

The monitoring network at the time of the EIS consisted of three multi-level standpipe monitoring nests, two in the open-cut area and one in the underground mining area. Each site is screened at three depths over a narrow range (minimum 34m, maximum 85m). Water levels were recorded only for the duration of pumping tests. It is recognised that the lack of longer duration time-series datasets was a deficiency of the EIS. Since then, the holes have been equipped with permanent sensors and dataloggers. They acquired continuous data since 1 May 2012 to 19 September 2012.

Seven new sites have been added to the monitoring network for the SEIS. All sites are equipped with continuously datalogged vibrating wire piezometers. In all, there are 25 piezometers at the seven sites, designed to monitor the full stratigraphic section down to the deepest coal seam to be mined. Four of the new sites are situated close to the mining footprint, with two upgradient of the open cut pits in the vicinity of Lagoon Creek, and two downgradient of the open cut pits overlying and adjacent to the underground mines. There are three far-field monitoring sites. The first is a single-piezometer at Alpha airport to monitor groundwater responses close to the Alpha township. The second is a 5-piezometer hole close to Jericho township. The third has two piezometers in the Clematis Sandstone and Rewan Formation strata of the Great Artesian Basin, as a check on whether mining effects reach the GAB.The loggers were installed over the period from September 2012 to November 2012. . Transient hydrographs were used in the Stage 2 model calibration and are displayed in the *Groundwater Assessment* report (contained in *Appendices – Volume 2* of this SEIS). The VWPs provide essential information on vertical head profiles and relative heads in each aquifer.

The hydrographs at these sites have provided essential baseline conditions for re-conceptualisation of the key processes that control the dynamics of the groundwater system.

Submitter No.	**419**	Issue Reference:	**8029**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Section 2.4, Modelling (p2-13)

DETAILS OF THE ISSUE

The modelling presented in the EIS has utilised a steady state model to predict impacts for the predicted life of the mine.

However contours of predicted drawdowns, after different time periods, are not provided and should be included.

It is not unusual for impacts to continue and affect landowners after mining ceases. The EIS includes insufficient information on these impacts or how they will be mitigated.

A groundwater model needs to be able to predict impacts many years after the mining ceases and at what time the maximum impact might occur. This will form a basis for formulating appropriate mitigation measures where the effect will be delayed.

Additional information is required in relation to recovery and when equilibrium might be reached. This modelling will need to adequately account for changing dewatering conditions within the mine including the end of mining. A transient model would be required to be developed and applied to provide this information prior to the commencement of mining.

The EIS should include a revised model that will allow predictions of maximum impact and time to recovery or equilibrium.

The EIS should provide contours of predicted drawdowns in each aquifer showing impacts both during and at the end of mine life.

The EIS should assess the impacts occurring after mining ceases on groundwater users and the water resource.

PROPONENT RESPONSE

The Stage 2 groundwater model includes transient calibration and transient progression of mining in order to quantify possible short-term impacts. In conformity with standard practice, drawdown maps are displayed at a number of times for a number of layers during the project life.

The Stage 2 model undertook a recovery simulation for 200 years to assess the timeframe for equilibration of groundwater levels, and whether they return to pre-mining levels. Delayed effects have been assessed. These effects will be taken into account for "make good" commitments where necessary.

Submitter No.	**419**	Issue Reference:	**8030**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Section 2.4, Modelling (page 2-13)

DETAILS OF THE ISSUE

In Volume 1, Project Overview, Chapter 5, Cumulative Impact Assessment, section 5.4.4, the potential cumulative effect of dewatering at Hancock Coal projects and at Waratah are assumed to lead to the following:

'The close proximity of the respective mines will lead to significant overlap between the cones of groundwater drawdown leading to compounded effects on groundwater levels. Supplementary numerical modelling will be required to gain a greater understanding of the likely combined radius of influence of the two projects.'

Current modelling does not take this cumulative effect into account. Future modelling will need to address this issue.

PROPONENT RESPONSE

The extent of the new numerical groundwater model has been designed to extend between eastings 360,000 and 490,000, and between northings 7,360,000 and 7,480,000. This includes the neighbouring mines and also the regional townships of Alpha, Jericho and Alice where groundwater forms an important component of reticulated water supply.

A data exchange agreement is in place with AMCI for shared information on the Galilee and South Galilee mines. Sufficient information on the Alpha mine is available in the public domain for cumulative impact assessment. However, it is noted that the Alpha (Hancock) EIS included no quantitative assessment of cumulative impacts. The South Galilee (AMCI) groundwater assessment has conducted a quantitative assessment of cumulative impact of the two neighbouring mines.

Groundwater models completed for proposed mines to the north and south of the Galilee Coal Project found maximum westerly drawdown extents of 10-15km, and easterly extents of about 5km.

It is likely that drawdown in the deepest mined coal seam will extend westwards beyond Jericho and will pass beneath the Clematis Sandstone outcrop, but it is unlikely that there will be any impact on the overlying aquifer and highly unlikely that there will be any impact on the recharge springs.

After discussions with Queensland Office of the Coordinator-General and DNRM, the original plan for cumulative impact assessment was to apply the Principle of Superposition. This would involve overlaying the drawdown contours

reported in the neighbouring Alpha and South Galilee groundwater assessments. In the event, the South Galilee assessment did not present the individual impact of that mine, and the Alpha assessment did not include the effects of a fractured zone. For these reasons, the Principle of Superposition could not be applied. Instead, the Galilee Project model simulated the effects of both neighbouring mines at their maximum extents.However, there is incomplete knowledge of geological detail and mining sequence for the other projects.

Submitter No.	**419**	Issue Reference:	**8031**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Section 5.1, Previous Investigations (p5-1)

DETAILS OF THE ISSUE

The EIS states that 'Groundwater in the region has previously been used to supply the port facility. The source of the water was the Splitters Creek bore field which is located 14km west of the port. An annual volume of 250L was licensed for the remaining bores within the field and this volume was not considered likely to increase (GHD, 2009).'

It appears that this could be a typographical error here with the 250L likely to be 250ML. This issue should be checked against the referenced report and or clarification be obtained from the DERM Rockhampton office.

PROPONENT RESPONSE

This matter will be clarified if required in future. It is considered unlikely to be the subject of further assessment, as port components are no longer part of the Galilee Coal project EIS, and the limit of assessment is now the boundary of the APSDA.

Submitter No.	**419**	Issue Reference:	**8032 / 7016**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Figure 3-5

DETAILS OF THE ISSUE

In this figure a geology map of the area is presented which shows the eastern boundary of the GAB approximately 40km west of the mine's western boundary. The location of the GAB is incorrect given that GAB sediments outcrops exist well to the east of the marked boundary.

PROPONENT RESPONSE

Waratah Coal acknowledges that the EIS did not have the correct position for the GAB boundary. It was previously incorrectly reported in the EIS as the base of the Clematis Sandstone, which is the most easterly recharge aquifer of the GAB.

Waratah Coal has used data from the Waratah Coal boreholes within and around the mine site to re-interpret the positions of the Clematis Sandstone and the Lower Triassic, Dunda Beds and Rewan Formation which form the base of the GAB. The discussion of the methodology used to interpret these locations, and maps depicting them, are presented in response to Issue Reference 17038 / 8016 contained in Part C – 02 – Land.

Submitter No.	419	Issue Reference:	8033 / 7017
Submitter Type	Government	TOR Category	Water Resources (Groundwater)
Name	DERM	Relevant EIS Section	Volume 5, Appendix 14, Groundwater, Section 2.3.3 (p2-6)

DETAILS OF THE ISSUE

A more detailed description of the locations of the nested monitoring bores and an accompanying map is required.

PROPONENT RESPONSE

The monitoring network at the time of the EIS consisted of three multi-level standpipe monitoring nests, two in the open-cut area and one in the underground mining area. Each site is screened at three depths over a narrow range (minimum 34m, maximum 85m). Water levels were recorded only for the duration of pumping tests. It is recognised that the lack of longer duration time-series datasets was a deficiency of the EIS. Since then, the holes have been equipped with permanent sensors and dataloggers. They acquired continuous data since 1 May 2012 to 19 September 2012.

Seven new sites have been added to the monitoring network for the SEIS. All sites are equipped with continuously datalogged vibrating wire piezometers. In all, there are 25 piezometers at the 7 sites, designed to monitor the full stratigraphic section down to the deepest coal seam to be mined. Four of the new sites are situated close to the mining footprint, with two upgradient of the open cut pits in the vicinity of Lagoon Creek, and two downgradient of the open cut pits overlying and adjacent to the underground mines. There are three far-field monitoring sites. The first is a single-piezometer at Alpha airport to monitor groundwater responses close to the Alpha township. The second is a 5-piezometer hole close to Jericho township. The third has two piezometers in the Clematis Sandstone and Rewan Formation strata of the Great Artesian Basin, as a check on whether mining effects reach the GAB.The loggers were installed over the period from September 2012 to November 2012. Transient hydrographs are gradually being extended for use in the Stage 2 model calibration. The VWPs will provide essential information on vertical head profiles and relative heads in each aquifer.

The hydrographs at these sites will provide essential baseline conditions for re-conceptualisation of the key processes that control the dynamics of the groundwater system. See also the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS.

Submitter No.	1840	Issue Reference:	8035
Submitter Type	Council	TOR Category	Water Resources (Groundwater)
Name	Barcaldine Regional Council	Relevant EIS Section	1.2.5.8

DETAILS OF THE ISSUE

Desalination of groundwater

Appendix 14 notes groundwater salinity of 400 to 1,300mg/L TDS (SKM 2009)[1], details on management and provision of SKM report are required.

It is noted that approvals were not attained for the aquifer testing, please advise how calculations were conducted and production estimates including impacts such as GAB were assessed.

Please advise how sampling from pump outlets provided full assessment of bores and groundwater. Installation of peizometers: There were limited sampling and bore locations within the proposed lease area.

1 SKM 2009. *Galilee Coal Project – Groundwater Impact Assessment Phase 1 – Groundwater Baseline Study.* E3 Consult. October 2009.

The predicted drawdown of up to 30km by Year 25 will likely impact on the long term viability of groundwater supplies to Alpha and surrounds which are 7km to 30km from the mine site. "the uncertainties in long term simulations were considered too large to provide meaningful results...groundwater recovery was not complete in simulations of 50 years..." "dewatering of surrounding aquifers".

Based on indications of overlapping impacts, decline or permanent alteration in groundwater (50+ years) and long term water supplies including drought proofing and support for return of grazing industry post-mining as indicated within respective EIS and loss of environmental values. There is a potential for irreversible impacts from groundwater extraction noting 980ML to 12,300ML/year inflows based on modelling calculations increasing annually over the LOM.

App 14 Section 8.5 Proposal for groundwater reinjection or artificial recharge to simulate wet season flows requires further detail including how impacts and contamination will be removed prior to recharge.

"The coal reserves of the mine are outside the GAB" conflicts with details on the project. There appears to be a reliance on low permeability and aquitards as complete protection for the groundwater horizons including the GAB.

The proponent is requested to advise how drawdown and groundwater extraction impacts will be addressed and provide full supporting evidence of considerations.

The proponent and Queensland Government can further assess groundwater once more collated data is available and cumulative impacts with surrounding mining operations are assessed.

Any proposal for make good or alternative water arrangements for landholder and bore owners needs to be developed as part of regional impacts strategy and not as part of isolated mitigation. The noted potential for groundwater contamination impacts has not been addressed, nor appropriate mitigation for the activities put in place including avoidance of impacts.

BRC note their strong concerns to the Coordinator-General and request that the area be declared a Cumulative Management Area (CMA) or similar and managed (i.e. by DERM/ QWC) as cumulative impact area for groundwater and that technical assessment include data from all proponent proposals. A long term management strategy for surface and groundwater within the Barcaldine Region and surrounds for the Galilee Basin be developed.

Please provide further details notes as per comments, as there is insufficient information provided at this stage to enable further comments by Barcaldine Regional Council.

PROPONENT RESPONSE

The analysis of groundwater impacts (both short and long term) has been conducted as a matter of course using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts. (See *Groundwater Assessment* report in *Appendices Volume 2* of this SEIS.)

The concerns of Barcaldine Regional Council have been addressed in the new *Groundwater Assessment* report contained in the *Appendices Volume 2* of this SEIS.

The recovery of groundwater levels after cessation of mining has been investigated by running a simulation for 200 years without any mining stresses. There will be a permanent lowering of the water table over the mine footprint, with a typical elevation of 340m AHD through the centre of the mining area. Mild groundwater sinks are maintained at each final void.For the deep hydrographs, the modelling shows rapid recovery over 50 years, with slower incomplete recovery out to 200 years. The shallowest hydrograph behaves differently, and is indicative of what will

happen at shallow depths. The water level declines for about 60 years, then stabilises, then starts to climb in concert with the deeper water levels. The early-time response is due to vertical drainage of water through the fractured zone over the mine voids, replenishing the deeper water-bearing formations.

A cumulative impact assessment (CIA) was undertaken for the South Galilee Coal Project, this project and the Alpha Coal Project. The CIA revealed a broad elongated cone of depression that is about 30km wide and over 100km in length along a north-south axis. The eastern limit of drawdown is well defined, as it is controlled by outcropping geology and the erosion of coal measures. There is some expansion of the drawdown limit to the west, including a small tongue crossing the GAB geological boundary in the area where the GAB rocks are hidden by Quaternary cover. The expansion to the west is not substantial and considered unlikely to impact on the GAB aquifer or the GAB springs.

Submitter No.	**1840**	Issue Reference:	**8036**
Submitter Type	Council	TOR Category	**Water Resources (Groundwater)**
Name	**Barcaldine Regional Council**	Relevant EIS Section	2.1.3.1; 2.1.3.2

DETAILS OF THE ISSUE

- How much mine construction and operations water is required?
- Is there any knowledge of the location or volumes of the existing domestic supplies?
- What will be the impacts on tapping into potential groundwater from alluvial basins?

PROPONENT RESPONSE

The site water management system has been further investigated and designed such that there is minimal requirement for imported water. Water captured onsite will be used in underground workings, dust suppression and coal washing. Despite this there is still an annual clean water requirement during mine operation estimated at 2500ML/yr, comprising:

- 2,000ML/year for the CHPP vacuum pumps.
- 350ML/year for wash downs within the Mine Industrial Area.
- 150ML/year for potable and fire fighting purposes.

Potable water demands for the mine construction phase are estimated to peak at 290ML/yr. This water demand will be met through contracted potable water suppliers carting from an offsite source.

In the initial EIS submission for the Galilee Coal Project a raw water storage was proposed to be constructed on Tallarenha Creek within the MLA. This dam is no longer included in the project. Waratah Coal had also applied for an annual allocation of 2,500ML/year from the Connors River Dam Project which was being developed by SunWater.

The Connors River Dam Project is no longer proceeding and SunWater is currently investigating the feasibility of a pipeline to supply water from the Burdekin River to the Galilee Basin. This pipeline is unlikely to be constructed in time for the commencement of mining at the Galilee Coal Project.

A raw water supply of 2,500ML/year is required for the mine. The following raw water supply options have been identified for the mine:

1. Existing Water Supply Schemes (Regional Pipelines):
    a. Burdekin Haughton Water Supply Scheme (BHWSS)
    b. Trading with existing water allocation holders
    c. Nogoa Mackenzie Water Supply Scheme (NMWSS)

2. Unallocated Surface Water:
   a. Burdekin WRP area
3. Groundwater and Local Supply, and
4. The Great Artesian Basin (GAB)

Of these options, it is proposed to utilise an initial temporary supply of raw water from a borefield in the vicinity of the mine. Discussions with DEHP have indicated that this is a feasible option. The ultimate permanent raw water solution is proposed via a pipeline from the Burdekin River to supply coal mines in the Galilee Basin.

Additional investigations will be required to confirm the feasibility of these proposed raw water sources. A potential contingency measure for the mine raw water supply is the operation of a water treatment plant at the mine to produce low salinity water from excess mine affected water. The initial water balance investigations for the mine indicate that there will be sufficient excess mine affected water to provide a raw water supply of 2,500ML/year via a water treatment plant.

Refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts. (See *Groundwater Assessment* report in *Appendices Volume 2* of this SEIS.)

Submitter No.	**1840**	Issue Reference:	**8037**
Submitter Type	Council	TOR Category	**Water Resources (Groundwater)**
Name	**Barcaldine Regional Council**	Relevant EIS Section	3.1.13.1.2

DETAILS OF THE ISSUE

"...modelling suggests .....significant impacts to groundwater users within 12-30km of the mine from drawdown..." Fall back is make good. What is the worst case scenario and subsequent cost to the project ... to make good?

"Further longer term hydraulic testing is required to fully predict the extent of potential impacts." How can we make predictions on impacts and subsequent mitigations without the appropriate testing?

Where are the vulnerable groundwater areas, or is it everything with 12-30km?

PROPONENT RESPONSE

The extent of predicted drawdowns has been reassessed with the new groundwater model. Drawdown will not be the same in all directions. It is expected to be greatest along the north-south axis and least in the easterly direction. The modelling predicts a broad water table drawdown extent that extends about 20km from the area of active mining to the north (for 1m drawdown), 10km to the south, and 15km to the east. The western extent (towards the GAB) does not leave the mine lease and the 1m drawdown contour aligns with the GAB geological boundary.

Modelling considered worst case scenarios in Stage 1 (December 2012) and more likely scenarios in Stage 2. Impacts are predicted by modelling, with the results of the groundwater testing incorporated in the parameters of the model. Refer to Issue Reference 8012 (in Part C – 18 – Environmental Management Plan) for more information.

Submitter No.	**419**	Issue Reference:	8038
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)** / EMP – (Water Resources [Groundwater])
Name	**DERM**	Relevant EIS Section	Vol 1, Project Overview, Chapter 7, Environmental Plan: Mine, Section 7.8.4 Element 4, Groundwater (p133)

DETAILS OF THE ISSUE

Volume 5, Appendix 14, Section 2.4 states:

> 'The Model was calibrated in a steady state simulation and not calibrated in transient mode due to a lack of transient data. This led to greater uncertainty in predictive runs of mine development under transient conditions.'

It was indicated that there was uncertainty surrounding hydraulic parameters and longer tests are required. It was also indicated in Appendix 14 that recalibration of the model with additional data could assist with refining predictions.

PROPONENT RESPONSE

Waratah Coal has instigated development of a new and more extensive groundwater model. This model development is proceeding in two stages. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

Some dataloggers were installed in the EIS monitoring bores in May 2012, and the VWP monitoring commenced at various sites from September to November 2012. Stage 2 of the modelling made use of the transient monitoring record, but Stage 1 was limited to steady-state calibration. However, it has been conducted on a much broader off-site set of groundwater levels than was used in the EIS model.

The uncertainty in formation permeabilities has been addressed by core laboratory measurements, packer testing, and acquisition of vertical head profiles (for model calibration of vertical connectivity) in VWP holes. Additional information (since the EIS) is now available from the neighbouring Alpha Coal Project. See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS for more information.

The *Draft Mine EM Plan* has also been amended accordingly (and is contained in *Appendices – Volume 2* of this SEIS) – refer to section 10.

Submitter No.	**419**	Issue Reference:	**6047 / 2026**
Submitter Type	Government	TOR Category	Nature Conservation (Freshwater Aquatic) / **Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 7 Aquatic Ecology, Section 7.5.4, Diversions (p222)

DETAILS OF THE ISSUE

The EIS states 'The diversion of Tallarenha Creek would impact on drainage in the region with higher flows caused by the diversion potentially impacting on hydrology and increasing flooding risk of the creeks downstream of the diversions...' and 'Potential impacts to hydrology are addressed in the flooding technical report...'.

No results from modelling were presented in the flooding technical report to quantify the impacts to hydrology from the diversions.

DERM notes that another mining lease holder downstream of this mining operation is also proposing diversion works. The design of the diversion/s for this project cannot impact on the downstream mining lease holder and proposed works or any other downstream landholder.

The EIS should address the design of the diversion and provide information on the impacts of the diversion on downstream users outside of the mine boundary. The design of the diversion needs to minimise the impact on flooding levels and frequencies both upstream and downstream of the project.

PROPONENT RESPONSE

Additional flood modelling of the proposed diversions and flood protection levees has been undertaken and is described in the *Mine Site Creek Diversion and Flooding* report (contained in *Appendices – Volume 2* of this SEIS). Results of this modelling indicate that although there are changes to the flood behaviour, including increases in flood depth and inundation extent, these impacts are contained wholly within the mine lease. Therefore impacts as a result of proposed diversion works do not impact downstream land holders. A *Mine Site Creek Diversion and Flooding* report is contained in *Appendices – Volume 2* of this SEIS. This details the modelling results and flood mapping which demonstrates that there are no off-site impacts.

Additional surface water aquatic ecology and GDE sampling has been undertaken in Tallarenha and Lagoon Creeks that provided an improved basis for understanding the key ecological components immediately downstream of the mine potentially at risk from altered hydrology-associated impacts (see the *Mine Site Aquatic Ecology and Water Quality* report and the *Subterranean Fauna Survey* contained in *Appendices – Volume 2* of this SEIS). A *Mine Water Quality Monitoring Program* has also been prepared and is contained in *Appendices – Volume 2* of this SEIS.

Refer also to Issue Reference 6015 in Part C – 17 – Cumulative Impacts.

Submitter No.	**494**	Issue Reference:	6054
Submitter Type	Individual	TOR Category	**Water Resources**
Name	**Name withheld**	Relevant EIS Section	

DETAILS OF THE ISSUE

- Lack of studies on effect of hydrography.
- Concern of breach of dam on Tallarenha creek.
- Contamination by Dam.

PROPONENT RESPONSE

The dam at the Confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is does not pose a risk for contamination or breach.

Submitter No.	556	Issue Reference:	6055
Submitter Type	Individuals	TOR Category	Water Resources
Name	Names withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

- Dam on Tallerenha Creek interferes with local ecosystems
- Flooding of agricultural land, and
- Groundwater contamination.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Flood modelling undertaken for the mine site indicates the impacts are confined to the mine lease boundary and therefore do not increase flood depth, extent or duration on agricultural land. Cross drainage structures associated with the rail have been designed to limit increases to inundation depth to 0.5m over agricultural land in the 1 in 100 year flood event. It should be noted that in many cases this vertical increase in flood level does not translate into significant increase in inundation area and is for a large infrequent event.

The new groundwater has examined changes in groundwater flow directions as a result of mining. This information can be used to assess whether poorer quality water is likely to migrate to an area of better water quality, or vice versa. See the *Groundwater Assessment* report contained in *Appendices – Volume 2* of this SEIS.

Section 10 of the *Draft Mine EM Plan* contains measures to protect against contamination of groundwater from mining operations (see *Appendices – Volume 2* of this SEIS).

Submitter No.	437	Issue Reference:	6056
Submitter Type	Individual	TOR Category	Water Resources
Name	Name withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

Proposed rail line traverses a number of braided river systems that flood extensively in the wet season.

PROPONENT RESPONSE

Preliminary design has been completed with the inclusion of all major waterway crossings with 1 in 100 year average recurrence interval (ARI) immunity. Environmental design criteria for these structures has been set to maintain flow connectivity particularly within expansive floodplains and braided systems. All major waterway crossings have been designed to include a combination of bridges and floodplain relief culverts to prevent redirection or concentration of flow and mimic natural conditions as much as possible. A rail flooding technical report has been prepared which outlines the design methodology and hydraulic performance of these waterway crossings (refer *Rail Corridor Cross Drainage* report contained in *Appendices – Volume 2* of this SEIS).

