

Advice to decision maker on coal mining project

IESC 2016-081: New Acland Coal Mine Stage 3 (EPBC 2007/3423) – Expansion

Requesting agency	The Australian Government Department of the Environment and Energy
Date of request	2 November 2016
Date request accepted	2 November 2016
Advice stage	Assessment

Context

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (the IESC) was requested by the Australian Government Department of the Environment and Energy to provide advice on the New Acland Coal Mine Stage 3 project (the proposed project) in Queensland.

The IESC has provided advice to the former Commonwealth Department of the Environment and the Queensland Office of the Coordinator-General on the draft Environmental Impact Statement (EIS) for the proposed New Acland Coal Mine Stage 3 project, EPBC 2007/3423 (IESC 2014-045 dated 10 April 2014). On 10 December 2015, the IESC provided additional advice to the former Commonwealth Department of the Environment on residual matters from the proponent's Additional Information to the Environmental Impact Statement (AEIS) for the proposed New Acland Coal Mine Stage 3 project, EPBC 2007/3423 (IESC 2015-073). Both pieces of advice are available on the IESC 'Advice to regulators on development proposals' website at <http://iesc.environment.gov.au/committee-advice/proposals>.

This advice draws upon aspects of information on the New Acland Coal Mine Stage 3 project within the assessment documentation and documents provided to the IESC between 10 December 2015 and 8 December 2016, together with the expert deliberations of the IESC. The project documentation and information accessed by the IESC, including additional information provided by the proponent, are listed in the source documentation at the end of this advice.

The proposed project is to expand the New Acland Coal Mine located approximately 35 km northwest of Toowoomba, extending the mining period by up to 12 years. The proposed project is located in the Lagoon Creek Catchment and the Clarence-Moreton Basin of Queensland. Lagoon Creek is an ephemeral creek that flows into Oakey Creek, which is part of the larger Condamine River Catchment of the Murray-Darling Basin. The proposed project would involve creation of three open cut pits to increase production of coal from the Walloon Coal Measures from 4.8 Mtpa to 7.5 Mtpa of thermal

product coal. Ancillary infrastructure development is proposed to include upgrading the existing coal handling and preparation plant (CHPP) and associated stockpile areas as well as construction of an 8-km rail-spur and balloon loop, and a train load-out facility.

Key potential impacts

The key potential impacts of the proposed project have been identified in various sections of the proponent's assessment documentation and in the IESC's previous advice. These include potential impacts caused by final void water quality and impacts to surface waters of Lagoon and Spring Creek, remnant patches of potentially groundwater dependent (GDE) vegetation and surrounding groundwater users.

Advice

The IESC's advice, in response to the requesting agency's specific questions is provided below.

Question 1: Does the additional information reasonably address the technical/scientific matters raised in the Department's request for additional information dated 20 October 2016, and the key issues identified in the IESC advice (December 2015), or does it provide a robust process to address the uncertainties relating to those matters?

Response

1. The IESC's response to whether the proponent has addressed the technical and scientific matters raised by the Commonwealth regulator is itemised at Attachment A.
2. Most matters raised in the IESC's advice of 10 December 2015 have been addressed, or a process to address them is provided within the additional information provided by the proponent. Matters that remain outstanding could be addressed through collection of additional data before and during operations. These include:
 - a. A strategy to model, assess, mitigate and manage potential groundwater quality risks from final voids that may become a groundwater source, or overtop to the surrounding environment.
 - b. Appropriate surface water quality monitoring, including continuous monitoring of flow and physio-chemical parameters, to provide a representative dataset of the existing conditions in surface water systems, particularly Lagoon Creek and Spring Creek against which to detect potential impacts during and after mining.
 - c. Derivation of site-specific surface water quality triggers and thresholds based on data gathered during at least the first 2-years of the project, where possible this should be established through event-based monitoring.

Explanation

3. The matters below from the 10 December 2015 IESC advice have been addressed by the proponent, or will be addressed through management processes and data acquisition identified within the additional information provided by the proponent.

Groundwater – role of faulting

- a. Evidence, characterisation and validation of the role of faulting within the project boundary have been provided. Geological mapping and drilling data provided by the proponent details the location, throw direction and strata offsets of four out of five faults within the proposed project area. The proponent's preliminary monitoring results show evidence that one fault

acts as, at a minimum, a partial barrier to groundwater flow (SLR, 2016a). The future work program, including a large-scale pump test and installation of additional monitoring bores will provide further detailed information on the groundwater behaviour of faults within the area of groundwater impact. The results and methods of this study should be incorporated into the ongoing groundwater model updates, as required by the Queensland Coordinator-General's Imposed Condition 12 (DSDIP, 2014), and applied to other faults in the project area.

- b. Sensitivity analysis on the role of faulting has been undertaken within the groundwater model by removing the horizontal flow barriers that represented faults, and the resulting effect on groundwater drawdown shown (New Hope Group, 2016). The result showed that representing faults with horizontal flow barriers reduces drawdown propagation through the barrier. For example, in the 'no faults' model runs groundwater drawdown in the Walloon Coal Measures and Marburg Sandstone extends further in a southerly direction beyond that predicted in the 'with faults' model. In the alluvium and basalt, a greater amount of lateral drawdown (within the one-metre drawdown contour) is observed. The 'no-fault' model runs are presented for the 50th and 84th percentiles of drawdown predictions (where the 84th percentile represents a lower probability of occurrence of the predicted drawdown extent) (SLR, 2016a). By modelling groundwater drawdown without horizontal flow barriers to represent the fault, assuming all other model parameters and structures remain the same, and given evidence that the fault acts as a (at least partial) barrier to groundwater flow, the actual observed lateral drawdown propagation through the fault is likely to be less than that modelled.

Groundwater modelling

- c. Improvement of the groundwater model's calibration in alluvial bores is proposed to be undertaken through incorporation of surrounding groundwater user abstraction rates in updated groundwater model predictions. Further, the proponent proposes to consider adjusting the weighting values applied to groundwater user bores to improve groundwater model calibration in the alluvium (SLR, 2016d). This will enable the model predictions to better match modelled and observed water levels in the alluvium. The groundwater model update is stipulated under the Queensland Coordinator-General's Imposed Condition 12 (DSDIP, 2014).
- d. Groundwater model boundaries have been satisfactorily justified. The proponent has also outlined an assessment to determine if updates to the groundwater model result in boundary influence on model drawdown predictions. If influences on model predictions from boundary conditions occur, boundaries will be extended further from the proposed project area (SLR, 2016d).
- e. Abstraction rates by surrounding groundwater users will be incorporated in the updated groundwater model (SLR, 2016d). A baseline assessment of groundwater user bore water levels and licensed abstraction has commenced (SLR, 2016c). The data gathered from the bore assessment will be incorporated into the construction of the groundwater model during the groundwater model update.

Groundwater dependent ecosystems (GDEs)

- f. Consistent with the IESC's 10 December 2015 advice, a systematic approach to identify GDEs was used by the proponent. All vegetation where groundwater was predicted to be less than ten metres below the surface was identified and overlaid on a map of the predicted drawdown. None of the vegetation identified was classified as an obligate GDE, though one remnant patch containing potential GDEs (*Eucalyptus populnea* woodland with *Acacia harpophylla* and/or *Casuarina cristata* on alluvial plains) was identified within the predicted

zone of drawdown (New Hope Group, 2016). The groundwater monitoring network includes a set of nested bores in the nearby vicinity of the potential GDEs capable of monitoring groundwater and aiding in determining the cause of impacts (if any) to this vegetation.

- g. The proponent provided evidence from literature (e.g. Ghadiri and Rose, 1992, p. 179) and field investigations to show Brigalow (*Acacia harpophylla*) is not groundwater dependent in the proposed project area. The information presented shows that, within the proposed project's area of influence, Brigalow roots are unlikely to extend below 0.9 metres depth and therefore the species is unlikely to rely on groundwater.
4. The matters identified below outline the key residual information gaps from the IESC's 10 December 2015 advice that require further consideration. Addressing the below matters could occur through collection of additional data before and during operations and submission of updated plans that include requirements for regular reporting, review, contingency actions and updating.

Final landform – groundwater quality

- a. The proponent has committed to update predictions of water level recovery within each of the three proposed final voids. However, a process to model and assess the potential local, long-term risks posed by gradual or rapid changes in water quality (e.g. salinity, pH, metals and toxicity) within final voids has not been provided. Given groundwater modelling predicts that two of the three proposed final voids pose varying levels of risk of becoming groundwater sources to the surrounding environment, the proponent should provide details of potential measures to characterise, model, manage and monitor the potential long term water quality risks posed by final voids. This work should be informed by ongoing gathering of data and information during mining and incorporated into regular updates of groundwater pit lake levels and water quality models.

Surface water

- b. Lagoon Creek and Spring Creek are noted to be in a highly altered state as a result of historical land use. Surface water flow in Lagoon Creek for the majority of the time is restricted to a series of disconnected pools in the form of artificially constructed farm dams (REMP, Section 3.1, p. 7). Historical and current sampling locations appear to occur mainly within these pools. Given the ephemeral and disconnected nature of Lagoon Creek, water quality has the potential to change temporally and spatially within pools, and along the length of Lagoon Creek in general. As such water quality monitoring should be increased to better reflect current conditions and provide a baseline against which potential impacts associated with the proposed project can be assessed.
- c. A range of environmental values (EVs) has been identified for Lagoon Creek, which include aquatic ecosystems, irrigation, stock watering, farm water supply/ use etc (REMP, Section 3.3, p. 19). Appropriate aquatic ecosystem protection water quality guidelines should be adopted that protect the range of environmental values identified for Lagoon Creek and to minimise impacts to downstream water quality.
- d. The proponent has committed to monthly monitoring of basic water quality parameters (EC, pH, total suspended solids and sulfate) within proposed sedimentation and environment dams. However monitoring and sampling of Lagoon Creek and Spring Creek is only proposed twice a year – pre-release and post-wet season. The timing of these events is unclear and the frequency is not sufficient to determine flow-related trends.
 - i. To determine current conditions within these systems, the IESC considers the frequency of sampling for an expanded range of analytes (e.g. metals, nutrients, ionic composition and