Submitter No.	1840	Issue Reference:	6057
Submitter Type	Council	TOR Category	Water Resources
Name	Barcaldine Regional Council	Relevant EIS Section	1.2.1

DETAILS OF THE ISSUE

Raw water supply and ...a water pipeline from proposed dam site on Tallarenha Creek to the mine and on-site water retention dams.

Local information and discussions with council note that water is not running in Tallarenha Creek, even following recent high rainfall and flooding. Further work on the geological profile and reliability of this creek is needed as it is likely to create a major and potentially long term impact if a dam is established without the benefit of the proposed water storage.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

Submitter No.	1840	Issue Reference:	6058
Submitter Type	Council	TOR Category	Water Resources
Name	Barcaldine Regional Council	Relevant EIS Section	1.2.4.2

DETAILS OF THE ISSUE

- " a detailed engineering investigation is required to determine the suitability and type of impoundment structure [dam] required"
- Mine dirty water dams are situated within clean water catchment boundary
- Rejects and tailings areas are located near to proposed dam
- Assumes reliability of100% for clean water supply from dam, and
- The placement of the clean water, return water and mine dirty water dams requires further explanation regarding management, design and flood immunity to prevent cross-contamination or releases.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore this dam is no longer part of the EIS.

A revised mine water management system has been designed that will facilitate segregation of clean, dirty and contaminated water streams, and capture and re-use of dirty and contaminated water to meet site water demands. Plans have been prepared that show the location and size of proposed water storage dams and the operating strategy for the dams has been described. Water balance modelling has been undertaken to demonstrate the performance of the mine water management system under a wide range of climate conditions. Refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

For more detail refer to Issue Reference 6020 and 6022 in Part C – 18 – Environmental Management Plan.

Submitter No.	782	Issue Reference:	6059
Submitter Type	Individual	TOR Category	Water Resources (Surface Water)
Name	Name withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

- Tallarenha Creek Dam unsuitable (insufficient yield)
- Sunwater pipeline not sustainable, and
- No embankments on rail (cause afflux)

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

SunWater and the Queensland Government will not be proceeding with the Connors River Dam Project. Alternative raw water supply options for the Galilee Coal Mine have been discussed in the *Mine Site Water Management System* report (contained in *Appendices – Volume 2* of this SEIS) and include groundwater supplies (temporary start-up option only), a pipeline from the Burdekin River to the Galilee Basin, and treatment of excess mine affected water.

Post rail flood modelling has been undertaken for twelve of the major waterway crossings of the proposed railway (refer *Rail Corridor Cross Drainage* report contained in *Appendices – Volume 2* of this SEIS). At major crossings bridges have been utilised to limit impacts to property owners and the environment. This modelling demonstrates minimal impact in terms of increase to inundation depth and flood extent. Design criteria have been set for the maintenance of flow connectivity, outlet velocity and minimum afflux with the structures designed to meet this criteria.

Submitter No.	420	Issue Reference:	6060 / 19119 / 4127
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** / Health & Safety
Name	Queensland Health	Relevant EIS Section	Surface Water, Waste and Social Vol 2 Chapter 9, 12, 16

DETAILS OF THE ISSUE

1. Queensland Health notes that the mine site waste water (including effluent from the sewerage treatment plant) is treated and stored on-site and that the treated waste water (to Class C quality) is intended to be recycled for on-site use. While it is understood the treatment processes may reduce the concentration of some contaminants, information on the direct and indirect human health risk of exposure to waste water has not been provided.
2. Queensland Health has concerns regarding the potential for offsite human exposure should waste water be released or escape. Examples include the potential for contaminants to reach downstream drinking water sources or other reservoirs where people may be exposed through dermal contact or farming activities. In particular Vol 2 Chapter 16, S16.5.3 (p395) identifies that the proponent will pipe water from the mine to be used for both stock and domestic purposes. The source and quality of this "mine water" has not been specified by the proponent.
3. Queensland Health has also noted that the proponent proposes to extract ground water for industrial and potable use and that the site has an on-site water treatment plant. This plant must provide water that complies with the Australian Drinking and Water Guidelines published by the National Health and Medical Research Council. Queensland Health is however unaware and therefore concerned as to whether the potable water supply, once treated at the plant, is appropriately tested and stored on-site as to ensure its quality and protect it from cross-contamination and other potential contaminants.

The proponent should provide further clarification in relation to:

1. Managing recycled water activities on-site highlighting compliance with the Australian Guidelines for Water Recycling – managing health and environmental risks (Phase 1) and (Phase 2) released by the National Environmental Protection Council. This document provides guidance on water quality and management planning for recycled water.
2. Providing adequate commitments to ensure that waters released / extracted from the mine site is appropriately managed, as to protect downstream drinking water sources or other reservoirs in the event of an off-site discharge. QH recommends that before any "mine water" is piped to a neighbouring property an appropriate risk assessment and water testing is undertaken to ensure the quality of the water is suitable for the intended use and that human health will not be compromised.
3. Storing, re-supplying and protecting (particularly from cross contamination) drinking water, to ensure water quality standards meet the Australian Drinking Water Guideline 2004 (ADWG). The proponent will also need to determine whether they will be regarded as a drinking water service provider as regulated by the *Water Supply (Safety and Reliability) Act 2008* and the *Public Health Act 2005*. If the proponent is not a drinking water service provider, then the proponent needs to develop a water quality management system.

PROPONENT RESPONSE

Accommodation camp and mine site sewerage systems will require on-site treatment and disposal. On-site systems will be sized, designed and managed to current standards for the mining industry. Generally, this would entail a secondary treatment system capable of producing recycled water suitable for irrigation via surface and/or sub-surface absorption beds and/or irrigation fields (at least Class C recycled wastewater quality).

A detailed site assessment, including of site opportunities and constraints, soils and local climatic conditions will be coupled with MEDLI mass balance modelling to determine sustainable irrigation loads for the site, coupled with a suitably sized wet weather storage and buffer storage systems to manage variable loads and low irrigation demands during wet periods. During heavy rainfall events, recycled water will be temporarily stored in the wet weather storage, to be discharged at a later date. Signage will be established to restrict access to these areas, and sludge from the plant will be transported off-site by a regulated waste contractor to a regulated waste facility.

A management system will be developed (as a Site Based Management Plan (SBMP) or similar) to manage the treatment system and infrastructure, irrigation and required monitoring program to ensure the scheme remains sustainable over the long term. The SBMP will contain:

- A summary of the system
- Organisational structure and responsibility
- Objectives and Targets
- A Risk assessment and identification of environmental issues and potential impacts
- An Environmental Management Plan
- An environmental monitoring and inspection plan
- Procedures for communication, tracking, incident management, reporting, and training, and
- Procedures for periodic review and continual improvement.

Treated wastewater may be used in progressive revegetation works during the life of the project, and following the cessation of mining. Treated sludge will not be used on mine rehabilitation works.

Design and operational details of the STP including disposal methods will be incorporated in the revised EM Plan.

For other water sources on the site, the water management system has been designed such that there will be no controlled (or uncontrolled) releases of contaminated water to the environment (see also Issue Reference 6020 in Part C – 18 – Environmental Management Plan). Water balance modelling utilising 122 years of meteorological data to demonstrate the demand for water onsite and adequately sized dams will prevent discharge of contaminated water. It should be noted however there will be some uncontrolled discharge associated with sediment control structures during prolonged wet periods. However this water is expected to be of dischargeable quality as these sediment control structures will receive runoff from rehabilitated spoil areas. Refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

Drinking water for the site will most likely be supplied by groundwater extraction or the Burdekin Falls Dam pipeline (see also Issue Reference 6038 in Part C – 03 – Nature Conservation) which will likely also supply Barcaldine Regional Council with drinking water. Hence water will be of acceptable quality with additional treatment through the proposed Drinking Water Treatment Plant (DWTP).

The DWTP will be developed and managed such that output water will meet the Australian Drinking Water Guidelines, and will operate under a Drinking Water Management Plan which will be developed prior to commissioning the plant, and based on the system chosen for the site.

It is not envisaged that the mine will be a water service provider under the Act.

Submitter No.	**419**	Issue Reference:	**6061 / 4128 / 2051 / 19120 / 8020**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	Volume 2, Section 8.4.5 – Groundwater Contamination (p247)

DETAILS OF THE ISSUE

Release of poor quality groundwater

The EIS states "groundwater inflow can be controlled by strategically placed sumps for pumping to surface storage, treatment and/or reuse in the mine water management system." (Volume 2, Section 8.4.5 p247).

The EIS also states "The groundwater is generally brackish to saline and useable for livestock drinking water and therefore, the potential for further deleterious impacts to potential uses is lower." (Volume 2, Section 8.5 p247).

The consultant's groundwater assessment (Vol 5, Chapter 14) tabulates bores of Tertiary aquifers with EC levels >20000 µS/cm, and ~50% of the recent Permian aquifer bore observations with TDS >4000 mg/L (>6000 µS/cm).

Note that livestock drinking water salinity tolerances are expressed in ANZECC (2000) as Total Dissolved Solids (TDS; mg/L), which can approximately calculated by 0.67 x EC (in µS/cm). The "no effect" TDS tolerance level for beef cattle (the predominant local land use) is 4000 mg/L (6000 µS/cm) (ANZECC 2000). Only "tolerant" or "very tolerant" crops are suited for irrigation with >4500 µS/cm water (ANZECC 2000).

If released incorrectly, this water has the potential to cause adverse environmental impacts. The EIS does not state how this water will be appropriately managed.

The EIS should include detailed plans for the management, reuse or disposal of saline and otherwise unsuitable excess groundwater. Also, to assess impacts adequately, the EIS must give details on the 'further deleterious impacts to potential uses.'

PROPONENT RESPONSE

The water quality signature of groundwater (in terms of suitable uses) has been reassessed in the new groundwater assessment (see *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS). A thorough examination of water quality records in the Queensland Government Groundwater Database has been conducted and additional water quality samples have been analysed.

Groundwater will be stored in suitably sized dams and reused onsite in underground and dust suppression operation. Refer to the response to Issue Reference 6020 (in Part C – 18 – Environmental Management Plan) which demonstrates these storages will be managed to prevent discharge.

Submitter No.	**419**	Issue Reference:	**6062 / 2035 / 10013 / 19108 / 4125 / 8034**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**DERM**	Relevant EIS Section	MINE EIS Project Design (Chapter 1)

DETAILS OF THE ISSUE

In Section 1.3.6.2 Groundwater (Project Design Chapter 1 of MINE EIS) of the EIS, the groundwater assessment concluded that given the predicted level of subsidence, crackling of the overlying geology is likely to occur. This cracking may result in rapid infiltration of rainfall into the aquifers surrounding the mine, potentially leading to increased rates of flow into the goafs requiring increased dewatering.

It is recommended that an estimate of this increased groundwater prediction is included in the site water balance models and management plan. Given that the proponent has selected to have no discharge of mine affected water, there will need to be capacity onsite to store the dewatering water during times of higher rainfall events. An important question to consider in the more detailed site water balance, is, what is planned for an occurrence where the dirty mine water dams, return dam are approaching capacity and further rain is anticipated (plus increase groundwater impacts in pits/underground)? Will water be pumped to one of the open pits as an interim solution until the water balance on site resumes to more practical levels? This may mean that mining from a certain area of a pit would have to cease for a period of time. If the 'no discharge' approach is considered as the best option for the site, then scenarios such as these should be considered well in advance of the site development.

PROPONENT RESPONSE

Surface changes due to longwall mining are dependent on the amount of surface subsidence, determined by factors such as overlying strata geology, the longwall block width, the seam height extracted, and the depth of cover. Subsidence impacts on the surface include the formation of tension cracks and in flat areas internal drain way subsidence troughs can form.

Types of remedial works for these impacts may include ripping, re-compacting and seeding of all tension cracks and reshaping any internally draining areas to be externally draining by the construction of contour drains and topsoiling and seeding any disturbed areas. These works will extend to blanketing and compacting of some water courses post-subsidence, preventing inflow of runoff into underground mining areas and maintain environmental surface flows. Materials which have been investigated for use in compacted blankets include silty alluvium and clay. Some re-alignment of water courses and minor earthworks will be necessary, but the work done so far allows these activities to be well planned prior to subsidence in any particular area. The natural fall of the mining area drains freely to the north and is sufficient to minimise the events of subsidence troughs. In the flatter areas, reshaping of any internally draining areas to be externally draining will be done by the construction of contour drains and appropriate rehabilitation measures.

On the cessation of subsidence in any one area and completion of remedial works, it is planned that the land will be returned to grazing and original land activities. Yield trials will verify the maintenance of original land productions.

The project area surface stratigraphy contains cohesive Quaternary alluvial and Tertiary sands, clays and laterites which are self-healing to tensile surface fracturing. Surface tension cracks which form in cohesionless creek bed alluvium and Recent Colluvium are self-healing and readily infill. Open tension cracks in surface clays need to be ripped and compacted.

The new groundwater model includes the fractured zone as a matter of course and sensitivity analysis on a range of permeability profiles that bracket likely and worst case scenarios. It is probable that the higher infiltration rates will be short-lived as the cracks will infill through remedial works as described in the rehabilitation management plan. The dewatering rates are likely to be high for a short time until the near-surface fractures are plugged with sediment.

Dams with the possibility of containing contaminated water have been designed with a design storage allowance and no external catchment area to prevent discharge under prolonged rainfall conditions. These dams will also be operated to stop pumped inflows above this design storage allowance with water to remain in pits. Both of these considerations have been included within the water balance modelling with the results indicating no discharge from these dams over the modelling simulation (refer *Mine Site Water Management System* report in *Appendices – Volume 2* of this SEIS).

Revised flood modelling has been undertaken using a post-mine ground surface (refer *Surface Water Impact Assessment of Longwall Mining Subsidence* report in *Appendices – Volume 2* of this SEIS). This modelling identifies locations of changes to the surface flow regime and assess possible mitigation measures where necessary in accordance with *Watercourse Subsidence – Central Queensland Mining Industry Guideline*[2].

Surface subsidence caused by longwall mining will be managed through Subsidence and Rehabilitation Management Plans.

For further information regarding subsidence and impacts refer to *Longwall Mining Subsidence Report* in *Appendices – Volume 2* of this SEIS.

Submitter No.	**419**	Issue Reference:	**6063**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 1 Project Description, Section 1.2.4.2, Tallarenha Creek Dam (p52)

DETAILS OF THE ISSUE

The EIS proposes a clean water supply for the mine of 4550ML/a from a dam to be constructed on Tallarenha Creek at the junction with Beta Creek with a catchment area comprising 866km^2 and a reservoir storage V of 18098ML. This would require the sourcing of unallocated water and would need to comply with the provisions of the Water Resource (Burdekin Basin) Plan 2007 and the Burdekin Basin Resource Operations Plan in addition to requirements of the *Water Act 2000*.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

Also refer to Issue Reference 6038 in Part C – 03 – Nature Conservation.

2 DERM (2011) *Watercourse Diversions – Central Queensland Mining Industry*. Department of Environment and Resource Management.

Submitter No.	419	Issue Reference:	6064
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Chapter 1 Project Description – 1.2.4.5 Water Storages (p52)

DETAILS OF THE ISSUE

The EIS proposes the release of water from the Tallarenha Creek dam during high intensity rainfall events through the bywash. The impacts of water storage on the watercourse downstream should be addressed. A key water management strategy objective is to maintain a sufficient quantity of surface water to protect downstream uses and environmental values of those waters (including maintenance of aquatic ecosystems as required in section 3.4.1.2 of the Terms of Reference).

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

Submitter No.	419	Issue Reference:	6065
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Chapter 6 – Commitments – Section 6.2.9 Surface Water Resources (p96)

DETAILS OF THE ISSUE

The EIS provides no commitments in relation to the diversion of watercourses.

It is recommended that the EIS commit to the design and rehabilitation for the watercourse diversions in accordance with the following documents:

- Project C8030 (Stage 1) – Maintenance of Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 2) – Monitoring Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 3) – Design and Rehabilitation Criteria for Bowen Basin River Diversions, and
- The Department of Environment and Resource Management Regional Guideline entitled 'Watercourse Diversions – Central Queensland Mining Industry' dated 15/03/2011.

PROPONENT RESPONSE

Conceptual design of the proposed watercourse diversions has been undertaken in accordance with the recommended guidelines. The *Mine Site Creek Diversion and Flooding* report (contained in *Appendices – Volume 2* of this SEIS) includes conceptual details for monitoring and rehabilitation of the diversion works in accordance with the abovementioned guidelines. Further detailed information relating to the maintenance and management of diversions will be provided as part of the licensing process under the *Water Act 2000* and associated approvals under the *Sustainable Planning Act 2009*.

Refer also to Issue Reference 6015 in Part C – 17 – Cumulative Impacts.

Submitter No.	419	Issue Reference:	6066
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Chapter 1 Project Description, Section 1.2.4 6 Proposed Tallarenha/Lagoon Creek Diversion (p57-58)

DETAILS OF THE ISSUE

The terms of reference (3.4.1.1 Description of environmental values) state that the EIS should provide a description of any watercourses likely to be affected by disturbance or stream diversion. The results of this description should form the basis for the planning and subsequent monitoring of rehabilitation of the watercourses during or after the operation of the proposal.

The EIS should provide sufficient information to determine whether the design of the proposed diversion and the rehabilitation of the diversion is based on the outcomes of the geomorphic condition of the current watercourses.

The diversion should be designed to mimic (an near as possible) the natural features of the watercourse in accordance with the following documents:

- Project C8030 (Stage 1) – Maintenance of Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 2) – Monitoring Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 3) – Design and Rehabilitation Criteria for Bowen Basin River Diversions
- The Department of Environment and Resource Management Regional Guideline entitled 'Watercourse Diversions – Central Queensland Mining Industry' dated 15/3/2011.

The EIS should contain enough conceptual information on the diversion to demonstrate that any diversion can be constructed to meet engineering requirements and relevant regulatory guidelines with specific reference as to how the design and the monitoring of the diversion will meet the ACARP and Departmental guidelines relating to watercourse diversions.

Further assessment of the diversion, including detailed functional hydraulic design, rehabilitation and monitoring requirements, will be required as part of approval processes under the *Water Act 2000* and associated approvals under the *Sustainable Planning Act 2009*.

PROPONENT RESPONSE

Refer to Issue Reference 6015 in Part C – 17 – Cumulative Impacts.

Submitter No.	419	Issue Reference:	6067
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Chapter 9 Surface Water Resources, Section 9.5.5, Creek Diversion (p264)

DETAILS OF THE ISSUE

The EIS states that the creek diversion will not result in any increase in flood discharges or levels within the waterways downstream of the diversion. This contradicts the statement in section 7.5.4 (p222) which states that there is the potential for flooding risks downstream of the diversion.

The EIS contains insufficient information to support the statement that the conceptual design will not cause increases in flood levels downstream.

PROPONENT RESPONSE

Refer to Issue Reference 6047 in Part C – 03 – Nature Conservation.

Submitter No.	419	Issue Reference:	6068
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Chapter 9 Surface Water Resources, Section 9.5, Potential Impacts (p263)

DETAILS OF THE ISSUE

The terms of reference (3.4.1.1 Description of Environmental Values) require a description of present and potential water uses downstream of the areas affected by the project. Section 3.4.1.2 of the terms of reference also requires that the protection of water entitlements be addressed. The EIS contains insufficient information to meet the requirements of the terms of reference.

PROPONENT RESPONSE

An investigation into surface water license holders downstream of the mine site indicates there are currently no licenses held within the Lagoon Creek catchment. The closest water surface water license holder is located approximately 200 km downstream on the Belyando River. As indicated by the water balance modelling this equates to less than 0.3 % reduction in average annual flow volume in the at this location. Detailed results of the site water management system and water balance modelling results are currently being compiled into a detailed technical report for submission.

From an environmental perspective, there is currently no existing information on the environmental values (EV's) associated with various reaches / sub-catchments of the Burdekin Basin, though such information is being collated by DEHP and it is expected (based on DEHP's own website information) that it will be made available in December 2013. Some assumptions can, however, be made in the interim as to what the relevant local EV's in waterways within and immediately adjacent to the mine site are likely to be based on the current knowledge of local land use, which is predominantly grazing. As a starting point, water quality data should be compared against:

- ecosystem protection values, and
- stock irrigation values.

Given that many of the waterways within and adjacent to the mine and rail have some level of exposure to riparian vegetation clearing, cattle access to creeks and agricultural runoff, the ecosystem protection level assigned to those waterways should be slightly to moderately disturbed (upland) freshwater streams (i.e. 95% ecosystem protection level). Exception to this might include any of the DIWA listed wetlands adjacent to the mine site, for which 99% ecosystem protection level trigger values could apply.

A water and sediment quality monitoring program will be prepared based on the results and a review of the current monitoring program (refer to the *Aquatic Environment Position Paper* contained in *Appendices – Volume 2* of this SEIS) to provide sufficient data to help inform the development of the Environmental Authority for the project. The monitoring program will be developed in accordance with procedures outlined in the ANZECC (2000)[3] guidelines, so there is an expectation that, as a first step, EV's for the waterways in question will be determined through processes

3 ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra

outlined in those guidelines. Once these are established, a 12 to 24 month water and sediment quality monitoring program will be initiated in consultation with DEHP. That monitoring program will clearly outline:

- Monitoring locations
- Monitoring frequency and schedule
- Routine and event-based monitoring
- Water and Sediment Quality Parameters (those water quality parameters already sampled should be used as a starting point – see Table 2-3 in the *Aquatic Environment Position Paper (*contained in *Appendices – Volume 2* of this SEIS)
- QA/QC objectives
- Sampling and analysis methodologies (the DERM (2009)[4] sampling protocols should be used as the guiding document)
- Protocols for other data collection techniques (e.g. any data loggers that might be installed)
- Documentation and records
- Data quality assessment, and
- Analysis.

It should be noted that the ephemeral nature of the waterways in question will restrict water quality and sediment quality sampling opportunities for a large proportion of any given year. This needs to be considered so that the number of sampling points and the timing and frequency of sampling put forward are sufficient to generate the required number of data points within the nominated timeframe such that the EA is not delayed. During the wet season, the remoteness of the study area and the nature of the roads will place further restrictions on water quality data collection. Various methods for enhancing site access will be utilised – for example helicopter or All Terrain Vehicle (ATV).

Submitter No.	**419**	Issue Reference:	**6069**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 9 Surface Water Resources, Section 9.5.5 Creek Diversion (p264, p266)

DETAILS OF THE ISSUE

The terms of reference (3.4 Water Resources) require that where a licence or permit will be required to take or interfere with the flow of water under the *Water Act 2000* this section should describe the details of the works to be constructed and the impacts of the works. The EIS does not adequately detail the construction work of the diversion channel.

The EIS describes two diversions of Tallarenha Creek (Volume 2 Chapter 9 p266) and in other places refers to one diversion (Section 9.5.5 Creek Diversion on p264). It is unclear from the EIS documentation whether there will be one or two diversions and where the section(s) of the diversion(s) is/are to be located. It is also unclear whether Saltbush Creek will be diverted.

The EIS should provide at least the following information:

- clarification of the location of each proposed diversion and the waterways to be diverted, and
- proposed works including length of the proposed diversion and typical cross sections of the diversion throughout its length.

4 DERM (2009) Monitoring and sampling manual 2009. Department of Environment and Resource Management, Version 2 September 2010.

The EIS must contain sufficient conceptual information on the diversion to demonstrate that any diversion can be constructed to meet engineering requirements and relevant regulatory guidelines with specific reference as to how the design and the monitoring of the diversion will meet the ACARP and Departmental guidelines relating to watercourse diversions.

Further assessment of the diversion, including detailed functional hydraulic design, rehabilitation and monitoring requirements, will be required as part of approval processes under the *Water Act 2000* and associated approvals under the *Sustainable Planning Act 2009*.

PROPONENT RESPONSE

There are two proposed diversions associated with the mine site. Malcolm Creek is proposed to be diverted to protect open-cut pits from flooding, while Lagoon Creek is proposed to be diverted into Saltbush Creek. Saltbush Creek will maintain its existing course with additional capacity to cater for the increased flow from Lagoon Creek. Flow from all diversions will be returned to their respective natural course prior to leaving the site boundary. The extent of diversion works is included in the figure shown in Issue Reference 6015 (in Part C – 17 – Cumulative Impacts). Concept design details of the proposed watercourse diversions are provided in the *Mine Site Creek Diversion and Flooding* report contained in *Appendices – Volume 2* of this SEIS.

Concerns have been raised by DNRM regarding the stability of the Malcolm Creek diversion with regards to its proximity to the open cut mines. In response to this Waratah Coal, the Office of the Co-ordinator General and DNRM met to discuss these issues, which were deemed to be resolved. Waratah Coal commit to liaising with DNRM in regards to this matter should they require further information.

Submitter No.	**419**	Issue Reference:	**6070**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 9 Surface Water Resources, Section 9.5, Potential impacts (p263)

DETAILS OF THE ISSUE

Malcolm Creek is included on maps (Figure 37 on page 53) and shown to be located within the proposed mine plan in the area of the proposed open-cut pit (OC2 south). It is also included in the hydrological modelling (Appendix 17).

The potential impact of the mine operations (both underground and open-cut mining) on Malcolm Creek and the proposed mitigation measures are not included in the EIS

PROPONENT RESPONSE

Malcolm Creek is proposed to be diverted to prevent impact on both open-cut and underground mining operations. Refer to the response to Issue Reference 6015 in Part C – 17 – Cumulative Impacts for further details.

Submitter No.	419	Issue Reference:	6071
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Chapter 9 Surface Water Resources, Section 9.5.6, Flooding (p264)

DETAILS OF THE ISSUE

Development of hydrological and hydraulic models has already been undertaken to determine existing flood behaviour but no information is presented from modelling to predict impact on flooding from mine infrastructure including waterway diversions. The Terms of Reference Section 3.4.1.2 Potential impacts and mitigation measures states that consideration should be given to the potential impacts of the project on floodplain hydrology (including changes to floodplain characteristics).

The EIS should include results from hydrological and hydraulic modelling for the project, including the impact of any diversions and other mine infrastructure to explain the impacts of the mine development on flooding (e.g. water depth and flood velocities).

PROPONENT RESPONSE

A *Mine Site Creek Diversion and Flooding Report* has been prepared and is included in the *Appendices – Volume 2* of this SEIS.

Submitter No.	419	Issue Reference:	6072
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Volume 2, Section 1.2.4 and Volume 2, Section 9, Water quality issues associated with water releases from the mine site

DETAILS OF THE ISSUE

Volume 2, Section 1.2.4.5, page 56 of the EIS states 'The site water balance model (AMEC, July 2010[5]) indicates that the operations will have a surplus of water'. This suggests that the project will require a net release of water to the receiving environment. While Volume 2, section 9.3.5 of the EIS commits to preparing a 'Mine water Management Plan', sections 9.5 and 9.6 do not discuss impacts or mitigation of mine water releases. It is noted that there is no information provided on the quality of these releases or their timing.

The EIS should include information on the quality of the water releases, their timing and management and the impacts associated with them. The EIS must also propose appropriate mitigation strategies and management procedures to manage these impacts. These strategies should be consistent with the DERM's 'Model Water Conditions for coal mines in the Fitzroy Basin'.

PROPONENT RESPONSE

Further detailed investigations have been undertaken during the SEIS phase in addition to the original EIS water balance report (AMEC, 2010). It should be noted that this was a high level report and did not account for losses such as seepage and evaporation. Detailed water balance modelling of the proposed site water management system has been undertaken for the SEIS to demonstrate that adequately water containment sized dams combined with maximum on-site reuse of water and additional enhanced evaporation technologies (e.g. sprinklers and

5 Australian Mining Engineering Consultants (AMEC) 2010. China First Galilee Coal Project Proposed Raw Water Dam Tallarenha Creek (Monklands Dam) Field Analysis Report prepared for Waratah Coal, November 2010

fan evaporators) will prevent discharge of contaminated water. It should be noted however there will be some uncontrolled discharge associated with sediment control structures during prolonged wet periods. However this water is expected to be of dischargeable quality as these sediment control structures will receive runoff from rehabilitated spoil areas. The additional SEIS mine water management investigations are summarised in the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

See also Issue Reference 6020 in Part C – 18 – Environmental Management Plan.

Submitter No.	**419**	Issue Reference:	**6073**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** / Sustainable Development
Name	**DERM**	Relevant EIS Section	Volume 2, Section 9.3.5 , Mine water management systems

DETAILS OF THE ISSUE

A relevant National reference for mine water management should be included.

It is suggested to include "Water Management" in the series 'Leading Practice sustainable development program for the mining industry[6]'.

PROPONENT RESPONSE

The site water management system has been designed with considerations for the principles outlined in *Leading Practice Sustainable Development Program for the Mining Industry – Water Management Handbook.*[7] Design methodology and assessment of the site water management system performance is outlined in the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**419**	Issue Reference:	**6074**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Volume 1, Section 7.8.3 – Element 3, Hydrology and Water Quality (p130)

DETAILS OF THE ISSUE

Environmental management plans (EM plans) need to be clearly detailed in order for water quality issues to be adequately addressed and assessed.

Section 203 (f) of the EP Act 1994 states an EM plan needs to: "contain enough other information to allow the administering authority to decide the application and conditions to be imposed on the environmental authority".

The EM plan only outlines the future water quality management plans and does not provide specific water quality conditions for controlled releases into the environment.

6 See *http://www.ret.gov.au/resources/resources_programs/lpsdpmining/pages/default.aspx*

7 *Leading Practice Sustainable Development Program for the Mining Industry: Mine Rehabilitation.* Department of Resources, Energy and Tourism, May 2008.

That the EIS includes details of objective measures for use in water quality management including, but not limited to:

- Water release conditions for EC, major ions, metals and suspended solids
- Minimum flow rates required for discharge
- Dilution ratios
- Timing of mine-affected water releases, and
- Monitoring schedule in relation to water releases.

PROPONENT RESPONSE

The water management system has been designed such that there will be no controlled (or uncontrolled) releases of contaminated water to the environment (refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.). Water balance modelling utilising 122 years of meteorological data to demonstrate the demand for water onsite and adequately sized dams will prevent discharge of contaminated water. It should be noted however that there will be some uncontrolled discharge associated with sediment control structures during prolonged wet periods. However, this water is expected to be of dischargeable quality as these sediment control structures will receive runoff from rehabilitated spoil areas.

Regardless of this, conditions for release will be set with regards to critical discharge limits under the EA derived during ongoing monitoring and completion of the aquatic ecology and water quality technical reports.

Submitter No.	**419**	Issue Reference:	**6075**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 1 Project Description, Section 1.2.4.6, Proposed Tallarenha/Lagoon Creek Diversion (p57-58)

DETAILS OF THE ISSUE

The EIS describes the location of the diversion and states that it will be designed in accordance with ACARP reports, including that it will be designed to contain a 1 in 100 year event.

A key objective of the water management strategy (from Section 3.4.1.2 of the Terms of Reference) is to replicate the existing geomorphic conditions of local watercourses. The EIS does not provide sufficient information to determine whether the diversion has been designed to replicate the existing geomorphic conditions.

Suggested Solution

The diversion should be designed to mimic (an near as possible) the natural features of the watercourse in accordance with the following documents:

- Project C8030 (Stage 1) – Maintenance of Geomorphic Processes in Bowen Basin River Diversions"
- Project C9068 (Stage 2) – Monitoring Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 3) – Design and Rehabilitation Criteria for Bowen Basin River Diversions, and
- The Department of Environment and Resource Management Regional Guideline entitled 'Watercourse Diversions – Central Queensland Mining Industry' dated 15/03/2011.

That the EIS contains sufficient conceptual information (based on the above reports and guidelines) to demonstrate the concept design mimics the geomorphic conditions of the existing creek and whether an application for a water licence under the *Water Act 2000* would be accepted.

The design should consider any impacts off lease downstream. In particular the changes to the catchments as a result of proposed infrastructure and the impacts of the Tallarenha Creek dam on the performance of the diversion during the operation of the mine and post mining operation.

PROPONENT RESPONSE

Concept design of the proposed creek diversions has been undertaken in accordance with Bowen Basin River Diversions, Design and Rehabilitation Criteria[8] and Watercourse Diversions – Central Queensland Mining Industry[9] As a part of this design geomorphic assessment of the existing creeks to be diverted has been undertaken. This assessment has allowed the geomorphic features to be replicated as part of the diversion works. Features include maintained stream length, bed slope, meander radius, capacity and instream benching. The location and extent of the proposed diversions is detailed in Figure 1. The basis of design and conceptual design details of the proposed watercourse diversions are provided in the *Mine Site Creek Diversion and Flooding* report contained in *Appendices – Volume 2* of this SEIS.

Figure 1. Concept of mine site creek diversions

Hydraulic modelling has also been undertaken to assess the hydraulic performance of the diversions, the results of which indicate compliance with the velocity, stream power and shear stress limits specified by DERM, though there are some very localised minor deviations for velocity which will be mitigated through appropriate scour protection or

8 ACARP (2002) *Bowen Basin River Diversions, Design and Rehabilitation Criteria*, Australian Coal Association Research Program.

9 DERM (2011) *Watercourse Diversions – Central Queensland Mining Industry*. Department of Environment and Resource Management.

planting. The results of the hydraulic modelling also demonstrate that changes in flood behaviour such as velocity, inundation depth and extent are limited to within the mine lease area. Refer to the *Mine Site Creek Diversion and Flooding* report.

Additional surface water quality, groundwater dependent ecosystem and aquatic ecosystem assessments have been undertaken and are presented in the *Appendices – Volume 2* of this SEIS (see *Mine Site Aquatic Ecology and Water Quality* report and *Subterranean Fauna Survey* report). A Mine Water Quality Monitoring Program has also been prepared and is contained in *Appendices – Volume 2* of this SEIS.

A rehabilitation plan for the project components will be prepared and will include the rehabilitation of the diverted creek and specification of riparian habitats. The use of locally propagated native flora species is recommended where practicable to maintain habitat characteristics and prevent the spread of weed and pest flora species.

The final Rehabilitation and Decommissioning Plan for the site will identify the closure actions required for the various surface water management structures including the watercourse diversions. At this stage, it is considered that the diversions would remain (Section 1.3 of the existing EIS); given the operational life of the project, the diversions will be functioning as natural watercourses by closure, hence re-establishment of the original watercourse could potentially result in additional impact downstream.

Submitter No.	**419**	Issue Reference:	**6076 / 19113**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 9 Surface Water Resources

DETAILS OF THE ISSUE

The EIS contains insufficient information on required watercourse crossings.

The Terms of Reference, Section 3.4.1.2 Potential impacts and mitigation measures states that any proposal for the diversion or crossing of affected waterways during mining and the stabilisation, restoration and integration of drainage of the works with surrounding and downstream drainage features should be discussed. Section 2.3 of the Terms of Reference, Construction, also requires details of crossing techniques including restoration works that would be used at waterway crossings.

The EIS should provide sufficient details of crossing design to determine the level of approval required.

Note that if there is significant re-alignment to watercourses as a result of crossings a water licence to interfere by diversion under the *Water Act 2000* may be required. Watercourse diversions should be minimised.

If a major re-alignment resulting in diversion and a licence to interfere is required then the diversion must be designed constructed and monitored in accordance with the following ACARP reports relative to stream diversions within the Bowen Basin:

- Project C8030 (Stage 1) – Maintenance of Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 2) – Monitoring Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 3) – Design and Rehabilitation Criteria for Bowen Basin River Diversions, and
- The Departmental Regional Guideline entitled 'Watercourse Diversions – Central Queensland Mining Industry' dated 15/03/2011.

PROPONENT RESPONSE

Preliminary design has been completed with the inclusion of all major waterway crossings outside of the mining lease. Environmental design criteria for these structures has been set to maintain flow connectivity and as result there are no proposed watercourse diversions associated with the rail. All major waterway crossings have been designed to include a combination of bridges and floodplain relief culverts to prevent diversion and mimic natural flow conditions as much as possible. The *Rail Corridor Cross Drainage* report outlines the design methodology and hydraulic performance of the waterway crossings.

There are approximately four crossings of waterways within the mine lease area associated with haul roads and rail. The locations of these crossings will be over the constructed diversions of Lagoon Creek and Malcolm Creek. Therefore there will be additional diversion requirements to facilitate crossings. These proposed diversions have been designed in accordance with the recommended guidelines.

Submitter No.	**419**	Issue Reference:	**6077 / 19114**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 9 Surface Water Resources

DETAILS OF THE ISSUE

The EIS contains insufficient information on watercourse crossings proposed for the rail line.

Any proposal for the diversion or crossing of affected waterways during mining and the stabilisation, restoration and integration of drainage of the works with surrounding and downstream drainage features should be discussed.

The EIS should provide details of crossing design to determine the level of approval required.

It should be noted that if there is significant re-alignment to watercourses as a result of crossings a water licence to interfere by diversion under the *Water Act 2000* may be required. It is preferable that design is undertaken to minimise diversion of any watercourses.

If a major re-alignment resulting in diversion and a licence to interfere is required then the diversion must be designed constructed and monitored in accordance with the following ACARP reports relative to stream diversions within the Bowen Basin:

- Project C8030 (Stage 1) – Maintenance of Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 2) – Monitoring Geomorphic Processes in Bowen Basin River Diversions
- Project C9068 (Stage 3) – Design and Rehabilitation Criteria for Bowen Basin River Diversions
- The Departmental Regional Guideline entitled 'Watercourse Diversions – Central Queensland Mining Industry' dated 15/03/2011.

PROPONENT RESPONSE

Refer to Issue Reference 6076.

Submitter No.	443	Issue Reference:	6079 / 2047
Submitter Type	Individual	TOR Category	Water Resources (Surface Water)
Name	Name withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

Any construction on or near Fox Creek will adversely impact on the Fox Creek system and consequentially Degulla Lake which three properties currently rely on for stock and domestic supplies.

PROPONENT RESPONSE

Any water released from the mine site during construction or subsequent operation will discharge water into Lagoon Creek. Lagoon Creek is not hydraulically linked with Fox Creek or Degulla Lake under low and moderate flow conditions. It is only during large infrequent flood events that Lagoon Creek may interact in discharge water into Fox Creek. It should also be noted that release of water during construction and operation will only occur under high rainfall conditions due to the water demand onsite. Water balance modelling using 122 years of meteorological has been undertaken with the results indicating no discharge of mine impacted water to the receiving environment. The only discharged from the site will occur from sediment dams during years of above average rainfall. These sediment dams will only receive rainfall from rehabilitated spoil areas and therefore the water is expected to be of dischargeable quality in accordance with DEHP standards. Refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	788	Issue Reference:	6080
Submitter Type	NGO	TOR Category	Water Resources (Surface Water)
Name	GVK Resources	Relevant EIS Section	

DETAILS OF THE ISSUE

- No flood modelling relating to the post rail construction situation
- No justification for damming Tallarenha Creek, and
- Diversion of Tallarenha Creek not consistent with the DERM or ACARP guidelines

PROPONENT RESPONSE

Post rail construction flood modelling

Post rail flood modelling has been undertaken for twelve of the major water crossings, using the concept design of all proposed bridge and culvert structures at these locations. At major crossings bridges have been utilised to limit impacts to property owners and the environment. This modelling demonstrates minimal impact in terms of increase to inundation depth and flood extent. Design criteria have been set for the maintenance of flow connectivity, outlet velocity and afflux has been set with the structures designed to meet this criteria. The *Rail Corridor Cross Drainage* report (contained in *Appendices – Volume 2* of this SEIS) provides details of the post-rail flood modelling and mapping and cross drainage structures proposed along the rail corridor alignment.

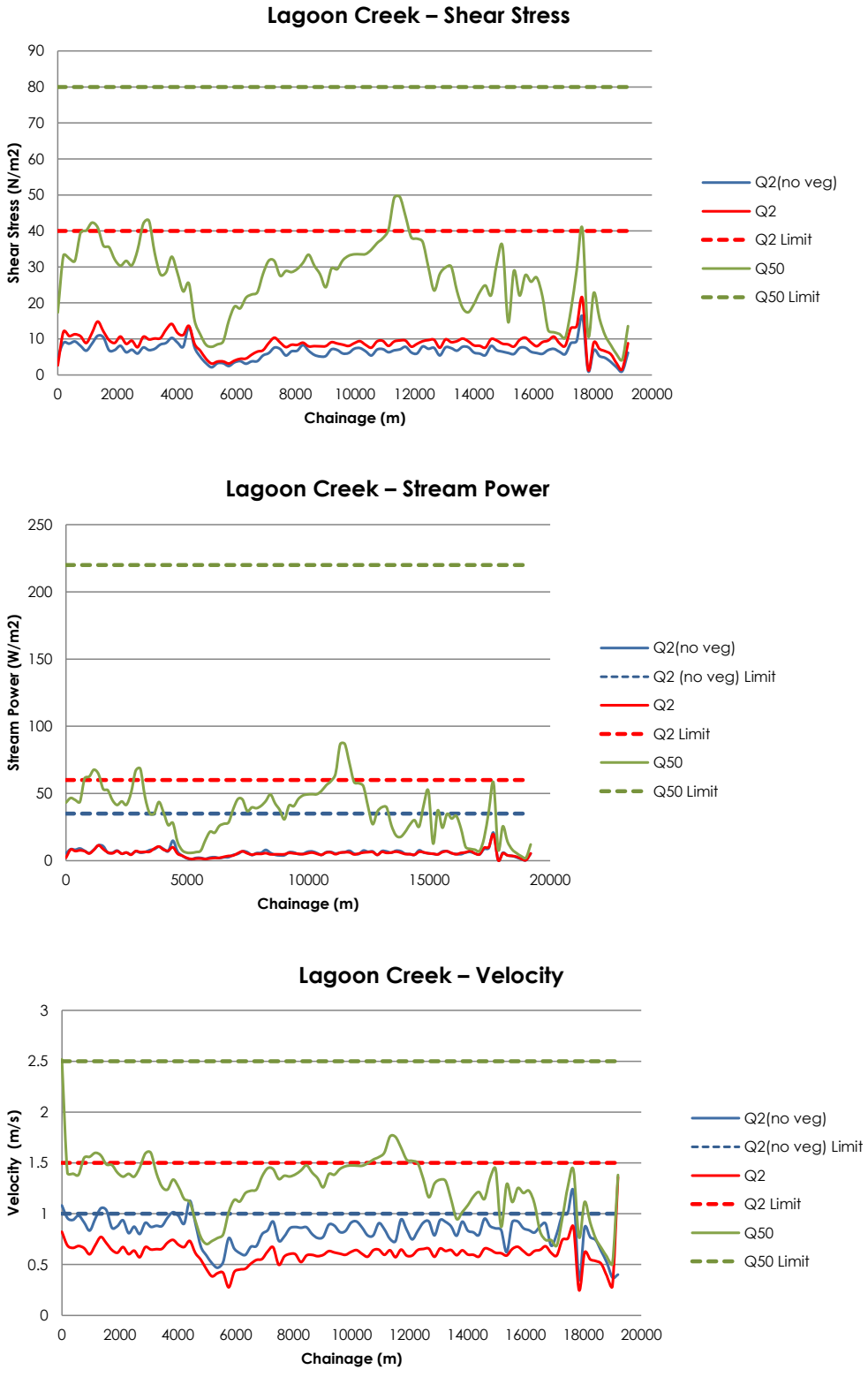
Tallarenha Creek Dam

The damming of Tallarenha Creek is no longer proposed due to the lack of reliability to supply the site with water during dry years.

Diversion of Tallarenha Creek

There is no diversion of Tallarenha Creek proposed. Lagoon Creek downstream of the confluence with Tallarenha Creek and Beta Creek is proposed to be diverted to prevent flooding of key mine infrastructure. The Lagoon Creek diversion has been designed to comply with ACARP and DERM Guidelines for watercourse diversions. The basis of design and predicted hydraulic characteristics of the proposed creek diversions are described in the *Mine Site Creek Diversion and Flooding* report contained in *Appendices – Volume 2* of this SEIS.

Figure 2. Hydraulic modelling results demonstrating compliance with DERM and ACARP guidelines



Submitter No.	419	Issue Reference:	6081
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Executive Summary (p42) Section 3.1.13.1.2 Water Resources: Surface Waters: Potential Impacts and Mitigation Measures and Mine EIS Chapter 1 Project Description (p52)

DETAILS OF THE ISSUE

The Tallarenha Creek dam was identified in the EIS as only containing the natural run-off and flows from upstream catchments of this location (and will not be used to receive any waters from the mine operations, mine impacted catchments, mine water treatment facilities etc). This commitment should be specified in the EIS, the on-site Water management plans, and any relevant Environmental Management Plans. It is not best environmental practise to use on-stream dams within the mine-water management systems. Discharging mine-affected water to this dam poses a potential environmental risk as during event flows the discharge of mine impacted waters is possible and would occur in an uncontrolled manner.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

Submitter No.	419	Issue Reference:	6082
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Volume 2, section 9, Stormwater Management

DETAILS OF THE ISSUE

Section 9.6 provides commitment to prepare a Stormwater Management Plan. Part of this plan is "to ensure impacted water is contained and re-used on-site where possible". This implies that it may not be possible to contain some contaminated water and it may be subject to uncontrolled release. The impacts of such a release are not discussed in detail in section 9.5, nor are details of mitigation measures proposed other than the development of the stormwater plan. It is thus not clear that management will be consistent with DERM's 'Model Water Conditions for coal mines in the Fitzroy Basin'. A detailed stormwater management plan should be prepared to adequately assess proposed management measures.

The proposed management plan should be consistent with DERM's 'Model Water Conditions for coal mines in the Fitzroy Basin'[10].

PROPONENT RESPONSE

A revised mine water management system has been designed that will facilitate segregation of clean, dirty and contaminated water streams, and capture and re-use of dirty and contaminated water to meet site water demands. Plans have been prepared that show the location and size of proposed water storage dams and the operating strategy for the dams has been described. Water balance modelling has been undertaken to demonstrate the performance of the mine water management system under a wide range of climate conditions.

The water balance modelling of the proposed site water management system demonstrates that adequately sized water containment dams combined with maximum on-site reuse of water and additional enhanced evaporation

10 DEHP Guideline – Model Water Conditions for Coal Mines in the Fitzroy Basin. *http://pan.search.qld.gov.au/search/search.cgi?query=model+water+conditions+for+coal+mines+in+the+fitzroy+basin&num_ranks=10&tiers=off&collection=qld-gov&profile=ehp.*

technologies (e.g. sprinklers or fan evaporators) will prevent discharge of contaminated water. It should be noted however there will be some uncontrolled discharge associated with sediment control structures during prolonged wet periods. However this water is expected to be of dischargeable quality as these sediment control structures will receive runoff from rehabilitated spoil areas.

Refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**419**	Issue Reference:	6083
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Executive Summary (p42), Section 3.1.13.1.2 Water Resources: Surface Waters: Potential Impacts and Mitigation Measures and Mine EIS Chapter 1 Project Description (p52)

DETAILS OF THE ISSUE

The proposed Tallarenha dam natural catchment appears to have a co-located footprint with future developments of underground mines. If subsidence where to occur in these catchment areas, it may alter the flow patterns, and reduce the water supply to the dam. This does not appear to have been considered in the EIS. In addition, the upstream location of the Tallarenha dam catchment on the eastern reaches of the Tallarenha creek may be impacted by the future plans of mining activity on-lease and on upstream mine leases. This also has not been discussed or considered in the EIS.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

Submitter No.	**1840**	Issue Reference:	6084
Submitter Type	Council	TOR Category	**Water Resources (Surface Water)**
Name	**Barcaldine Regional Council**	Relevant EIS Section	

DETAILS OF THE ISSUE

The two Tallarenha Creek diversions are of concern. There does not appear to be enough background data to provide appropriate design and mitigation measures for the diversions to be successful.

PROPONENT RESPONSE

Concept design of the proposed creek diversions has been undertaken in accordance with Bowen Basin River Diversions, Design and Rehabilitation Criteria[11] and Watercourse Diversions – Central Queensland Mining Industry[12]. As a part of this design geomporphic assessment of the existing creeks to be diverted has been undertaken. This assessment has allowed the geomorphic features to be replicated as part of the diversion works. Features include, stream length, bed slope, meander radius, capcity and instream benching. Hydraulic modellng has also been undertaken to assess the flow conditions within the diversions. The results indicates compliance with the velocity, stream power and shear stress limits foe watercourse diversions specified by EHP. The basis of design and predicted hydraulis characteristics of the proposed creek diversions are described in the *Mine Site Creek Diversion and Flooding* report contained in *Appendices – Volume 2* of this SEIS.

11 ACARP (2002) *Bowen Basin River Diversions, Design and Rehabilitation Criteria,* Australian Coal Association Research Program

12 DERM (2011) *Watercourse Diversions – Central Queensland Mining Industry.* Department of Environment and Resource Management

Submitter No.	**419**	Issue Reference:	**6085**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** / Decommissioning & Rehabilitation
Name	**DERM**	Relevant EIS Section	Chapter 1 Project Description, Section 1.3.5.1, Rehabilitation Action Plan, Table 7 (p66)

DETAILS OF THE ISSUE

The draft performance indicators for the decommissioning and rehabilitation program do not address the diversion of Tallarenha Creek or any other proposed diversions.

PROPONENT RESPONSE

The decommissioning and rehabilitation of the proposed creek diversions will be undertaken in accordance with the Bowen Basin River Diversions, Design and Rehabilitation Criteria[13]. The *Mine Site Creek Diversion and Flooding* report (contained in *Appendices – Volume 2* of this SEIS) includes a monitoring program for all stages of the diversion including baseline, construction, operation and relinquishment monitoring. As a part of this monitoring progam key performance indictors to demonstrate that the diversion is operating as a watercourse in equilibrium with adjoining reaches are provided.

The *Draft Mine EM Plan* has been amended to address rehabilitation and decommissioning requirements – refer to section 9.6 – 9.9. The *Draft Mine EM Plan* is contained in the *Appendices – Volume 2* of this SEIS.

Submitter No.	**419**	Issue Reference:	**10014 / 6086**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** / Land (Land Disturbance)
Name	**DERM**	Relevant EIS Section	Chapter 6 – Commitments – Section 6.5.9 Surface Water Resources (p96)

DETAILS OF THE ISSUE

There are no commitments in the EIS in relation to the potential impacts of subsidence on identified environmental values, including watercourses and vegetation, nor does it propose appropriate management or mitigation measures that would be required due to the potential impacts of underground mining operations.

The EIS should develop a subsidence management plan in accordance with the draft Departmental guideline Watercourse Subsidence – Central Queensland Mining Industry.

PROPONENT RESPONSE

Waratah Coal aims to minimise the potential impact of subsidence that may result from longwall mining undertaken by its operation and proactively manage subsidence impacts that may result from its underground operations. This includes the prevention and management of impacts as well as monitoring to provide early identification of impacts.

More specifically, the objectives of the Subsidence Management Strategy are to:

- Outline the monitoring and measurement protocols
- Establish responsibilities for the management of subsidence related issues during and immediately following under-mining
- Satisfy the applicable regulatory requirements for subsidence management across the Waratah Coal Project

13 ACARP (2002) *Bowen Basin River Diversions, Design and Rehabilitation Criteria,* Australian Coal Association Research Program.

- Justify the relevance, suitability and adequacy of the proposed mine layout and mine sequence with respect to subsidence related issues
- Establish management priorities and detail the proposed mitigation/remediation and management measures. This includes presenting contingency plans / procedures, and
- Detail the review and reporting protocols.

Subsidence Management Process, Structure and Organisation

Waratah Coal's overall approach to subsidence management includes the following:

- Design to reduce surface impacts – Mine design is such to reduce the potential impact to public safety, the natural environment and built features
- Identify and manage environmental risks – specialist studies (including subsidence) are prepared to identify potential impacts to public safety, the natural environment and built features
- Measure baseline information – Background data is established for the surface above the proposed mining area, this will include the establishment of subsidence monitoring points
- Monitor the effects of mining – Continued monitoring of data for the surface above the proposed mining area, including subsidence monitoring points
- Regularly assess and interpret monitoring – Monitoring data is analysed to identify any variances
- Re-assess impacts – Where variances are identified that are greater than predictions, additional assessment of impacts is undertaken
- Identify and implement remedial actions – If additional assessment indicates greater impacts, then remedial action may be required. Stakeholder consultation will be undertaken in determining and implementing remedial actions, as required
- Implement remedial actions – In the event that any surface impacts due to subsidence are noted, appropriate remediation and/or mitigation measures will be implemented in consultation with appropriate stakeholders, and
- Provide regular progress reports – Progress reports will be provided to relevant parties in accordance with reporting conditions outlined in approval documentation.

Surface subsidence caused by longwall mining will be managed through Subsidence and Rehabilitation Management Plans – see *Longwall Mining Subsidence Report* and *Rehabilitation and Decommissioing Report* in *Appendices – Volume 2* of this SEIS.

The potential maximum impacts of underground longwall mining associated with the proposed Galilee Coal Project on flood and stream flow characteristics within the mine lease area have been identified and are described in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report in *Appendices – Volume 2* of this SEIS.

Flood modelling has been undertaken to identify subsidence ponding areas and changes to flood inundation depths, extents and velocities as a result of mine subsidence. Water balance modelling has been performed to assess the potential reduction in stream flow volumes as a result of underground mine subsidence and capture of runoff in open cut pits and dams.

Management strategies to reduce the impacts of subsidence on waterways are identified in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1840**	Issue Reference:	6088
Submitter Type	Council	TOR Category	**Water Resources** / Land
Name	**Barcaldine Regional Council**	Relevant EIS Section	Mine Flood Modelling

DETAILS OF THE ISSUE

- App 17 the model has not been calibrated, does not incorporate post-design flood impacts and notes flow rates of 600m^3/sec on Lagoon Creek. What are the impacts on Tallarenha Creek, the subject of dam installation and other?
- Flood impacts are confined to 1:100 year max. in reporting.
- Flood modelling does not note any information relating to subsidence (as suggested in 1.3.6.1 'flood modelling on the site has indicated that the subsidence will have minimal impact on the upstream and downstream processes")

Impacts of mining, proposed dam, diversion channels, underground/above ground, storage dams and spoil piles should be considered in the flooding impacts assessment and that scaled topographical data be obtained from proponent at scale (<25m).

A simulated post mining flood model for final topographical land form is also required to enable proponent to design and assess potential impacts and appropriate mitigation.

Flood modelling probabilities should be extended based on recent flooding impacts 2010/11 to include min 1:500/ 1:1,000 ARI.

PROPONENT RESPONSE

Revised flood modelling has been completed based on the proposed creek diversions and flood protection levees within the mine lease area. The modelling has been undertaken for average recurrence intervals ranging from the 1 in 2 year to the 1 in 1000 year flood events. The design flow rate for these events has been revised through validation against flood frequency analysis of the flow gauging station on Native Companion Creek. This flood frequency analysis has been extended to include the 2010/2011 wet season which has resulted in larger flow rates than originally reported.

The 1 in 1000 year flood modelling is consistent with the DERM requirements for the protection of mine infrastructure, people and on site containment dams. The dam located on Tallarenha Creek is no longer proposed and therefore does not impact the flood behaviour within the area. Results of the post mine flood modelling indicate the proposed creek diversions and flood protection levees do modify the flood behaviour due to redirection of flow and reduction in floodplain storage. However, these impacts are localised and are wholly contained within the mine lease area. The flood modelling study undertaken for the creek diversions and waterways in the vicinity of the open cut coal mines and mine industrial area is detailed in the *Mine Site Creek Diversion and Flooding* report in *Appendices – Volume 2* of this SEIS.

The potential maximum impacts of underground longwall mining associated with the proposed Galilee Coal Project on flood and stream flow characteristics within the underground mining area have been identified and are described in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report contained in *Appendices – Volume 2* of this SEIS.

Flood modelling has been undertaken to identify subsidence ponding areas and changes to flood inundation depths, extents and velocities as a result of mine subsidence. Water balance modelling has been performed to assess the potential reduction in stream flow volumes as a result of underground mine subsidence and capture of runoff in open cut pits and dams. Modelling has been undertaken in accordance with *Watercourse Subsidence – Central Queensland Mining Industry Guideline*.

Management strategies to reduce the impacts of subsidence on waterways are identified in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report in *Appendices – Volume 2* of this SEIS.

Submitter No.	419	Issue Reference:	6089 / 6090
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Chapter 1 Project Description, Section 1.3.2.1.2, Mine Water Storages (p64)

DETAILS OF THE ISSUE

The EIS proposes several decommissioning options for the mine water dams including the Tallarenha Creek dam. The proposed decommissioning of this dam may require authorisation under the *Water Act 2000* and comply with specified conditions.

PROPONENT RESPONSE

The dam at the confluence of Beta Creek and Tallarenha Creek is no longer proposed due to the low reliability for clean water supply to the mine. Therefore is no longer part of the EIS.

Submitter No.	419	Issue Reference:	2017
Submitter Type	Government	TOR Category	Nature Conservation (Aquatic Ecology) / **Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Volume 2, Section 9.4.6 – Existing water quality

DETAILS OF THE ISSUE

The EIS is inconsistent with Queensland Water Quality Guidelines (QWQG) for the development of Water Quality Objectives (WQOs) and Reference Site selection.

Volume 2, Chapter 9, page 265 states that water quality criteria will be developed using 20th and 80th percentiles from baseline assessments. This implies WQOs have been developed under the QWQG methodology. QWQG (2009) recommends 18 samples per site (or group of sites similar water type) over at least 12 months to develop WQOs. Sites have been grouped at the river basin level with no apparent consistency in water quality parameters between sites within the current groups.

QWQG recommends data should be collected over 12-24 months. The EIS uses data collected with 1-2 samples per site over six months to develop WQOs, this is inadequate to give reliable values.

Reference and impact monitoring sites within each group have not been identified for use over the life of the project.

In order to effectively manage water quality across the project it is necessary to identify different water types. To do this will require separate analysis of water quality data.

Suggested Solution

That the EIS should describe the current state (with relevant data) of reference and monitoring sites using methods consistent with *Queensland Water Quality Guideline* methods and standards (DERM, 2009[14]).

It is recommended that any WQOs established for the location should be derived with methods consistent with the Queensland Water Quality Guideline (DERM, 2009) standards. This will require collecting samples over a wider temporal range, and collecting the recommended number of samples at reference sites to develop WQOs. Reference site selection also needs take into consideration proposed mining projects upstream of the project site (e.g. Alpha Coal – South Galilee Coal Project).

14 DERM (2009) *Monitoring and Sampling Manual 2009,* Department of Environment and Resource Management, Version 2, September 2010

When grouping sites by water type, the grouping should be justified by demonstrating similarities in water quality parameters (e.g. by 2D multi-dimensional scaling plots).

PROPONENT RESPONSE

The existing data collected as part of the SEIS is detailed in the *Mine Site Aquatic Ecology and Water Quality* report and the *Rail Aquatic Ecology and Water Quality* report (contained in the *Appendices – Volume 2* of this SEIS). A detailed *Mine Water Quality Monitoring Plan* has also been developed (also contained in the *Appendices – Volume 2* of this SEIS) which includes both a summary of existing available data (including against the Alpha Coal Project EIS data), and a plan for a robust program to derive interim and later formal water quality objectives for the project.

Sampling was undertaken during the EIS (two occasions) and the SEIS (another 2 occasions) during the:

- October 2009 and April/May 2010 (EIS), and
- April 2012 and September 2012 (SEIS).

This spans around 3 years, and four rounds, with the EIS sampling including 24 sites in the Belyando Basin, including 11 sites in the Sandy Creek sub-catchment and one site in the Belyando Floodplain sub-catchment, and the SEIS including 14 sites (some of which were the same or very close to the EIS sites), though the same waterways were sampled during both the EIS and SEIS. The consistency of the data was hampered by the ephemerality of the streams, and incomplete crossover of parameters and sites between the EIS and SEIS sampling, due in part to access constraints.

The Alpha Coal Project EIS[15] presented median and 95th percentile data for various analyses for each site monitored, based on seven rounds of sampling at each of 15 sites, most of which were considered as fulfilling the reference site criteria. Based on these data all but fulfilling the minimum requirements to derive interim water quality objectives they put forward interim water quality objectives for a range of parameters.

Statistics of the water quality data collected as part of the Galilee Coal Project sampling (EIS and SEIS) was compared to similar statistics from the Alpha Coal Project (i.e. medians and 95th percentiles) as described in the *Mine Water Quality Monitoring Plan* (refer to *Appendices – Volume 2* of this SEIS). It was concluded that the water quality data collected as part of the China First Coal Project baseline water quality monitoring program is broadly consistent with that collected as part of the Alpha Coal Project EIS. This finding was expected given that the two projects are regionally directly adjacent to one another and that some of the same waterways were sampled as part of the two studies. Given that baseline water quality monitoring program data collected thus far for the Project are broadly consistent with those collected by for the Alpha Coal EIS from the reference sites used to derive their interim water quality objectives, it is proposed that those interim water quality objectives be adopted for the Project until such time as the baseline water quality data are sufficient to derive final water quality objectives for waterways within and adjacent to the Project. Details of the interim water quality objectives put forward by Hancock Coal as part of their Alpha Coal EIS, and proposed for the Galilee Coal Project are given in the *Mine Water Quality Monitoring Plan* (contained in the *Appendices – Volume 2* of this SEIS).

The adoption of these interim levels is proposed to be followed by a robust monitoring program designed to collect additional data to support setting of more localized interim water quality objectives. The choice of parameters, frequencies, methods and sites (including reference and control / impact sites) is discussed further in the *Mine Water Quality Monitoring Plan* (refer to *Appendices – Volume 2* of this SEIS), aimed to follow the suggested DERM (2009) Queensland Water Quality Guideline[16] standards.

The *Mine Water Quality Monitoring Plan* also sets out proposed End of Pipe release limits and flow criteria, and operational monitoring requirements.

15 Hancock Coal. 2011. *Alpha Coal EIS*.

16 DERM (2009) *Monitoring and Sampling Manual 2009,* Department of Environment and Resource Management, Version 2, September 2010.

Submitter No.	348, 508	Issue Reference:	2032, 2033
Submitter Type	Individuals	TOR Category	Water Resources
Name	Names withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

Water quality analysis inadequate.

PROPONENT RESPONSE

Further water quality monitoring has been completed as part of the surface water aquatic ecology monitoring program, although further water and sediment quality sampling is required. As such, a monitoring program has been developed to help inform the conditions Waratah Coal will need to adhere to under the Environmental Authority. In the interim, the longer term monitoring undertaken by Hancock Coal (2011) as part of the adjacent Alpha Coal Project has been used to set interim Water Quality Objectives, based on a favourable comparison of the results of the two monitoring programs. This is described in more detail in response to Issue Reference 2017.

Submitter No.	768	Issue Reference:	2034
Submitter Type	NGO	TOR Category	Water Resources
Name	Mackay Conservation Council	Relevant EIS Section	

DETAILS OF THE ISSUE

Not enough work done on groundwater dependent ecosystems

PROPONENT RESPONSE

Additional stygofauna and hyporheic fauna monitoring has been carried out as part of the supplementary EIS study in accordance with the WA Guideline requirements for GDE sampling. The findings of the surveys are presented in the *Subterranean Fauna Survey* report contained in the *Appendices – Volume 2* of this SEIS.

Submitter No.	419	Issue Reference:	2036
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	DERM	Relevant EIS Section	Volume 2, Section 9.6, p265 and Volume 3, Section 9.5, p388 – Mitigation Measures

DETAILS OF THE ISSUE

The EIS states that in the event of a downstream exceedance in water quality, upstream and downstream results will be compared to determine whether there is an impact resulting from works (refer 2nd last dot point on p265).

As the waterways upstream from the mine site are ephemeral, upstream sampling for impact verification may not possible due to lack of flow or water.

The EIS should describe management measures to be taken when an exceedance is detected downstream but upstream conditions are unsuitable for comparison.

The EIS should identify upstream and downstream sampling locations as well as alternate reference locations when upstream conditions are unsuitable for comparison.

PROPONENT RESPONSE

Waratah Coal acknowledges this as a potential issue, and compounding this is the fact that, should the South Galilee Coal Project (SGCP) go ahead (which is immediately upstream from this project), waters upstream of this project could be potentially be subject to impacts by mine-affected water releases. It may be that this project and the SGCP will need to identify and sample a common reference site upstream of both mines. The reach of Alpha Creek upstream of the SGCP would serve as a good potential starting point as Alpha Creek flows for a longer portion of the year than other systems within the study region and that reach is not currently impacted by mining (apart from quarrying), but shares similar habitat characteristics to Tallarehna Creek. Cooper Creek could also be considered as an un-impacted reference stream.

Suggested reference site have been outlined in the *Mine Water Quality Monitoring Program* (contained in the *Appendices – Volume 2* of this SEIS), plus the adoption of interim Water Quality Objectives (WQOs), and a program to refine these WQOs over time, and prior to the project construction commencing.

In the advent of insufficient flow, these WQOs (or alternative WQOs ultimately adopted in the EA) will be used to determine whether an impact or exceedance has likely occurred. However, since discharge is flow dependant, and discharge is anticipated to occur only when required coinciding with rainfall events, it is also anticipated that discharge will occur only when flow is occurring within the receiving waters, and therefore background (upstream) sites are available for sampling.

The exact location of sampling points has been identified in the *Mine Water Quality Monitoring Program*, or will be determined following detailed design (when the location of discharge points and the Stormwater drainage system has been defined).

Submitter No.	**419**	Issue Reference:	**2037**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Volume 2, Section 9.6, page 265 and Volume 3, Section 9.5, page 388 – Mitigation Measures

DETAILS OF THE ISSUE

Mitigation measures related to comparing upstream and downstream water quality for exceedances need more clarification.

The EIS refers to "similar" results and "noticeably higher than upstream" difference between sites (Volume 2, Section 9.6, p265). Quantitative methods are necessary to define an appropriate level of difference between upstream and downstream water quality so that the relevant environmental incident procedures (as per Volume 1, Section 7.79, p120 and Volume 1, Section 8.79, p192) may be carried out. This is required to avoid cumulative impacts on water quality.

PROPONENT RESPONSE

It is common for the conditions set out in Environmental Authorities for central Queensland coal mines to stipulate that the median value for a given parameter measured at a nominated site downstream of the discharge point not exceed that for the nominated site upstream of the upstream monitoring site(s) by more than a set amount or percentage.

Where downstream values exceed both the adopted trigger levels (or WQOs) and upstream values, an investigation in accordance with the ANZECC & ARMCANZ[17] methodology into the potential for serious or material environmental harm

17 ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Australian and New Zealand. Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

will be undertaken, and mitigation measures enacted to control any potential environmental harm. Exceedances of EA conditions will be reported to DEHP as required under the EA.

Submitter No.	**419**	Issue Reference:	**2038**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Environmental Values (p41-42 Executive Summary)

DETAILS OF THE ISSUE

The environmental value assessment should include an assessment of all environmental values downstream of the proposed activity and that will be potentially affected. The assessment should not simply be an assessment of current environmental values on the proposed mine site itself.

The EIS should undertake an assessment of environmental values of waterways downstream of the proposed mine site. In addition to livestock drinking water, values such as crop irrigation, general farm use, potential recreational values (primary or secondary), human drinking water must be considered. This should include a map and subsequent inclusion of relevant water quality objectives (WQO) for those environmental values.

PROPONENT RESPONSE

A desk-top assessment of environmental values (EVs) for the waterways downstream of the mine has been undertaken and is described in the *Environmental Values Identification for Galilee Coal Mine* report (refer to *Appendices – Volume 2* of this SEIS). This includes a detailed assessment of all potential EVs that could apply to the waterways potentially affected by the Project.

In addition, the Department of Environment and Heritage Protection is also currently performing an Environmental Values identification study for the Burdekin River basin which is due for completion in December 2013. Draft Environmental Values for the Burdekin River basin were established by NQ Dry Tropics in 2009 as part of the Burdekin Water Quality Improvement Plan. A desktop review of water uses within the receiving waterways of the Galilee Coal Mine has confirmed the suitability of the draft Environmental Values identified in the Burdekin Water Quality Improvement Plan. The draft Environmental Values identified for the Galilee Coal Mine are:

- **Lagoon Creek, Sandy Creek, tributary of Jordan Creek and Jordan Creek:** aquatic ecosystems (slightly to moderately disturbed), stock watering, and cultural and spiritual values.
- **Belyando River:** aquatic ecosystems (slightly to moderately disturbed), stock watering, irrigation, drinking water, and cultural and spiritual values.

Submitter No.	**419**	Issue Reference:	**2039**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

The Queensland Water Quality Guideline for Conductivity in the Belyando-Suttor Zone is incorrectly presented in Table 1 of the Surface Water Resources Chapter (Chapter 9, p252).

PROPONENT RESPONSE

The *Mine Aquatic Ecology and Water Quality* report; the *Mine Water Quality Monitoring Program* and the *Draft Mine EM Plan* contain the correct values (where relevant). All are contained in *Appendices – Volume 2* of this SEIS

Submitter No.	**419**	Issue Reference:	**2040**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

The ANZECC and ARMCANZ Guidelines (2000)[18] for 95% species protection tabulated in Table 2 of the Surface Water Resources Section (Chapter 9, p252) contain a number of errors.

PROPONENT RESPONSE

The *Mine Aquatic Ecology and Water Quality* report; the *Mine Water Quality Monitoring Program* and the *Draft Mine EM Plan* contain the correct values (where relevant). All are contained in *Appendices – Volume 2* of this SEIS

Submitter No.	**419**	Issue Reference:	**2041**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

DERM supports the inclusion of monitoring of cations and anions presented in Table 7 of the Surface Water Section. Certain additional indicators should be considered for monitoring during reference, baseline and receiving water quality studies. As outlined in the Final Model Water Conditions for Coal Mines in the Fitzroy Basin (July 2011), some relevant additional indicators should also be considered.

In the time between now and the resubmitted EIS and EA application process (and on an on-going basis) additional indicators should be included in the surface water monitoring program, including but not limited to:

- Aluminium (dissolved (field-filtered) and total (unfiltered))
- Mercury (dissolved (field-filtered) and total (unfiltered))
- Boron (dissolved (field-filtered) and total (unfiltered))
- Cobalt (dissolved (field-filtered) and total (unfiltered))
- Manganese (dissolved (field-filtered) and total (unfiltered))
- Molybdenum (dissolved (field-filtered) and total) (unfiltered))
- Selenium (dissolved (field-filtered) and total (unfiltered))
- Silver (dissolved (field-filtered) and total (unfiltered))

18 ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

- Uranium (dissolved (field-filtered) and total (unfiltered))
- Vanadium (dissolved (field-filtered) and total (unfiltered)), and
- Fluoride (total (unfiltered).

PROPONENT RESPONSE

Sampling as part of the supplementary EIS works involved the monitoring of these additional parameters, as well as some others to provide a more thorough characterisation of water quality in the waterways potentially impacted by the project (see the *Mine Water Quality Monitoring Program* contained in *Appendices – Volume 2* of this SEIS). These parameters will be used as a starting point for ongoing monitoring to inform the development of the Environmental Authority.

Submitter No.	**419**	Issue Reference:	**2042**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

The EIS presents a summary of baseline water quality results for the Upper Belyando Catchment in both Table 7 (of Surface Water Resources, Chapter 9) and in Table 3-2 (of Appendix 15). The data presented in these tables do not match each other and it is not clear which data set is an accurate reflection of water quality data collected to date.

PROPONENT RESPONSE

The *Mine Aquatic Ecology and Water Quality* report; the *Mine Water Quality Monitoring Program* and the *Draft Mine EM Plan* contain the correct values (where relevant). All are contained in *Appendices – Volume 2* of this SEIS

Submitter No.	**419**	Issue Reference:	**2043**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

The toxicity expressed by a toxicant is dependant on the bioavailability of the toxicant. Hence, the ANZECC/ARMCAMZ trigger values (TVs) are reflective of the bioavailable concentration (dissolved metal concentrations). The water quality data assessed as part of this report, however, relates to unfiltered 'total' metals concentrations (i.e. including suspended particulates). Total concentrations are not a good measure for this purpose – the reason being is that it is more likely that the total concentration will exceed the ANZECC/ARMCANZ (2000) TV, and the bioavailable fraction of a 'total concentration' measure can be lesser, thus it is much better to use dissolved concentrations when comparing to the trigger values. However, if the total concentration for a contaminant is demonstrated to be below the ANZECC/ARMCANZ (2000)[19] trigger value, then the dissolved concentrations for the contaminant in question will also be below the trigger value.

It is recommended that both totals (un-filtered) and dissolved (field-filtered) metals samples are collected and analysed as part of future surface water monitoring programs for all aspects of the proposal (mine and rail).

19 ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

PROPONENT RESPONSE

This advice has been incorporated into sampling as part of the supplementary EIS, which involved the monitoring of both dissolved and total metal concentrations. This approach will continue to be adopted during future monitoring programs.

Submitter No.	**419**	Issue Reference:	**2044**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**DERM**	Relevant EIS Section	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

Important considerations in the process for establishing locally derived water quality objectives. On page 265 of the Surface Water Resources Chapter 9, the proponent proposes to establish trigger values using 20th and 80th percentiles (25th/75th for EC) identified through baseline investigations. This is also mentioned throughout other relevant sections of the provided documents. There are a number of very important considerations and requirements for undertaking such processes. For example, so far, water quality monitoring in and proximal to the planned mine location has occurred on two occasions, once in the dry season (October 2009) and once in the wet (March/April 2010). All up 9 sites were targeted but these have returned a 10 data points as water was not present for much of the dry season sampling trip. Also by admission in the EIS, certain sampling undertaken in the wet season was met with low/no flowing water at the sampling sites. Given that it is known that water quality is strongly influenced by flow conditions and that under very low or nil flows, water quality is often poor, this current data set would not constitute a satisfactory data-set in terms of deriving even interim local water quality objectives (triggers).

It is recommended that the Queensland Water Quality Guidelines (QWQGs) (2009)[20] are followed when designing monitoring programs and in the process of deriving local water quality. This should include as a minimum:

- At least 8-12 data points/site (for interim WQOs) from good quality reference condition sites (3 or more) relevant to the location in question (see criteria under section 4.4.3 and 4.4.4 of the QWQGs (2009)[21]
- Water Quality data should have been collected over 12-24 months (rather than over one sampling event), and
- Reference site criteria should be meet and justified as per outlined in section 4.4.2 of the QWQGs (2009).

It is recommended that surface water quality monitoring continues during the upcoming wet season, preferably over a number of flow events. This data will be crucial if interim local water quality objectives are to be reliably established.

PROPONENT RESPONSE

The existing data collected as part of the SEIS is detailed in the *Mine Site Aquatic Ecology and Water Quality* report and the *Rail Aquatic Ecology and Water Quality* report (contained in the *Appendices – Volume 2* of this SEIS). A detailed *Mine Water Quality Monitoring Plan* has also been developed (also contained in the *Appendices – Volume 2* of this SEIS) which includes both a summary of existing available data (including against the Alpha Coal Project EIS data), and a plan for a robust program to derive interim and later formal water quality objectives for the project.

Sampling was undertaken during the EIS (two occasions) and the SEIS (another 2 occasions) during the:

- October 2009 and April/May 2010 (EIS), and
- April 2012 and September 2012 (SEIS).

20 DERM 2009. *Queensland Water Quality Guidelines 2009.* Department of Environment and Resource Management. Version 3. September 2009.

This spans around 3 years, and four rounds, with the EIS sampling including 24 sites in the Belyando Basin, including 11 sites in the Sandy Creek sub-catchment and one site in the Belyando Floodplain sub-catchment, and the SEIS including 14 sites (some of which were the same or very close to the EIS sites), though the same waterways were sampled during both the EIS and SEIS. The consistency of the data was hampered by the ephemerality of the streams, and incomplete crossover of parameters and sites between the EIS and SEIS sampling, due in part to access constraints.

The Alpha Coal Project EIS presented median and 95th percentile data for various analytes for each site monitored, based on seven rounds of sampling at each of 15 sites, most of which were considered as fulfilling the reference site criteria. Based on these data all but fulfilling the minimum requirements to derive interim water quality objectives they put forward interim water quality objectives for a range of parameters.

Statistics of the water quality data collected as part of the Gailiee Coal Project sampling (EIS and SEIS) was compared to similar statistics from the Alpha Coal Project (i.e. medians and 95th percentiles) as described in the *Mine Water Quality Monitoring Plan* (refer to *Appendices – Volume 2* of this SEIS). It was concluded that the water quality data collected as part of the Galilee Coal Project baseline water quality monitoring program is broadly consistent with that collected as part of the Alpha Coal Project EIS. This finding was expected given that the two projects are regionally directly adjacent to one another and that some of the same waterways were sampled as part of the two studies. Given that baseline water quality monitoring program data collected thus far for the Project are broadly consistent with those collected as part fo the Alpha Coal EIS from the reference sites used to derive their interim water quality objectives, it is proposed that those interim water quality objectives be adopted for the Project until such time as the baseline water quality data are sufficient to derive final water quality objectives for waterways within and adjacent to the Project. Details of the interim water quality objectives put forward by the Alppa Coal EIS, and proposed for the Galilee Project are given in the *Mine Water Quality Monitoring Plan* (contained in the *Appendices – Volume 2* of this SEIS).

The adoption of these interim levels is proposed to be followed by a robust monitoring program designed to collect additional data to support setting of more localized interim water quality objectives. The choice of parameters, frequencies, methods and sites (including reference and control/impact sites) is discussed further in the *Mine Water Quality Monitoring Plan* (refer to *Appendices – Volume 2* of this SEIS), aimed to follow the suggested Queensland Water Quality Guideline (DERM, 2009)[21] standards.

The *Mine Water Quality Monitoring Plan* also sets out proposed End of Pipe release limits and flow criteria, and operational monitoring requirements.

Submitter No.	**419**	**Issue Reference:**	**2046**
Submitter Type	Government	**TOR Category**	**Water Resources (Surface Water)**
Name	**DERM**	**Relevant EIS Section**	Surface Water Resources, Chapter 9, Mine EIS

DETAILS OF THE ISSUE

It is assumed that the table presented in the Appendix 15 (Table 3-2) is the more accurate depiction of the summary data. While undertaking a review of the raw data (Appendix 15), there were no occasions where PCBs (total) were detected at any Belyando catchment site, yet in the Chapter 9 Table 7 version of data, the maximum PCBs is recorded as detected and at 10µg/L. Also in the main body of text the Copper median is reported as "3ug/L" with an 80th percentile of "4ug/L" which matches the data presented in the Table 3-2 Appendix 15 version of Belyando catchment water quality data.

21 DERM 2009. *Queensland Water Quality Guidelines 2009*. Department of Environment and Resource Management. Version 3. September 2009.

PROPONENT RESPONSE

The *Mine Aquatic Ecology and Water Quality* report; the *Mine Water Quality Monitoring Program* and the *Draft Mine EM Plan* contain the correct values (where relevant). All are contained in *Appendices – Volume 2* of this SEIS

Submitter No.	**419**	Issue Reference:	**2048 / 6087**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** / Nature Conservation (Aquatic Ecology)
Name	**DERM**	Relevant EIS Section	Volume 2, Section 9.5.5 – Creek Diversion

DETAILS OF THE ISSUE

The EIS does not provide sufficient detailed information on water quality management in regards to stream diversions for Tallarenha Creek and Lagoon Creek.

The EIS provides no clear description of how potential increased turbidity from erosion resulting from the creek diversions will impact on water quality or aquatic ecology values.

The EIS also does not describe how these impacts will be mitigated or managed.

PROPONENT RESPONSE

A desktop geomorphic review of the creek reaches to be diverted has been undertaken. This assessment indicates that the reaches are significantly modified as a result of farming activities. This has led to increased sediment mobilisation and loss of riparian vegetation which is evident through the bank erosion and increased sediment bed load within the reaches. It is expected that this sediment load becomes easily mobilised during the wet season resulting increased turbidity under existing conditions. The proposed diversion of Malcolm Creek and Lagoon Creek has been designed to maintain existing stream lengths, bed slope and meander radius of the existing creek systems. Results of the hydraulic modelling undertaken for the diversion designs indicates a reduction in velocities, stream power and bed shear stress below natural conditions. The diversion will also go through a significant establishment phase to allow the establishment of vegetation to stabilise batters and decrease sediment mobilisation. In addition construction and operational monitoring will also identify areas of erosion or poor performance which will be rectified through the establishment of vegetation or rock armouring.

The main aquatic ecology components at risk through erosion-related sediment runoff would be submerged macrophytes (which are unlikely to be present in Lagoon Creek based on its sandy ephemeral nature), pollution-sensitive and riffle-bed associated macroinvertebrates (few would be expected in an ephemeral sand-bed stream such as Lagoon Creek) and fish that spawn on these substrates (e.g. Eel tail catfish, Purple spotted gudgeon – neither of which is considered rare or threatened). If turbidity and TSS reached high enough levels (i.e. through severe erosion) there could be some direct fish mortality through the clogging or abrasion of gills, but the likelihood of such impacts occurring is small given many local fish species are used to short-term elevated turbidity and TSS associated with rainfall events, and fish have some capacity to move out of areas where elevated turbidity and TSS occur. If there were direct mortality impacts, these impacts would likely be restricted in spatial scale and no species of conservation significance would be affected. Recovery in the affected areas after such impacts would also likely be relatively rapid based on recolonisation from adjacent reaches or sub-catchments.

As noted above, the diversion has been designed and will be constructed according to relevant guidelines and best practice techniques, such that erosion during the establishment and operation phases would be minimised.

Submitter No.	419	Issue Reference:	2049
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** /Nature Conservation (Aquatic Ecology)
Name	**DERM**	Relevant EIS Section	Volume 2, Section 9.4.5 – Description of surface waters

DETAILS OF THE ISSUE

A number of waterways (Beta Creek, Lagoon Creek, Malcolm Creek, Pebbly Creek, Saltbush Creek, and Spring Creek – refer Volume 2, section 9.4.5) intersect the mine site footprint and may be subject to mining and/or subsidence impacts. The current state of these creeks and potential impacts of mining and related activities have not been sufficiently described in the EIS, particularly with reference to seasonal variation in flow as per the Terms of Reference. Detailed information should be provided to allow DERM to adequately assess the potential impacts on these watercourses.

To adequately assess potential impacts on water quality, the EIS should describe the current state of Beta Creek, Lagoon Creek, Malcolm Creek, Pebbly Creek, Saltbush Creek, and Spring Creek.

PROPONENT RESPONSE

This issue was addressed as part of the surface water quality, groundwater dependent ecosystem and aquatic ecosystem assessments carried out as part of the supplementary EIS (see *Mine Site Aquatic Ecology and Water Quality* report and *Subterranean Fauna Survey* report contained in *Appendices – Volume 2* of this SEIS). These creeks were surveyed both in terms of water quality and in terms of aquatic habitat and aquatic flora and fauna. A *Mine Water Quality Monitoring Program* has also been prepared and is contained in *Appendices – Volume 2* of this SEIS.

These creeks have been identified as being highly ephemeral with little to no flow occurring within the dry season. This conclusion has been drawn from anecdotal evidence as analysis of stream gauging data from the Native Companion Creek within the neighbouring catchment. The proposed water management system has been designed to minimise the impacts to seasonal variation of flow within the watercourses traversing the mine site as much as practical. Natural catchments will be diverted through the mine site prevent the taking of water from maintain the hydrological regime of the system.

Submitter No.	419	Issue Reference:	2050
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)** /Nature Conservation (Aquatic Ecology)
Name	**DERM**	Relevant EIS Section	Volume 2, Chapter 9 – Description of surface waters

DETAILS OF THE ISSUE

As per the Terms of Reference the EIS should describe the environmental values of the surface waterways of the affected area in terms of:

- Values identified in the EPP (Water), and
- Downstream water uses, including their significance to the local community and/or environment.

PROPONENT RESPONSE

A desktop assessment of environmental values (EVs) for the waterways downstream of the mine has been undertaken and is described in the *Environmental Values Identification for Galilee Coal Mine* report (refer to *Appendices – Volume 2* of this SEIS). This included a detailed assessment of all potential EVs that could apply to the waterways potentially affected by the Project.

In addition, the Department of Environment and Heritage Protection is also currently performing an Environmental Values identification study for the Burdekin River basin which is due for completion in December 2013. Draft Environmental Values for the Burdekin River basin were established by NQ Dry Tropics in 2009 as part of the Burdekin Water Quality Improvement Plan. A desktop review of water uses within the receiving waterways of the Galilee Coal Mine has confirmed the suitability of the draft Environmental Values identified in the Burdekin Water Quality Improvement Plan. The draft Environmental Values identified for the Galilee Coal Mine are:

- **Lagoon Creek, Sandy Creek, tributary of Jordan Creek and Jordan Creek:** aquatic ecosystems (slightly to moderately disturbed), stock watering, and cultural and spiritual values.
- **Belyando River:** aquatic ecosystems (slightly to moderately disturbed), stock watering, irrigation, drinking water, and cultural and spiritual values.

Submitter No.	**425**	Issue Reference:	**17043**
Submitter Type	Individuals	TOR Category	Land (Land Use & Tenure) / **Water Resources**
Name	**Names withheld**	Relevant EIS Section	Vol 2 16.5.3

DETAILS OF THE ISSUE

Water

PROPONENT RESPONSE

Operational issues such as water use and protection of water supply from potentially contaminating activities will be negotiated with the affected landowners as part of ongoing consultation. Waratah Coal fully understands that water is a priority issue in this section of central west Queensland.

It should be noted that Waratah Coal abides by a Code of Conduct which sets out requirements for appropriate behavior on landowners properties. Waratah Coal's contractors are also bound by Waratah Coal's Code of Conduct.

Submitter No.	**664**	Issue Reference:	**17088**
Submitter Type	Council	TOR Category	Nature Conservation / **Water Resources**
Name	**Whitsunday Regional Council**	Relevant EIS Section	

DETAILS OF THE ISSUE

Water resources

The rail alignment traverses four different catchments including the Belyando, Suttor, Bowen/Bogie and Don. Species of aquatic flora and fauna are threatened by the construction of the rail corridor. The particular concern for the Council area is the array of species that may be impacted in the Bowen River Catchment. The report includes information that demonstrates the current health and variety of species present. It states that EMP's will be developed for the construction and operational phases of the project that address freshwater ecology issues and mitigation and

management techniques. More information is required to determine how the proposed waterway crossings will affect the aquatic ecology when the final route of the rail corridor and design of crossings is finalised.

Potential impacts of most concern to the waterways include the loss of riparian vegetation, increased sediment load, increased turbidity and suspended solids, contamination from equipment used to build bridge and river crossings, disturbance of Acid Sulfate Soils, increased traffic across stream bed, barriers to fish movement and the overall decline of ecosystem health and diversity. The flooding levels may also be affected with the introduction of structures in the streambed altering the hydraulic regime significantly. It is likely the rail corridor will impact on local groundwater regimes and overland flow.

It is also estimated in the EIS that 10,000 megalitres of water will be required for the construction of the rail line mostly for earthworks. However no detail has been provided regarding the quantity required to service temporary accommodation. Where the water will be sourced from has not been specified but does include use of domestic supplies from Collinsville and Mount Coolon, farm dams, existing turkey nest dams and groundwater. It is proposed to source water for the marshalling and maintenance yard from the Bowen supply network. Quantity required and timing of the water requirements have not been defined. These factors must be taken into consideration so as to not impede the supply of water to the community and landowners.

PROPONENT RESPONSE

Responses to the three issues raised are as follows:

1. Aquatic ecology

Waratah Coal have undertaken supplementary assessments of aquatic ecology and surface water quality throughout the length of the railway corridor and results are included in the *Rail Aquatic Ecology and Water Quality* report (contained in *Appendices – Volume 2* of this SEIS). This has been used to assist in preparation of the *Draft Rail EMP* (also contained in *Appendices – Volume 2* of this SEIS) and as a baseline from which future potential impacts on aquatic ecological refuges along the railway corridor can be monitored.

2. Flood levels, groundwater, overland flows

FLOOD LEVELS AND OVERLAND FLOWS

Waratah Coal have undertaken extensive flood modelling for the pre- and post-railway scenarios. Environmental design criteria for these structures has been set to maintain flow connectivity, particularly within expansive floodplains and braided river systems. The *Rail Corridor Cross Drainage* report (contained in *Appendices – Volume 2* of this SEIS) outlines the design methodology and hydraulic performance of the rail waterway crossings in relation to flooding. The design ensures that aquatic ecosystems and landowners will not be significantly affected by increased flood levels, extended duration of flooding or excessive concentration of flow velocities caused by the railway.

GROUNDWATER

Waratah Coal can undertake work with respects to potential impacts of the rail on groundwater now that the vertical alignment for the rail has been engineered and the excavation depths for cuttings are known. The approach will be to use Queensland government bore records to glean typical depths to the water table along the route. These depths will then be compared to the expected depth of excavation along the route to isolate locations where the water table might be breached. If necessary, at places with a definite risk, actual depths to water could be checked by augering/ drilling or shallow geophysics.

Occasional alterations of shallow groundwater flow directions are considered unlikely to be of any material concern. The shallow groundwater will still pass beneath the rail line.

There is the potential for changes in groundwater quality (as a result of rail construction activities) to influence any shallow alluvial aquifers and hyporheic environments connected to waterways with consequent impacts on any stygofauna or hyporheic fauna (assuming they exist) associated with those ecosystems. Equally, if the groundwater is expressed at the surface then any significant changes in groundwater quality could potentially impact on surface water ecosystems or other values such as irrigation or stock drinking. Appropriate chemical handling procedures will be put in place as part of the construction rail EMP to provide for management and mitigation of potential impacts. See also the *Draft Rail EMP* (contained in *Appendices – Volume 2* of this SEIS).

3. Water requirements

The quantity of water required to service the temporary accommodation is estimated to be approximately 66ML per annum which has been included in the total rail construction requirement of 10,000ML. The ongoing requirement for the marshalling yard and maintenance facilities will be approximately 3.5ML per annum.

These water requirements will be sourced in consultation with the landowners and the relevant authorities to ensure that existing landowners and users are not affected. Preliminary investigations have indicated that potentially eleven new or existing water sources would be available without impeding on current supply.

Submitter No.	**901**	Issue Reference:	**17236**
Submitter Type	Individual	TOR Category	**Water Resources (Groundwater)**
Name	**Name withheld**	Relevant EIS Section	

DETAILS OF THE ISSUE

Assesment of underground water basin to evaluate impact on Great Artesian Basin is required.

PROPONENT RESPONSE

The analysis of impacts to the great Artesian Basin has been assessed for realistic and worst case prediction of short term and long term impacts on the Clematis Sandstone (see the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS).

The predictive simulations show negligible drawdown (less than 1m) in the Clematis Sandstone for the base case model and for sensitivity tests in which the vertical permeability of the Rewan Formation / Dunda Beds aquitard is increased by two orders of magnitude. In the underlying Permian formations, there will be significant drawdowns in the west of the model area caused by Project mining, but it is probable that this depressurisation will not propagate to the GAB aquifer.

Submitter No.	**1840**	Issue Reference:	**17239**
Submitter Type	Council	TOR Category	**Water Resources (Surface Water)**
Name	**Barcaldine Regional Council**	Relevant EIS Section	

DETAILS OF THE ISSUE

The underground component of mining requires further detailed planning to assess impacts and mitigation and poses a significant risk to waterways, as a result of flooding and post mining reinstatement.

PROPONENT RESPONSE

Access to the underground mines has been designed to have immunity to a 1:1000 ARI flood event, hence there is a very low risk of flooding of underground mines.

The subsidence impact assessment has recently been completed and revised flood modelling has been undertaken using the post-mine ground surface to assess changes to the flooding and stream flow regimes as a result of subsidence (refer to the *Longwall Mining Subsidence* Report and the *Surface Water Impact Assessment of Longwall Mining Subsidence* Report contained in *Appendices – Volume 2* of this SEIS).

It should be noted though that Waratah Coal aims to minimise the potential impact of subsidence that may result from longwall mining undertaken by its operation and proactively manage subsidence impacts that may result from its underground operations. This includes the prevention and management of impacts as well as monitoring to provide early identification of impacts.

Surface changes due to longwall mining are dependent on the amount of surface subsidence, determined by factors such as overlying strata geology, the longwall block width, the seam height extracted, and the depth of cover. Subsidence impacts on the surface include the formation of tension cracks and in flat areas internal drain way subsidence troughs can form.

Types of remedial works for these impacts may include ripping, re-compacting and seeding of all tension cracks and reshaping any internally draining areas to be externally draining by the construction of contour drains and topsoiling and seeding any disturbed areas. These works will extend to blanketing and compacting of some water courses post-subsidence, preventing inflow of runoff into underground mining areas and maintain environmental surface flows. Materials which have been investigated for use in compacted blankets include silty alluvium and clay. Some re-alignment of water courses and minor earthworks will be necessary, but the work done so far allows these activities to be well planned prior to subsidence in any particular area. The natural fall of the mining area drains freely to the north and is sufficient to minimise the events of subsidence troughs. In the flatter areas, reshaping of any internally draining areas to be externally draining will be done by the construction of contour drains and appropriate rehabilitation measures.

On the cessation of subsidence in any one area and completion of remedial works, it is planned that the land will be returned to grazing and original land activities. Yield trials will verify the maintenance of original land productions.

The project area surface stratigraphy contains cohesive Quaternary alluvial and Tertiary sands, clays and laterites which are self-healing to tensile surface fracturing. Surface tension cracks which form in cohesionless creek bed alluvium and Recent Colluvium are self-healing and readily infill. Open tension cracks in surface clays need to be ripped and compacted.

Surface subsidence caused by longwall mining will be managed through Subsidence and Rehabilitation Management Plans. Further information regarding subsidence and impacts are contained in the *Longwall Mining Subsidence* Report; the *Surface Water Impact Assessment of Longwall Mining Subsidence* report; and the *Rehabilitation and Decommissioning* section of the *Draft Mine EM Plan. See Appendices – Volume 2* of this SEIS for all three reports.

Submitter No.	**88**	Issue Reference:	**10009**
Submitter Type	Individual	TOR Category	Land (Land Disturbance) / **Water Resources**
Name	**Name withheld**	Relevant EIS Section	

DETAILS OF THE ISSUE

Long wall mining will cause subsidence and subsequently interfere with natural hydrology.

PROPONENT RESPONSE

Waratah Coal aims to minimise the potential impact of subsidence that may result from longwall mining undertaken by its operation and proactively manage subsidence impacts that may result from its underground operations. This includes the prevention and management of impacts as well as monitoring to provide early identification of impacts.

More specifically, the objectives of this Management Strategy are to:

- Outline the monitoring and measurement protocols
- Establish responsibilities for the management of subsidence related issues during and immediately following under-mining
- Satisfy the applicable regulatory requirements for subsidence management across the Waratah Coal Project
- Justify the relevance, suitability and adequacy of the proposed mine layout and mine sequence with respect to subsidence related issues
- Establish management priorities and detail the proposed mitigation/remediation and management measures. This includes presenting contingency plans / procedures, and
- Detail the review and reporting protocols.

Subsidence Management Process, Structure and Organisation

Waratah Coal's overall approach to subsidence management includes the following:

- Design to reduce surface impacts – Mine design is such to reduce the potential impact to public safety, the natural environment and built features
- Identify and manage environmental risks – specialist studies (including subsidence) are prepared to identify potential impacts to public safety, the natural environment and built features
- Measure baseline information – Background data is established for the surface above the proposed mining area, this will include the establishment of subsidence monitoring points
- Monitor the effects of mining – Continued monitoring of data for the surface above the proposed mining area, including subsidence monitoring points
- Regularly assess and interpret monitoring – Monitoring data is analysed to identify any variances
- Re-assess impacts – Where variances are identified that are greater than predictions, additional assessment of impacts is undertaken
- Identify and implement remedial actions – If additional assessment indicates greater impacts, then remedial action may be required. Stakeholder consultation will be undertaken in determining and implementing remedial actions, as required
- Implement remedial actions – In the event that any surface impacts due to subsidence are noted, appropriate remediation and/or mitigation measures will be implemented in consultation with appropriate stakeholders, and
- Provide regular progress reports – Progress reports will be provided to relevant parties in accordance with reporting conditions outlined in approval documentation.

Surface subsidence caused by longwall mining will be managed through Subsidence and Rehabilitation Management Plans.

Interference with natural hydrology will be rehabilitated by remedial works which may include ripping, re-compacting and seeding of all tension cracks and reshaping any internally draining areas to be externally draining by the construction of contour drains and topsoiling and seeding any disturbed areas. These works will extend to blanketing and compacting of some water courses post-subsidence, preventing inflow of runoff into underground mining areas

and maintain environmental surface flows. Materials which have been investigated for use in compacted blankets include silty alluvium and clay. Some re-alignment of water courses and minor earthworks will be necessary, but the work done so far allows these activities to be well planned prior to subsidence in any particular area. The natural fall of the mining area drains freely to the north and is sufficient to minimise the events of subsidence troughs. In the flatter areas, reshaping of any internally draining areas to be externally draining will be done by the construction of contour drains and appropriate rehabilitation measures.

On the cessation of subsidence in any one area and completion of remedial works, it is planned that the land will be returned to grazing and original land activities with natural hydrology passages. Yield trials will verify the maintenance

The project area surface stratigraphy contains cohesive Quaternary alluvial and Tertiary sands, clays and laterites which are self-healing to tensile surface fracturing. Surface tension cracks which form in cohesionless creek bed alluvium and Recent Colluvium are self-healing and readily infill. Open tension cracks in surface clays need to be ripped and compacted.

For further information regarding subsidence and impacts refer to the *Longwall Mining Subsidence* report in *Appendices – Volume 2* of this SEIS. The potential maximum impacts of underground longwall mining associated with the proposed Galilee Coal Project on flood and stream flow characteristics within the underground mining area have been identified and are described in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1840**	Issue Reference:	**10010 / 8018**
Submitter Type	Council	TOR Category	Land / **Water Resources (Groundwater)**
Name	**Barcaldine Regional Council**	Relevant EIS Section	1.3.6

DETAILS OF THE ISSUE

Surface subsidence and suitability for grazing land post mining.

Noted "groundwater... predicted level of subsidence, cracking of overlying geology is likely to occur" with "rapid infiltration of rainfall into the aquifers... flow into goafs potentially leading to increased dewatering." Please provide further details.

PROPONENT RESPONSE

The soil profile will remain intact, with surface tension cracks only occurring in areas where depth of cover to mining horizon is less than about 180m. In these cases remedial works may include ripping, re-compacting and seeding of all tension cracks and reshaping any internally draining areas to be externally draining by the construction of contour drains and top soiling and seeding any disturbed areas. These works will extend to blanketing and compacting of some water courses post-subsidence, preventing inflow of runoff into underground mining areas and maintain environmental surface flows. Materials which have been investigated for use in compacted blankets include silty alluvium and clay. Some minor earthworks will be necessary, but the work done so far allows these activities to be well planned prior to subsidence in any particular area. The natural fall of the mining area drains freely to the north and is sufficient to minimise the events of subsidence troughs. In the flatter areas, reshaping of any internally draining areas to be externally draining will be done by the construction of contour drains and appropriate rehabilitation measures.

The new groundwater model includes the fractured zone as a matter of course and sensitivity analysis on a range of permeability profiles that bracket likely and worst case scenarios. Higher infiltration rates will be short-lived as the cracks will infill with sediment after one or more rainfall events or will be managed as described above.

The subsidence impact assessment has recently been completed and revised flood modelling has been undertaken using the post-mine ground surface to assess changes to the flooding and stream flow regimes as a result of subsidence (refer to the *Longwall Mining Subsidence* report and *Surface Water Impact Assessment of Longwall Mining Subsidence* report contained in *Appendices – Volume 2* of this SEIS).

Submitter No.	**1841**	Issue Reference:	21003
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

Flooding is a concern especially with regard to the potential impacts on the matters of national environmental significance (MNES) and their habitats. More information is required that clearly explain what the potential for impacts may be on habitats through flooding and how that will be mitigated or managed.

PROPONENT RESPONSE

Mine

Additional work commissioned by Waratah Coal has been undertaken (see Fauna Assessment and the *Mine Site Creek Diversion and Flooding* reports in *Appendices – Volume 2* of this SEIS[22]) to quantify any direct and indirect impacts of the diversions on MNES. Potential or actual MNES at the mine site are the Northern Quoll, Koala, Brigalow Scaly-foot, Yakka Skink, Squatter Pigeon and Black-throated Finch. There are no TECs or EPBC listed plant species.

Modifications to the existing flood behaviour, including increases to inundation depths, durations and flow velocities through the mine lease are expected to be limited (see series of Figures in Appendix D and E of the *Mine Site Creek Diversion and Flooding* report in *Appendices – Volume 2* of this SEIS) These impacts will be localised to the proposed creek diversions only, which are limited to within the mining lease area, and within this, further limited to the proposed clearing footprint depicted in Figure 3.

In compliance with the DERM[23] and ACARP[24] Guidelines the diversions will be returned to the original channel before leaving the mining lease boundary. It should also be noted that the proposed creek diversions have been designed such that there will be no impacts in small magnitude frequent flow events. Potential impacts are only expected in rare extreme rainfall events, and such impacts are limited to increases in inundation depths for limited periods of time. There will be no discharges from mining operations proposed to the diversion channels.

Given the above, the modifications to flooding are not expected to have any significant impacts on conservation significant fauna species or their habitats at the mine.

Surface subsidence caused by longwall mining has the potential to cause extended ponding along the watercourses that flow through the underground mines, however a range of management strategies will be employed to mitigate the impacts of subsidence. Longwall mining subsidence impacts and management strategies are described in the *Longwall Mining Subsidence Report* and the *Surface Water Impact Assessment of Longwall Mining Subsidence* report (contained in *Appendices – Volume 2* of this SEIS).

22 Note also that a Mine Site Flora and Vegetation report is currently being prepared and will be completed by end August 2012. The contents of the report have been used to inform the Mine Site Fauna Assessment and the *Mine Site Creek Diversion and Flooding Report*s

23 ACARP (2002) *Bowen Basin River Diversions, Design and Rehabilitation Criteria,* Australian Coal Association Research Program.

24 DERM (2011) *Watercourse Diversions – Central Queensland Mining Industry.* Department of Environment and Resource Management.

Rail

Changes to the existing flood behaviour that will be caused by the proposed railway have been quantified and mapped (refer to the *Rail Corridor Cross Drainage* report (contained in *Appendices – Volume 2* of this SEIS). Cross drainage structures including bridges and culverts have been designed to limit increases to inundation depths to 0.5m upstream of the railway embankment and maintain flow connectivity. Structures have also been designed to limit outlet velocities to within acceptable limits in accordance with the Queensland Department of Main Roads Road Drainage Design Manual[25]. Because design criteria are such that inundation depth and time are minimised, there are not expected to be any significant direct or indirect impacts of changes in flood regime along the rail on MNES.

Submitter No.	**1841**	Issue Reference:	**21007**
Submitter Type	Government	TOR Category	Nature Conservation (Terrestrial Ecology) / **Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Volume 5B – Appendix 10

DETAILS OF THE ISSUE

Need more information about the final creek diversions and what they will impact on.

PROPONENT RESPONSE

The proposed creek diversions will be limited to within the mine lease area. Construction of the diversions will require no additional clearing of vegetaion to that already proposed to facilitate the mine infrastructure (see Figure 4).

None of the vegetation to be cleared in the mine clearing footprint is analogous with any TEC, and there have been no records of any flora species listed under the EPBC Act within mine clearing footprint (see the two *Flora and Vegetation Reports* contained in *Appendices – Volume 2* of this SEIS). Potential or actual fauna species listed under the EPBC Act at the mine site are Northern Quoll, Koala, Brigalow Scaly-foot, Yakka Skink, Squatter Pigeon and Black-throated Finch. The *Fauna Assessment Report* (contained in *Appendices – Volume 2* of this SEIS) describes the potential likelihood of presence and use of the site by these species, as well as the potential impacts and mitigation measures. The *Biodiversity Offset Proposal* (contained in *Appendices – Volume 2*) of this SEIS outlines the offset proposal for those impacts that cannot be minimised or mitigated.

Concept design of the proposed diversions has been commissioned by Waratah Coal, with design undertaken in accordance with DERM and relevant industry guidelines for watercourse diversions. See the *Mine Site Creek Diversion and Flooding Report* in *Appendices – Volume 2* of this SEIS. Water within the proposed diversions will be returned to the natural waterways prior to leaving the mine lease boundary.

25 Queensland Department of Main Roads. 2002. Road *Drainage Design Manual*. Queensland Government. Department of Main Roads.

Submitter No.	1841	Issue Reference:	21036
Submitter Type	Government	TOR Category	Water Resources (Groundwater)
Name	Commonwealth DSEWPaC	Relevant EIS Section	Appendix 26 – MNES report

DETAILS OF THE ISSUE

3.11 Great Artesian Basin

The EIS does not adequately address the impact of the development upon the ecological community listed as 'The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (GAB)', which is considered to occur within 200km from the proposed development. As determined from the map in the draft EIS, the GAB boundary appears to range from 40-60km from the eastern and western footprint of the mine proposal. Recent conditioning by this department has required the consideration of impacts to the GAB occurring within 100 km of the extent of maximum modelled impact associated with the developments. To this end, further data is required on the geology and hydrology of the Galilee Coal Mine development region. Detailed groundwater hydrological flow modelling is required to predict any impact on the development upon aquifers of the GAB. Should the extent of maximum drawdown be closer than 100km to the GAB, then any subsequent impacts on the listed ecological community needs to be quantified.

PROPONENT RESPONSE

The base of the GAB is defined by the Lower Triassic Dunda Beds and Rewan Formation, a thick (~100m) aquitard that lies beneath the Clematis Sandstone, the most easterly outcropping aquifer in the GAB. The Clematis Sandstone is part of the GAB recharge beds known as the Eastern Recharge Zone. This zone is 60-70km wide between Barcaldine and the GAB boundary which lies about 20km east of Jericho.

The EIS did not have the correct position for the GAB boundary. It was positioned at the western boundary of the recharge zone, rather than at it's eastern boundary.

The western edge of the current mine plan is close to the boundary of the Clematis Sandstone and the Dunda Beds, but the boundary is obscured by Quaternary cover sediments. This means that the mine's footprint is designed to pass beneath the GAB's basal aquitard but it is not clear whether or not it will lie beneath the GAB's basal aquifer. The modelling in this report assumes a conservative condition by drawing a straight line between the most easterly Clematis Sandstone outcrops to the north and south of the gap. It is more likely that the boundary will be farther to the west.

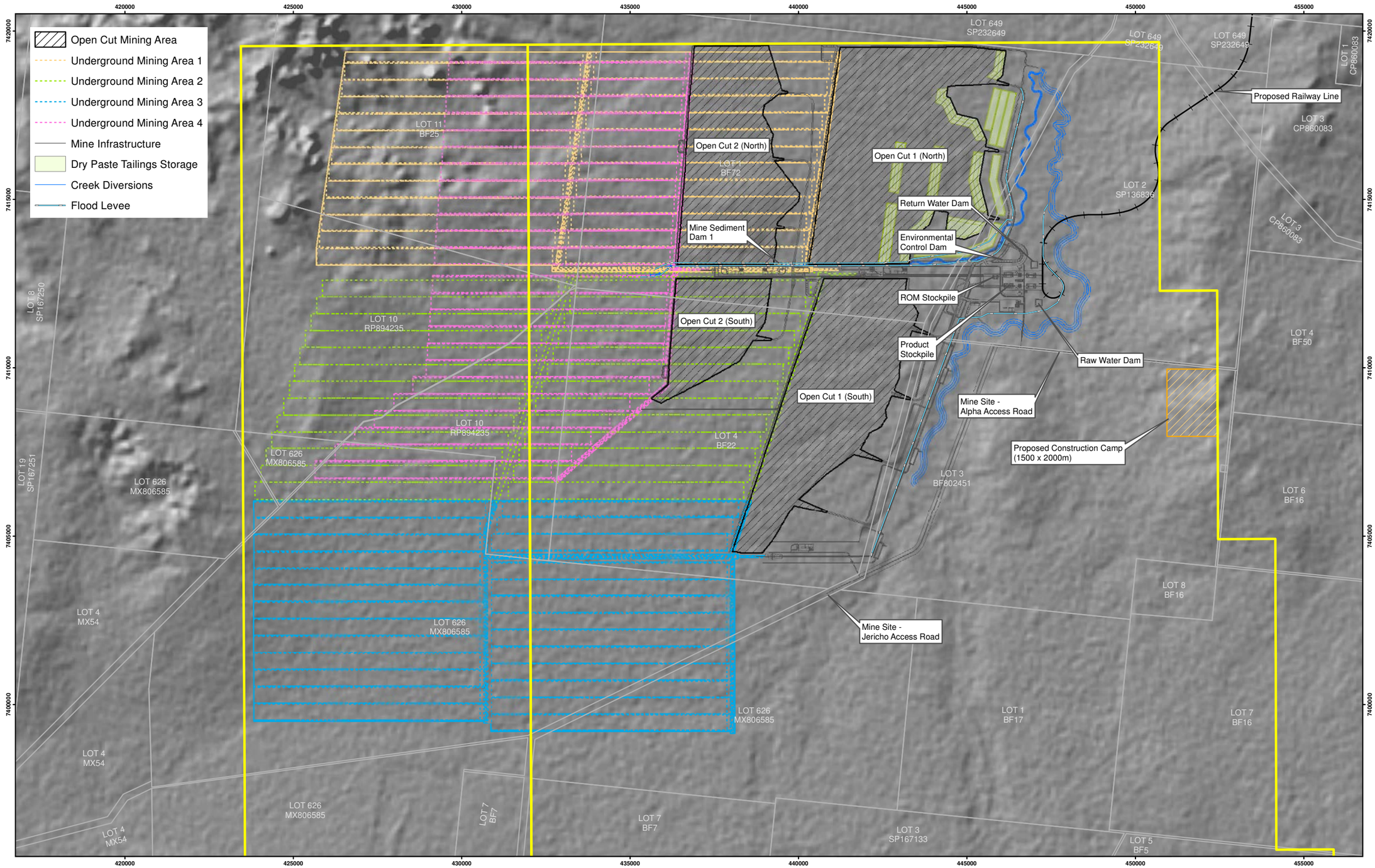
There are mapped recharge springs 30-40km to the west of the GAB boundary within the recharge zone and also to the west of the recharge zone, in the Barcaldine Spring Complex. However, these are recharge springs and not the discharge springs that are protected under the EPBC Act which lists the "community of native species dependent on natural discharge of groundwater from the Great Artesian Basin" as an endangered ecological community[26].

26 The Recovery plan for the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (Fensham *et al.*, 2010) excludes recharge springs:

> "The website provides further definition for the listing and specifically excludes some springs in the recharge areas: 'Natural discharge springs mainly occur within twelve "spring groups" across the Basin (Habermehl & Lau, 1997). A number of these -the Cape York, Flinders River, Barcaldine, Springsure and Mitchell/Staaten River groups (see Fig. 1) -include some springs that arise from recharge rejection within the recharge areas of the Basin. These springs are not included in this determination.'
>
> The detailed groundwater model for the Galilee Projet extends to Easting 360000 about 50km to the west of Jericho and 70km to the west of the GAB boundary. This includes the recharge springs nearest to the proposed mine" (page 6).
>
> "Springs which are not included in this community and not covered by this recovery plan are generally associated with outcropping sandstone, which can form rugged landscapes with springs often situated in gullies and providing the source for streams. Recharge springs are not included" (page 7).

Fensham, R.J., Ponder, W.F. and Fairfax, R.J. 2010. *Recovery plan for the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin*. Report to the Department of Environment, Water, Heritage and the Arts, Canberra. Queensland Department of Environment and Resource Management, Brisbane.

Figure 3. Proposed clearing footprint



GALILEE COAL PROJECT (Northern Export Facility)

Waratah Coal
THE NEW ENERGY IN COAL

Mineralogy House, Level 7, 380 Queen Street, Brisbane Qld 4000, Australia

Source:	Cadastral Boundaries: DERM 2012 EPC Boundary: Department of Natural Resources and Mines (DNRM) 2012 Mine Detail: Waratah Coal Pty. Ltd. 2012 Background Image: Shaded relief: ESRI Data & amp; Maps 2006
Disclaimer:	This plan is based on or contains data provided by others. Waratah Coal Pty. Ltd. gives no warranty in relation to the data (including accuracy, reliability, completness, currency or suiability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to and use of the data. Data must not be used for direct marketing or be used in breach of privacy laws.
File:	File: WAR20-26-SEIS004b-FIG-3-MINE-INFRASTRUCTURE-ARRANGEMENT- Date: 14/11/2012

0 1,000 2,000 3,000 4,000 5,000
Metres

A3 Scale 1:100,000

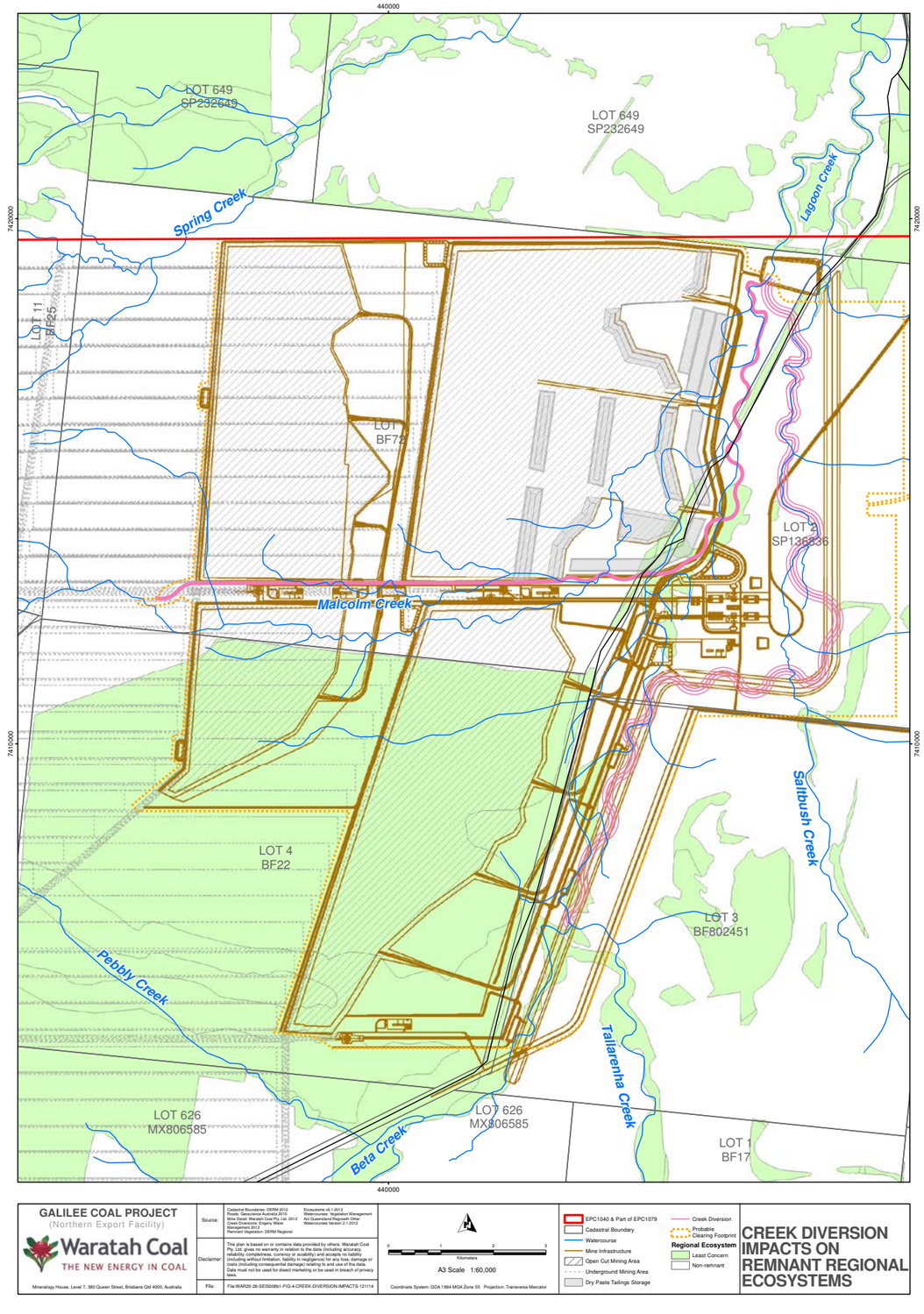
Coordinate System: GDA 1994 MGA Zone 55 Projection: Transverse Mercator

EPC1040 & Part of EPC1079

Cadastral Boundary

MINE INFRASTRUCTURE ARRANGEMENT

Figure 4. Creek Diversion Impacts on Remnant Regional Ecosystems



The coordinates of the nearest recharge springs have been obtained and the spring sites are included in the groundwater model as sites of specific interest for drawdown assessment. The nearest discharge springs are expected to occur at the western and south-western edges of the GAB many hundreds of kilometres away.

The Galilee Project model predicts a broad water table drawdown extent that extends about 20km from the area of active mining to the north (for 1m drawdown), 10km to the south, and 15km to the east. The western extent (towards the GAB) does not leave the mine lease and the 1m drawdown contour aligns with the GAB geological boundary. The study found no predicted impact on the GAB aquifers. This is due primarily to the protection offered by the thick Dunda/Rewan aquitard that separates the basal GAB aquifer from the Permian coal measures.

Drawdown in the deepest mined coal seam will extend beyond Jericho to the west and will pass beneath the Clematis Sandstone outcrop, but it is unlikely that there will be any impact on the overlying aquifer and highly unlikely that there will be any impact on the recharge springs. There certainly will be no effect on discharge springs hundreds of kilometres away.

See also the *Groundwater Assessment* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1841**	Issue Reference:	**21037**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Volume 1, Chapter 7, 7.8.4.1 p 133

DETAILS OF THE ISSUE

As acknowledged in the EIS (Vol.1 Chapter 7, section 7.8.4.1 p.133) "the EIS has determined that little is currently known about the hydrological regime in this area". The EIS needs to explain and provide geological and modelled hydrological evidence supporting the assumption that flow does not occur between the coal seams and GAB sediments, which are located in close proximity to the development.

PROPONENT RESPONSE

There is much better knowledge now of the local groundwater hydrology following the investigations and modelling for neighbouring mines, and expanded investigations for this project. The physical properties of the lithologies between the basal GAB aquifer and the coal seams have been determined by direct measurement and by inference through model calibration.

Waratah Coal has completed installation of a 530m deep hole close to Jericho in the GAB and another hole has been instrumented with vibrating wire piezometers in the Clematis Sandstone and Rewan Formation of the GAB. The Jericho hole has been instrumented with a string of five multi-level vibrating wire piezometers to give information on the natural vertical hydraulic gradient. In replicating this gradient, model calibration has improved knowledge of the permeabilities of the Triassic GAB lithologies and the Permian coal measures. Waratah Coal also has undertaken laboratory measurement of horizontal and vertical permeabilities of Permian core samples.

See the *Groundwater Assessment* report (contained in *Appendices – Volume 2* of this SEIS) for further information.

Submitter No.	**1841**	Issue Reference:	21038
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Vol 5 – Appendix 15; Volume 2, Chapter 9

DETAILS OF THE ISSUE

Surface Water

The surface water monitoring undertaken by the proponent does not adequately address the specified terms of reference (ToR). Generally, Vol.5, Appendix 15 and Vol.2, Chapter 9 are focussed on the construction phase of the project; very little regard is given to on-going operations and to the decommissioning phases for the mine, rail or port facilities. An assessment of the cumulative impacts of the coal mine and others nearby should be considered by the proponent. The plan itself does not adequately address the ToR's or provide sufficient information to adequately determine the risk of adverse impact to MNES.

PROPONENT RESPONSE

Waratah Coal has commissioned a new *Draft EM Plan* for the mine and a *Draft Environmental Management Plan* (EMP) for the rail (see both contained in *Appendices – Volume 2* of this SEIS). Both Plans cover the construction and operational phases of the project. It is acknowledged that the EMP included in the draft EIS provided information on impacts and control measures for the construction phase and said less about the operational and decommissioning/ rehabilitation phases. This has now been addressed (in fact most of this information was contained in the EIS chapters and simply had not been repeated in the EMP). Environmental values and impacts have been transferred from the EIS to the EMPs for all project phases. Environmental protection objectives have been developed.

An Updated Cumulative Impact Assessment has been undertaken and is presented in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1841**	Issue Reference:	21039
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Volume 5 – Appendix 15 p 2-2

DETAILS OF THE ISSUE

The proponent grouped all waterways in the project area and then stated that as "most of the areas has been disturbed to some degree" the environmental value for "the project area is overall slightly to moderately disturbed ecosystem as per the QWQG" (Vol. 5 App15 p.2-2). The EIS should provide details such as sustainability, physical integrity, environmental values and other requirements as specified in the ToR. The EIS should specify the environmental values for each water body and course potentially impacted by the project.

PROPONENT RESPONSE

From our now more advanced knowledge of the study area and the waterways in question, the general statement in relation to the aquatic ecosystems being Slightly to Moderately disturbed ecosystems as per the QWQG is still correct. While the study area is remote and not subject to heavy urbanisation impacts, many waterways have been modified through dam construction, clearing of riparian vegetation, road crossing construction and cattle access to creeks.

A desk-top assessment of environmental values (EVs) for the waterways downstream of the mine has been undertaken and is described in the *Environmental Values Identification for Galilee Coal Mine* report (refer to *Appendices – Volume 2* of this SEIS).

The Department of Environment and Heritage Protection is also currently performing an Environmental Values identification study for the Burdekin River basin which is due for completion in December 2013. Draft Environmental Values for the Burdekin River basin were established by NQ Dry Tropics in 2009 as part of the Burdekin Water Quality Improvement Plan. A desktop review of water uses within the receiving waterways of the Galilee Coal Mine has confirmed the suitability of the draft Environmental Values identified in the Burdekin Water Quality Improvement Plan. The draft Environmental Values identified for the Galilee Coal Project Mine are:

- **Lagoon Creek, Sandy Creek, tributary of Jordan Creek and Jordan Creek:** aquatic ecosystems (slightly to moderately disturbed), stock watering, and cultural and spiritual values.
- **Belyando River:** aquatic ecosystems (slightly to moderately disturbed), stock watering, irrigation, drinking water, and cultural and spiritual values.

Submitter No.	**1841**	Issue Reference:	21040
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

EIS needs to quantify the amount of water and stream-flow in each surface water course and provide a description of the existing surface water drainage patterns and existing and historical water flows in the major streams and wetlands.

PROPONENT RESPONSE

An assessment of the existing surface water drainage patterns and stream flow volumes in the waterways discharging from the proposed mine lease area is described in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1841**	Issue Reference:	21041
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

The surface water monitoring program is insufficient to describe seasonal variation as only two sampling runs were conducted, one occurring prior to a cyclone and the other during the dry season when only 27 of the 54 sites containing enough water to sample.

PROPONENT RESPONSE

Waratah Coal have commissioned additional sampling at a number of sites within and adjacent to the mine site as well as along the rail corridor (n=22) during the 2012 post wet season period. Further sampling has been proposed as detailed in the *Mine Water Quality Monitoring Program* (contained in *Appendices – Volume 2* of this SEIS), including sufficient sites and sampling to determine interim water quality objectives for the Project.

While acknowledging that further baseline water quality sampling should (and will) be carried out in the lead up to construction, the data available (along with desktop information for the study area, for example, data from the Alpha Coal EIS, the South Galilee Coal Project, and other literature) is expected to be sufficient to characterise seasonal variability in the interim, and it is important that the logistical challenges in terms of collecting temporal water quality

data in the study area is recognized, as most of the streams sampled are ephemeral. Hence, they are dry for much of the year and, when they are actually flowing, they are often very difficult to access (due to boggy terrain and/or inundation of floodplain areas). Thus the data set from this study would be expected to be more limited compared to other study areas that feature permanently flowing streams.

To overcome this to some extent, consideration has been given to setting up permanent water quality data logging stations at key points (i.e. upstream, within and downstream of the MLA) on waterways intersecting the MLA to monitor parameters such as EC, pH and turbidity during the pre and post construction and operation phases. The use of all-terrain vehicles (ATV's) to access sampling sites during wet periods is also being considered.

Submitter No.	**1841**	Issue Reference:	21042
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

EIS lacks sufficient evidence to support the conclusion that Cooper Creek is not hydraulically linked. Either it is included or more evidence provided to support the conclusions.

PROPONENT RESPONSE

Approximately 5% of the proposed mine lease area is situated within the Cooper Creek basin (the balance of the lease area is within the Burdekin River basin). Underground mining will only occur within 30% of the area draining to Cooper Creek (i.e. only 1.5% of the overall mine lease area). No mine surface infrastructure is proposed to be located within this area. Potential impacts on Cooper Creek stream flows will extend only to impacts associated with underground mine subsidence. These impacts are assessed as negligible in the *Surface Water Impact Assessment of Longwall Mining Subsidence* report contained in *Appendices – Volume 2* of this SEIS. These impacts can be managed and mitigated with the implementation of a Subsidence Management Plan – See Section 10 of the *Longwall Mining Subsidence Report* in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1841**	Issue Reference:	21043
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

More than four photographs are needed to show the geomorphic condition of any water course likely to be affected by disturbance. In addition, photographic monitoring was inadequate, as none of the photographs taken at monitoring points were consistent. No photographic zoom, scales or geo-references were used to provide context for the photos.

PROPONENT RESPONSE

Geomorphic condition of waterways has been addressed as part of the creek diversion works for the mine site (seethe *Mine Site Creek Diversion and Flooding Report* in *Appendices – Volume 2* of this SEIS). The assessment of the geomorphic condition has been undertaken to quantitatively define existing geomorphic conditions. This assessment has utilised aerial photography and aerial laser scanning survey in addition to specific photographs. This analysis of the existing geomorphic condition has been undertaken in accordance with DERM and Australian Coal Association Research Program guidelines.

Bridges are the preferred option for major watercourse crossings of the railway to minimise disturbance within the water courses and maintain the current geomorphic condition. Where culverts are required for crossing of major water courses they will be located to maintain existing flow connectivity and limit outlet velocity to maintain the current geomorphic condition. Structures have also been designed to limit outlet velocities to within acceptable limits in accordance with the Queensland Department of Main Roads Road Drainage Design Manual[27].

It is understood that the Hancock Coal EIS contained much work of this nature (e.g. photographic points). Waratah Coal agree that this is useful and this may be something that is adopted as part of the baseline / compliance monitoring approach listed in the Mine EM Plan and Rail EMP, but, despite being useful, photographic descriptions are not considered material to how the geomorphic condition of relevant waterways is described in terms of general bed and bank erosion / integrity in an EIS context. Georeferenced photopoints would be useful for monitoring potential impacts on the stream geomorphology, that is, to document potential erosion and bed aggradation and so will be considered as part of the monitoring outlined in the Mine EM Plan and Rail EMP.

Submitter No.	**1841**	Issue Reference:	**21044**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Sections 3.2.3, 4.23 and 5.2.3 (volume??)

DETAILS OF THE ISSUE

Sections 3.2.3, 4.23 and 5.2.3 are related to riparian condition and do not provide information required for planning and monitoring of rehabilitation of the watercourse during or after operation of the proposal.

PROPONENT RESPONSE

Riparian vegetation surveys at the mine have occurred as part of the program of supplementary vegetation and flora assessments (see the two *Flora and Vegetation* reports contained in *Appendices – Volume 2* of this SEIS). Additional information has also been captured as part of the aquatic assessments based upon the Queensland AusRIvAS habitat assessment protocols (see the *Mine and Rail Aquatic Ecology and Water Quality* reports contained in *Appendices – Volume 2* of this SEIS). The EM Plan and Decommissioning and Rehabilitation Plan for the mine will provide for planning and monitoring of watercourses during and post operation. In addition, the creek diversions within the mining lease area have been designed to maintain the existing geomorphic features of the existing creeks including stream length, grade, meander radius, incisement ratio and flow capacity as well as natural features such as in-stream benching. The diversions will be revegetated with native vegetation and a purpose specific management plan will be developed to assist in establishment of this vegetation and long term maintenance. This management plan is being developed in accordance with the Australian Coal Association Research Program guidelines.

Submitter No.	**1841**	Issue Reference:	**21045**
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

The EIS indicates that information on flood studies can be found in sections 3.2.5, 4.2.5 and 5.2.5. Vol.5 does not contain a section 3.2.5 and the other two sections only contain one paragraph each on climate, they should at least summarise the conclusions of the flood modelling report.

27 Queensland Department of Main Roads. 2002. *Road Drainage Design Manual.* Queensland Government. Department of Main Roads.

PROPONENT RESPONSE

Refer to the Flooding Technical reports prepared as part of the EIS which can be found as Appendix 16 and Appendix 17. The *Mine Site Creek Diversion and Flooding* Report (contained in *Appendices – Volume 2* of this SEIS) identifies pre- and post-mining flooding conditions for the waterways flowing through the open cut mining area. The *Surface Water Impact Assessment of Longwall Mining Subsidence* report (contained in *Appendices – Volume 2* of this SEIS) identifies pre- and post-mining flooding conditions for the waterways flowing through the underground mining area. The *Rail Corridor Cross Drainage* report (also contained in *Appendices – Volume 2* of this SEIS) identifies pre- and post-railway flooding conditions for the major waterways crossing the proposed railway corridor.

Submitter No.	**1841**	Issue Reference:	21046
Submitter Type	Government	TOR Category	**Water Resources (Surface Water)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

The selected water monitoring sites, especially around the mine site, do not provide the spatial coverage required to form an adequate baseline dataset. As a minimum, a BACI design as out lined in the NWQMS guideline 7 (ANZECC and ARMCANZ 2000[28]) is required. In addition, several of the measured chemical parameters exceeded the NWQMS guideline 4 (ANZECC and ARMCANZ 2000[29]) trigger values for slightly to moderately disturbed ecosystems. The EIS should collect sufficient water quality data and then develop locally derived baseline trigger values, as outlined in the NWQMS.

PROPONENT RESPONSE

This comment refers to the fact that the 2010 E3 study only sampled one site within the mine site (on Lagoon Creek), whereas several other watercourses intersect the EPC and these were not sampled. The recent sampling carried out by Waratah Coal's consultants addresses this to an extent (all waterways intersecting the mine site and immediately downstream of the mine site have now been sampled), however, only one round of water quality sampling has been carried out to date (see the *Aquatic Environment Position Paper* contained in *Appendices – Volume 2* of this SEIS for more information). The array of sites sampled will be re-sampled as part of ongoing monitoring. The next round of sampling is currently tentatively scheduled for late August.

There is no need to implement a BACI design monitoring approach during the EIS phase. The role of the EIS is to characterise waterways in terms of habitat and associated flora and fauna, focussing mainly on areas potentially impacted by the proposed development. A BACI design will be considered as part of the monitoring approach adopted within the EMPs to assess potential impacts associated with the Project, however, this would require suitable upstream reference sites to be identified. It should be noted, then, that the availability of suitable monitoring sites could preclude a BACI design approach as many streams within the study area only flow for very short periods, so some sections of stream may have standing water, while others will not.

28 ANZECC & ARMCANZ (2000). *Australian Guidelines for Water Quality Monitoring and Reporting*. Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

29 ANZECC & ARMCANZ (2000). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, Australian and New Zealand Environment and Conservation Council & Agriculture and Resource Management Council of Australia and New Zealand, Canberra.

Submitter No.	1841	Issue Reference:	21047
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	Commonwealth DSEWPaC	Relevant EIS Section	vol.5 App 15. pp. 3-9

DETAILS OF THE ISSUE

TPH (either from tannins or fuel) was detected at several sites, but no analysis was undertaken (vol.5 App 15. pp. 3-9). This is an issue that could have been easily resolved.

PROPONENT RESPONSE

This is not considered a critical issue. The recent supplementary water quality assessments included measurements of various TPH fractions. No exceedences were recorded for any of the organic contaminant parameters (i.e. TPH, PAH, Organic-C and Organic-P pesticides, BTEX, etc.). Only a few samples recorded levels of TPH compounds above the limit of reporting (LOR), which are expected to relate to runoff from roads or oil leaks from agricultural machinery.

The Alpha Coal EIS (2011[30]) also noted that there were no readings for TPH above the LOR. Combined, these results suggest that the waterways within and adjacent to the Project site currently have negligible levels of organic contaminants present. This is not surprising given that the study area is remote, not near industrial landuse and most waterways sampled were not adjacent to highways and, therefore, not subject to organic contaminant input through road runoff.

Submitter No.	1841	Issue Reference:	21048
Submitter Type	Government	TOR Category	Water Resources (Surface Water)
Name	Commonwealth DSEWPaC	Relevant EIS Section	

DETAILS OF THE ISSUE

The list of impacts and associated mitigation measures are inadequate because common risks related to this type of project have not been included. Further there is a disproportionate emphasis on the construction phase of the project, with little consideration of the on-going operation, and none to the decommissioning of the project. In addition indirect impacts have not been considered on water quality, such as, weed infestation, lateral subsidence, diversion of Tallerenha Creek, dewatering of mine site, acid sulphate soils, and routine and emergency waste discharges. The management measures also lack detail and commitments.

PROPONENT RESPONSE

Additional surface water quality, groundwater dependent ecosystem and aquatic ecosystem assessments have been undertaken and are presented in the *Appendices – Volume 2* of this SEIS (see *Mine Site Aquatic Ecology and Water Quality* report and *Subterranean Fauna Survey* report). A *Mine Water Quality Monitoring Program* has also been prepared and is contained in *Appendices – Volume 2* of this SEIS.

The *Mine Site Creek Diversion and Flooding Report* (in *Appendices – Volume 2* of this SEIS) provides a monitoring program for the creek diversions (see Section 8). The creek diversion monitoring program encompasses all phases of the project including construction, establishment, monitoring and relinquishment. The monitoring program has been developed in accordance with the Australian Coal Association Research Program guidelines[31]. This will be incorporated in to the overall EM Plan.

30 Hancock Prospecting. 2011. *Alpha Coal EIS*.

31 ID&A (2001). *Monitoring and Evaluation Program for Bowen Basin River Diversions*. Australian Coal Association Research Program. Program No. C9068. February 2001.

Submitter No.	**1841**	Issue Reference:	21049
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Volume 5 Appendix 14

DETAILS OF THE ISSUE

Volume 5 Appendix 14 considers the project's potential impacts to groundwater. The following comments relate to the findings of these chapters.

The EIS only undertook desktop investigations of the local and regional hydrogeology for the rail alignment and coal terminal, as it was considered that 'these components will not significantly penetrate the underlying hydrogeology", however, as the rail alignment and coal terminal could still result in significantly altering shallow near surface groundwater, and water quality this is not considered adequate.

PROPONENT RESPONSE

The coal terminal is no longer part of the project, hence no response is required in relation to potential impacts of the coal terminal on groundwater.

With regards to the rail, a desktop analysis is the appropriate first step. Now that the concept design for the rail is completed (see the *Railway Concept Design Report* in *Appendices – Volume 2* of this SEIS) and excavation depths for cuttings are known, the approach will be to use Queensland government bore records to glean typical depths to the water table along the route. These depths will then be compared to the expected depth of excavation along the route to isolate locations where the water table might be breached. If necessary, at places with a definite risk, actual depths to water could be checked by augering/drilling or shallow geophysics.

Occasional alterations of shallow groundwater flow directions are considerd unlikely to be of any material concern. The shallow groundwater will still pass beneath the rail line.

There is the potential for changes in groundwater quality (as a result of rail construction activities) to influence any shallow alluvial aquifers and hyporheic environments connected to waterways with consequent impacts on any stygofauna or hyporheic fauna (assuming they exist) associated with those ecosystems. Equally, if the groundwater is expressed at the surface then any significant changes in groundwater quality could potentially impact on surface water ecosystems or other values such as irrigation or stock drinking. Appropriate chemical handling procedures will be put in place as part of the EMP for the construction phase of the rail to provide for management and mitigation of potential impacts.

Waratah Coal have committed to covering their wagons (see response to Issue Reference 12004 in Part C – 06 – Air Quality), so there will be negligible potential for contamination of groundwater through rail operational activities.

Submitter No.	**1841**	Issue Reference:	21050
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

Aquifer connectivity: the EIS states that 'simulations with increased vertical hydraulic conductivity to simulate cracking reporting inflows up to an order of magnitude higher … ' However, further detailed data is required before reliable estimates can be made'. Further information is essential to determine whether the assessment undertaken by the proponent is adequate.

PROPONENT RESPONSE

When underground mining is undertaken, a fractured zone is developed above the mined panels to a height (h) that is proportional to the width (w) of the longwall panels. The *Longwall Mining Subsidence Report* (see *Appendices – Volume 2* of this SEIS) has recently been completed and estimates the height to which the fracturing will extend to be 180m above the mining horizon. This has been incorporated into the groundwater model by the groundwater modelling team, which has vast experience in similar modelling in New South Wales in operational mines where the height of the fractured zone can be confirmed in the calibration process.

There is substantial documentation on fractured zones in Queensland in the Bowen Basin but nothing yet in the Galilee Basin. For this reason, modelling has undertaken uncertainty analysis to assess possible impacts for more permeable fracturing.

There is no way to "measure" fractured zone properties in advance of mining.

Submitter No.	**1841**	Issue Reference:	21051
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

Further sampling and information of sampling techniques is required to determine whether Stygofauna are present. More sampling is required in the actual sampling area and to the south of the mine footprint, including information of the water levels sampled.

PROPONENT RESPONSE

Waratah Coal has commissioned additional stygofauna and hyporheic fauna sampling within and adjacent to the mine site. Sampling protocols were consistent with WA guidelines (best practice) and 45 groundwater bores and nine hyporheic sites were sampled for stygofauna and hyporheic fauna in April and September 2012. The stygofauna collected from the mining lease application area were identified as a *cyclopoid copepod*, an Astigmata water mite and specimens from three *Oligochaete* Families *(Enchytraeidae, Naididae* and *Phreodrilidae)*.

See the *Subterranean Fauna Survey* report contained in *Appendices – Volume 2* of this SEIS for more detail.

Submitter No.	**1841**	Issue Reference:	21052
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	

DETAILS OF THE ISSUE

Monitoring and modelling design: the number and location of bores are considered to be inadequate to assess the impacts to groundwater, more bores are needed in the southern area of the proposed mine footprint; further information is required on monitoring during the mines life and following decommissioning as only the initial monitoring regime is included; further information is required on model geometry as it is unclear how the model relates to the nationally accepted Murray-Darling Basin Commission's Groundwater Flow Modelling Guideline (2000)[32].

32 Aquaterra Consulting. 2000. *Murray-Darling Basin Commission Groundwater Flow Modelling Guideline.*

PROPONENT RESPONSE

An expanded field monitoring program has been completed. This consists of a mixture of multi-level vibrating wire piezometer (VWP) holes in the west, south-west and south-east and extra monitoring sites to the east in the vicinity of Lagoon Creek upgradient of the open cut pits.

At the time of the EIS, there were three multi-level standpipe monitoring nests, two in the open-cut area and one in the underground mining area. Each site is screened at three depths over a narrow range (minimum 34m, maximum 85m). The holes are newly equipped with permanent sensors and dataloggers.

Most of the test intervals for the three monitoring nests were in the coal seams close to subcrop. As there was a lack of permeability data from coal seams or interburden with any significant cover depth, a new monitoring plan was put in place.

Seven new sites have been added to the monitoring network for the SEIS. All sites are equipped with continuously datalogged vibrating wire piezometers. In all, there are 25 piezometers at the 7 sites, designed to monitor the full stratigraphic section down to the deepest coal seam to be mined. Four of the new sites are situated close to the mining footprint, with two upgradient of the open cut pits in the vicinity of Lagoon Creek, and two downgradient of the open cut pits overlying and adjacent to the underground mines. There are three far-field monitoring sites. The first is a single-piezometer at Alpha airport to monitor groundwater responses close to the Alpha township. The second is a 5-piezometer hole close to Jericho township. The third has two piezometers in the Clematis Sandstone and Rewan Formation strata of the Great Artesian Basin, as a check on whether mining effects reach the GAB.The loggers were installed over the period from September 2012 to November 2012. Transient hydrographs are gradually being extended for use in the Stage 2 model calibration. The VWPs will provide essential information on vertical head profiles and relative heads in each aquifer.

The *Groundwater Assessment* report (presented in *Appendices – Volume 2* of this SEIS) recommends that five bores be added to the long-term monitoring plan.

Waratah Coal's new groundwater assessment team is well aware of the Murray-Darling Basin Commission's *Groundwater Flow Modelling Guideline* (2000)[33]. The team is led by Dr Noel Merrick who was one of the three authors of the Guideline. These guidelines have been updated with new National Groundwater Modelling Guidelines issued by the National Water Commission in June 2012.

See also Section 1.0 of the *Groundwater Assessment* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**1841**	Issue Reference:	**21053**
Submitter Type	Government	TOR Category	**Water Resources (Groundwater)**
Name	**Commonwealth DSEWPaC**	Relevant EIS Section	Volume 5 Appendix 14

DETAILS OF THE ISSUE

Volume 5 Appendix 14 also considers the potential impacts to groundwater drawdown. The EIS acknowledges that the mine will have a significant impact on groundwater within 12 to 30km of the mine, however, some risks have not been adequately addressed, including impacts to:

- MNES
- The EIS does not consider cumulative impacts within the Galilee Basin. Specifically, impacts to the EPBC listed GAB and stygofauna.

33 Aquaterra Consulting. 2000. Murray-Darling Basin Commission *Groundwater Flow Modelling Guideline*.

PROPONENT RESPONSE

The groundwater model has been expanded to include the Alpha Mine to the north and the South Galilee Mine to the south, for cumulative impact assessment. The model extends from Northing 7,360,000 to 7,480,000. See the *Groundwater Assessment* report contained in *Appendices – Volume 2* of this SEIS. Particular attention has been paid to the GAB.

The stygofauna collected from the mining lease application area in April and September 2012 were identified as a cyclopoid copepod, an Astigmata water mite and specimens from three Oligochaete Families (Enchytraeidae, Naididae and Phreodrilidae. To satisfy the Terms of Reference for this (and all) EIS, endemism must be disproved at the Family or Order level for stygofauna. The copepod, water mite and oligochaetes are not endemic, as the Order/Family they belong to occurs in all Australian States[34]. Hence any proposed mining activities associated with the Galilee Coal Project will not put at risk or threaten the survival of the taxa at the Order/Family level of taxonomic resolution.

The base of the GAB is defined by the Lower Triassic Dunda Beds and Rewan Formation, a thick (~100m) aquitard that lies beneath the Clematis Sandstone, the most easterly outcropping aquifer in the GAB. The Clematis Sandstone is part of the GAB recharge beds known as the Eastern Recharge Zone. This zone is 60-70km wide between Barcaldine and the GAB boundary which lies about 20km east of Jericho.

The western edge of the current mine plan is close to the boundary of the Clematis Sandstone and the Dunda Beds, but it is not clear whether or not it will lie beneath the GAB's basal aquifer. The modelling in this report assumes a conservative condition by drawing a straight line between the most easterly Clematis Sandstone outcrops to the north and south of the gap. It is more likely that the boundary will be farther to the west.

There are mapped recharge springs 30-40km to the west of the GAB boundary within the recharge zone and also to the west of the recharge zone, in the Barcaldine Spring Complex. However, these are recharge springs and not the discharge springs that are protected under the EPBC Act which lists the "community of native species dependent on natural discharge of groundwater from the Great Artesian Basin" as an endangered ecological community[35]. The coordinates of the nearest recharge springs have been obtained and the spring sites are included in the groundwater model as sites of specific interest for drawdown assessment. The nearest discharge springs are expected to occur at the western and south-western edges of the GAB many hundreds of kilometres away.

The Galilee Project model predicts a broad water table drawdown extent that extends about 20km from the area of active mining to the north (for 1m drawdown), 10km to the south, and 15km to the east. The western extent (towards the GAB) does not leave the mine lease and the 1m drawdown contour aligns with the GAB geological boundary. The study found no predicted impact on the GAB aquifers. This is due primarily to the protection offered by the thick Dunda/Rewan aquitard that separates the basal GAB aquifer from the Permian coal measures.

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34 GHD. 2012. *Galilee Coal Project Supplementary EIS Subterranean Fauna Survey*. Prepared for Waratah Coal.

35 The Recovery plan for the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (Fensham *et al.*, 2010) excludes recharge springs:

> "The website provides further definition for the listing and specifically excludes some springs in the recharge areas: 'Natural discharge springs mainly occur within twelve "spring groups" across the Basin (Habermehl & Lau, 1997). A number of these -the Cape York, Flinders River, Barcaldine, Springsure and Mitchell/Staaten River groups (see Fig. 1) -include some springs that arise from recharge rejection within the recharge areas of the Basin. These springs are not included in this determination.'
>
> The detailed groundwater model for the Galilee Project extends to Easting 360000 about 50km to the west of Jericho and 70km to the west of the GAB boundary. This includes the recharge springs nearest to the proposed mine" (page 6).
>
> "Springs which are not included in this community and not covered by this recovery plan are generally associated with outcropping sandstone, which can form rugged landscapes with springs often situated in gullies and providing the source for streams. Recharge springs are not included" (page 7).

Fensham, R.J., Ponder, W.F. and Fairfax, R.J. 2010. *Recovery plan for the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin*. Report to the Department of Environment, Water, Heritage and the Arts, Canberra. Queensland Department of Environment and Resource Management, Brisbane.).

Drawdown in the deepest mined coal seam will extend beyond Jericho to the west and will pass beneath the Clematis Sandstone outcrop, but it is unlikely that there will be any impact on the overlying aquifer and highly unlikely that there will be any impact on the recharge springs. There certainly will be no effect on discharge springs hundreds of kilometres away.

See also the *Groundwater Assessment* report contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**664**	Issue Reference:	**17190**
Submitter Type	Council	TOR Category	Social / Transport / **Water Resources**
Name	**Whitsunday Regional Council**	Relevant EIS Section	

DETAILS OF THE ISSUE

Rail Line Route

The proposed rail line route will connect the mine (near the town of Alpha within the Barcaldine Regional Council area) to the coal stockyards and terminal within the APSDA. Over the proceeding 15-20 years the capacity of the rail is to increase to 400Mt per annum. The proposed 'gradual' increase of rail capacity over the proceeding 15-20 years will require significant further construction. No project timeframe or housing plans for these works are provided as part of this EIS, this inturn, severely distorts the impact the project will have on housing and employment in the region.

Field assessments in 2010 determined a 1.6km wide corridor of investigation for the proposed rail route. The alignment proposed within this EIS has varied slightly to this 1.6km wide corridor. The EIS states that the proposed alignment is yet to be finalised. The proposed rail route will be better defined following airborne laser scanning, outlining that the current proposed alignment is 'indicative, not definitive'. Fluctuation of 50m or 100m of the rail corridor might not appear to have a large overall affect on the outcome on a regional scale, yet at a site based investigation this fluctuation can have significant impacts on the utilisation and value of a single property. To provide certainty to property owners and to calculate the true environmental and social impacts the department should ensure the proponent include detailed design and timelines that reflect the entire life of the project (15-20 years).

This would include projected number of workers required and plans for their accommodation over the projected 15-20 year period. By not providing this information the proponent is misleading the department in its intentions. The Department can not reasonably consider the impact of the rail line without plans of the final route.

PROPONENT RESPONSE

The rail construction workers will be based in work camps, including at Merinda. The operational workforce, for both the port and rail, will be based permanently in or near Bowen.

Waratah Coal will liaise with the Whitsunday Regional Council in regard to construction numbers and rosters, work camp locations and design (and other relevant features) prior to the finalisation of the work camps.

Waratah Coal has commissioned a concept design of the 453km of rail corridor (from the boundary of the APSDA to the beginning of the rail loop at the mine site) – see *Railway Concept Design Report* in *Appendices – Volume 2* of this SEIS. This engineering provides the vertical alignment of the rail, which in turn provides the width required for the rail easement. At present, 421km of the rail vertical alignment has been engineered (with the balance 32km awaiting the completion of the Digital Terrain Model (DTM)), which will be completed as soon as possible.

The final railway easement will be an average width of 49.5m[36]. In relatively flat terrain the rail will be 40m wide and in areas where cross-slope cuttings are required the width of the easement will be wider – up to a maximum width of

36 Average width was calculated by dividing the total area of the rail footprint (2215ha) by the length of the rail (453km).

184m (however there are only two areas exceeding 150m). The easement includes both the rail and a service road. In the 32km of the corridor which have not yet been engineered, a footprint area of 40m was assumed based upon the relatively flat topography.

Submitter No.	**493, 517, 671, 685, 694, 696, 711, 712, 726, 783, 1255, 534, 690, 794, 355, 699, 763, 764, 566, 598**	Issue Reference:	**17208, 17209, 17210, 17211, 17212, 17213, 17214, 17215, 17216, 17217, 17218 / 17220, 17221, 17224, 17232, 17233, 17234, 17235, 17238, 17247, 17248, 17249**
Submitter Type	Individual / Council	TOR Category	**Water Resources**
Name	**Name withheld / Barcaldine Regional Council**	Relevant EIS Section	

DETAILS OF THE ISSUE

Lowering of water table due to mine dewatering.

PROPONENT RESPONSE

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. .

See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS for more information.

Submitter No.	**417**	Issue Reference:	**17219**
Submitter Type	Council	TOR Category	**Water Resources**
Name	**Isaac Regional Council**	Relevant EIS Section	

DETAILS OF THE ISSUE

The EIS report should accurately address and identify sources of ensuring that sufficient water is available of ordinary operations of the proposed mine under drought conditions.

PROPONENT RESPONSE

The site water management system has been further investigated and designed such that there is minimal requirement for imported water. Water captured onsite will be used in underground workings, dust suppression and coal washing. Despite this there is still an annual clean water requirement during mine operation estimated at 2500ML/yr, comprising:

- 2,000 ML/year for the CHPP vacuum pumps
- 350 ML/year for wash downs within the Mine Industrial Area
- 150 ML/year for potable and fire fighting purposes.

Potable water demands for the mine construction phase are estimated to peak at 290ML/yr. This water demand will be met through contracted potable water suppliers carting from an offsite source.

In the initial EIS submission for the Galilee Coal Project a raw water storage was proposed to be constructed on Tallarenha Creek within the MLA. This dam is no longer included in the project. Waratah Coal had also applied for an annual allocation of 2,500 ML/year from the Connors River Dam Project which was being developed by SunWater.

The Connors River Dam Project is no longer proceeding and SunWater is currently investigating the feasibility of a pipeline to supply water from the Burdekin River to the Galilee Basin. This pipeline is unlikely to be constructed in time for the commencement of mining at the Galilee Coal Project.

A raw water supply of 2,500ML/year is required for the mine. The following raw water supply options have been identified for the mine:

1. Existing Water Supply Schemes (Regional Pipelines):
    a. Burdekin Haughton Water Supply Scheme (BHWSS)
    b. Trading with existing water allocation holders
    c. Nogoa Mackenzie Water Supply Scheme (NMWSS)
2. Unallocated Surface Water:
    a. Burdekin WRP area
3. Groundwater and Local Supply, and
4. The Great Artesian Basin (GAB)

Of these options, it is proposed to utilise an initial temporary supply of raw water from a borefield in the vicinity of the mine. Discussions with DEHP have indicated that this is a feasible option. The ultimate permanent raw water solution is proposed via a pipeline from the Burdekin River to supply coal mines in the Galilee Basin.

Additional investigations will be required to confirm the feasibility of these proposed raw water sources. A potential contingency measure for the mine raw water supply is the operation of a water treatment plant at the mine to produce low salinity water from excess mine affected water. The initial water balance investigations for the mine indicate that there will be sufficient excess mine affected water to provide a raw water supply of 2,500 ML/year via a water treatment plant.

Refer to the *Mine Site Water Management System* report in *Appendices – Volume 2* of this SEIS, for more information.

Submitter No.	**737**	Issue Reference:	**17222**
Submitter Type	Individual	TOR Category	**Water Resources**
Name	**Name withheld**	Relevant EIS Section	

DETAILS OF THE ISSUE

Insufficient study of hydrology

PROPONENT RESPONSE

The *Mine Site Creek Diversion and Flooding* report (contained in *Appendices – Volume 2* of this SEIS) identifies pre- and post-mining flooding conditions for the waterways flowing through the open cut mining area. The *Surface Water Impact Assessment of Longwall Mining Subsidence* report (contained in *Appendices – Volume 2* of this SEIS) identifies pre- and post-mining flooding conditions for the waterways flowing through the underground mining area. The *Rail Corridor Cross Drainage* report (contained in *Appendices – Volume 2* of this SEIS) identifies pre- and post-railway flooding conditions for the major waterways crossing the proposed railway corridor.

Submitter No.	509	Issue Reference:	17225
Submitter Type	NGO	TOR Category	Water Resources
Name	Lock the Gate Alliance Inc.	Relevant EIS Section	App 15

DETAILS OF THE ISSUE

- App 15 (surface water) does not discuss the potential impact of the mine on existing users of surface water
- Submitter believes that 'make good' provisions do not work as one can not make good permanent damage.

PROPONENT RESPONSE

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

The "make good" commitments are articulated in the *Groundwater Assessment* report contained in *Appendices – Volume 2* of this SEIS and in the final EM Plan.

Submitter No.	283 / 1840	Issue Reference:	17227 / 17241
Submitter Type	NGO / Council	TOR Category	Water Resources (Surface Water)
Name	Capricorn Conservation Council/ Barcaldine Regional Council	Relevant EIS Section	Volume 2 Section 9.3.5

DETAILS OF THE ISSUE

Paucity of rain gauges in the Belyando catchment may lead to under calculation of flood mitigation issues.

More modelling is needed and some modelling should be based on significant events such as the 2008 rainfall events.

PROPONENT RESPONSE

Mine

Additional work commissioned by Waratah Coal has been undertaken on flooding at the mine site. Modifications to the existing flood behaviour, including increases to inundation depths, durations and flow velocities through the mine lease are expected to be limited (see series of Figures in Appendix D and E of the *Mine Site Creek Diversion and Flooding Report* in *Appendices – Volume 2* of this SEIS). These impacts will be localised to the proposed creek diversions only, which are limited to within the mining lease area, and within this, further limited to the proposed clearing footprint.

Rail

Post rail flood modelling has been undertaken for twelve of the major waterway crossings of the proposed railway (refer to the *Rail Corridor Cross Drainage* report contained in *Appendices – Volume 2* of this SEIS). At major crossings bridges have been utilised to limit impacts to property owners and the environment. This modelling demonstrates minimal impact in terms of increase to inundation depth and flood extent. Design criteria have been set for the maintenance of flow connectivity, outlet velocity and minimum afflux with the structures designed to meet this criteria.

Significant Events

For both the mine and rail, the hydrologic analysis undertaken has been revised to account for the recent large rainfall events experienced in 2011.

Submitter No.	**697**	Issue Reference:	17228
Submitter Type	Individual	TOR Category	**Water Resources (Groundwater)**
Name	**Name withheld**	Relevant EIS Section	

DETAILS OF THE ISSUE

- No proper pump testing of the monitoring bores or private bores has been done
- Only conceptual modelling undertaken to date, needs to be numerical modelling, and
- Make good water agreements need be made.

PROPONENT RESPONSE

It is not true that only conceptual modelling was undertaken in EIS. The numerical modelling that was done has been recast and extended as part of this SEIS. To supplement the pumping tests conducted in the EIS, the SEIS activities have included packer testing and core laboratory measurement of permeability. The "make good" commitments are articulated in the *Groundwater Assessment* report and the *Draft Mine EM Plan* both contained in *Appendices – Volume 2* of this SEIS.

Submitter No.	**782**	Issue Reference:	17229
Submitter Type	Individual	TOR Category	**Water Resources (Groundwater)**
Name	**Name withheld**	Relevant EIS Section	

DETAILS OF THE ISSUE

- Effect of under ground mining on ground water regime and quality
- Human / animal injury from non-capping of test holes, and
- Cross contamination of aquifer from non-capping of test holes.

PROPONENT RESPONSE

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS, for more information on aquifer connectivity and cross-contamination assessments.

Submitter No.	779	Issue Reference:	17230
Submitter Type	Individuals	TOR Category	Water Resources (Groundwater)
Name	Names withheld	Relevant EIS Section	

DETAILS OF THE ISSUE

- Confusion within the EIS as to the boundary of the GAB
- The submitter states that a number of springs occur around 60 km north of the proposed development and question whether these arise from an independent aquifer or the GAB
- Questions relating to statigraphic mapping, cracking from subsidence and the potential impacts on the GAB
- Paucity of base-line information
- Impact of drawdown on groundwater supplies has not been properly assessed
- Question about the details of the make good water arrangements, and
- Questions about differences in predictions to groundwater recovery time between Hancock and Waratah Coal EIS's.

PROPONENT RESPONSE

Boundary of the GAB

Refer to issue reference 17038 in Part C – 02 – Land for information regarding the boundary of the GAB

Springs

Refer to Issue Reference 21036 (in this chapter) for an assessment of the impact of the development upon the ecological community listed as 'The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (GAB)'.

Base-line information

Waratah Coal expanded the field investigation program and the monitoring network and commissioned a new and more extensive groundwater model. See the *Groundwater Assessment* report in *Appendices – Volume 2* of this SEIS for more information.

Drawdown and make good water agreements

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

Predictions to groundwater recovery time

The model includes a recovery simulation for at least 200 years to enable assessment of the timeframe for equilibration of groundwater levels, and whether they return to pre-mining levels.

Submitter No.	875	Issue Reference:	17231
Submitter Type	Individuals	TOR Category	Water Resources (Groundwater)
Name	Names withheld	Relevant EIS Section	EIS 3.1.13.2

DETAILS OF THE ISSUE

- Cumulative impact on groundwater of separate but adjoining mines within North and south Galilee;
- Drawdown forecast by Waratah and Hancock is large. Impacts on existing bore holes required by graziers;
- More work to establish baseline condition of groundwater required
- Pump testing to aquifers;

PROPONENT RESPONSE

A completely new groundwater assessment has been undertaken on behalf of Waratah Coal. This is based on data acquisition from an extended monitoring network with continuous data loggers, additional aquifer permeability tests, an updated geological model, and a new comprehensive numerical groundwater model.

The original EIS model did not include a quantitative assessment of cumulative mining impacts. The new model extent has incorporated the mines to the immediate north and south for a full cumulative impact assessment.

The analysis of groundwater impacts (both short and long term) has been conducted using the new groundwater model. This includes drawdown impacts on farm bores and changes in creek-aquifer water exchanges that might impact on creek flow or groundwater dependent ecosystems. The model development proceeded in two stages. Stage 1 (completed in December 2012) simulated steady-state conditions for worst-case prediction of long-term impacts at the end of mining. Stage 2 involved transient calibration and simulated the transient progression of mining in order to quantify possible short-term impacts.

See to the *Groundwater Assessment* report presented in the *Appendices – Volume 2* of this SEIS.

Submitter No.	354	Issue Reference:	17240
Submitter Type	NGO	TOR Category	Water Resources (Surface Water)
Name	AMCI	Relevant EIS Section	Economic Impact Statement Vol3 Ch17

DETAILS OF THE ISSUE

Access to a water allocation from the Connors River Dam.

PROPONENT RESPONSE

The site water management system has been further investigated and designed such that there is minimal requirement for imported water. Water captured onsite will be used in underground workings, dust suppression and coal washing. Despite this there is still an annual clean water requirement during mine operation estimated at 2500ML/yr, comprising:

- 2,000ML/year for the CHPP vacuum pumps
- 350ML/year for wash downs within the Mine Industrial Area
- 150ML/year for potable and fire fighting purposes.

Potable water demands for the mine construction phase are estimated to peak at 290 ML/yr. This water demand will be met through contracted potable water suppliers carting from an offsite source.

In the initial EIS submission for the Galilee Coal Project a raw water storage was proposed to be constructed on Tallarenha Creek within the MLA. This dam is no longer included in the project. Waratah Coal had also applied for an annual allocation of 2,500ML/year from the Connors River Dam Project which was being developed by SunWater.

The Connors River Dam Project is no longer proceeding and SunWater is currently investigating the feasibility of a pipeline to supply water from the Burdekin River to the Galilee Basin. This pipeline is unlikely to be constructed in time for the commencement of mining at the Galilee Coal Project.

A raw water supply of 2,500ML/year is required for the mine. The following raw water supply options have been identified for the mine:

1. Existing Water Supply Schemes (Regional Pipelines):
    a. Burdekin Haughton Water Supply Scheme (BHWSS)
    b. Trading with existing water allocation holders
    c. Nogoa Mackenzie Water Supply Scheme (NMWSS)
2. Unallocated Surface Water:
    a. Burdekin WRP area
3. Groundwater and Local Supply, and
4. The Great Artesian Basin (GAB)

Of these options, it is proposed to utilise an initial temporary supply of raw water from a borefield in the vicinity of the mine. Discussions with DEHP have indicated that this is a feasible option. The ultimate permanent raw water solution is proposed via a pipeline from the Burdekin River to supply coal mines in the Galilee Basin.

Additional investigations will be required to confirm the feasibility of these proposed raw water sources. A potential contingency measure for the mine raw water supply is the operation of a water treatment plant at the mine to produce low salinity water from excess mine affected water. The initial water balance investigations for the mine indicate that there will be sufficient excess mine affected water to provide a raw water supply of 2,500 ML/year via a water treatment plant.

Refer to the *Mine Site Water Management System* report contained in *Appendices – Volume 2* of this SEIS.

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