- polycyclic aromatic hydrocarbons) be increased for at least the first two years of the project, and where possible, event-based monitoring immediately after the first flushing flow to detect any pulsed concentrations of analytes that may have accumulated during the previous flow. This will establish a statistically robust data set from which site-specific water quality objectives (or guidelines) can be derived.
- ii. During the initial period where monitoring to determine site-specific water quality thresholds is still ongoing, ANZECC water quality guidelines for 95 per cent species protection in slightly to moderately disturbed systems could be used.
- e. The Receiving Environment Monitoring Program (REMP) (BMT WBM, 2016a) refers to “receiving water contaminant trigger levels” within the 14 July 2015 draft Environmental Authority (EA). However, the triggers are not provided in the draft EA or attached to the REMP. Therefore the IESC is unable to comment on these trigger values. Further, water quality guidelines noted in Table 3-3 and Table 3-7 of the REMP should be checked and verified. In particular:
- i. Inconsistencies were noted in Table 3-7 for: cadmium (ANZECC guideline reported as 0.3 µg/L, should be 0.2 µg/L); cobalt (EA trigger reported as 90 µg/L, Jeebropilly EA reported as 1.4 µg/L); lead (EA trigger reported as 4 µg/L, Jeebropilly EA reported as 3.4 µg/L); and mercury (should be 0.06 µg/L not 0.6 (high reliability) because ANZECC recommends using 99% protection as GV due to bioaccumulation potential).
 - ii. Table 3-7 is also missing a number of ANZECC guidelines. While some are low reliability guidelines, they should still be incorporated in the absence of site-specific water quality objectives. These include: cobalt – 1.4 µg/L (low reliability); molybdenum – 34 µg/L (low reliability); silver – 0.05 µg/L (high reliability); uranium – 0.5 µg/L (low reliability); and vanadium 6 µg/L (low reliability).
 - iii. Detection limits for silver, uranium and vanadium are currently above the guidelines and therefore are not suitable for determining exceedances.
 - iv. The units in Table 3-3 of the REMP are expressed in µg/L, they should be expressed in mg/L.
- f. The location and flow data associated with the two installed surface water flow gauges are not provided. While GPS coordinates are provided for the two gauges (BMT WBM, 2016a, p. 28), the gauges should be plotted on a map in relation to current and proposed discharge points and sampling points. Available flow data since installation should also be provided. The REMP states this as a requirement (BMT WBM, 2016a, p. 37). Flow gauges are important in identifying conditions when discharges can occur.

Question 2: Does the proponent’s revised groundwater modelling provide a reasonable prediction of the expected maximum range of groundwater drawdown for the proposed mine?

Response

- 5. The methods and data used by the proponent in their updated groundwater modelling, as described in Question 1, are appropriate for this stage of the proposed project and consistent with industry standards. The IESC considers that the combined drawdown envelopes of the AEIS modelling (‘with faults’ model) and the updated groundwater modelling (‘no faults’ model) encompass the likely range of groundwater drawdown that would be realised by the proposed project.

6. Notwithstanding this, the IESC notes that all models are simplified representations of reality and therefore there will always be some residual risk of drawdown extending beyond the bounds presented in modelling. These residual risks can be addressed during the regular groundwater model update process required by the regulator and through ongoing monitoring and refining hydrogeological characterisation, including:
 - a. Consideration of a broader range of recharge and specific storage values including field based estimates of recharge that are independent of the modelling.
 - b. Recognition of aquifer heterogeneity by incorporating spatial variations in hydraulic properties of the aquifer away from the mine rather than assuming homogeneous aquifers that contain faults.
 - c. Updating hydraulic parameterisation of faults in the groundwater model using pump test data.
 - d. Employing a sufficient number of Monte Carlo realisations to ensure convergence in the range of groundwater drawdown predictions.

Question 3: Are there any additional management measures that may be implemented to better address the above matters?

Response

7. Yes. In response to Question 1, the IESC identified some residual matters from the 10 December 2015 advice that have not been addressed by the proponent. A range of measures to mitigate, manage and monitor the residual concerns is provided below. If the proposed project is approved, these measures could be undertaken prior to commencement of, or in some instances during, mining.

Final landform and voids

8. A Final Land Use and Rehabilitation Plan is required under the Queensland Coordinator-General's Imposed Condition 8. This plan, or its equivalent, will be critical to managing potential long-term risks associated with the voids and final landform. In addition to the conditions within the Queensland Coordinator-General's report, measures to be incorporated in a Final Land Use and Rehabilitation Plan, or an equivalent plan, should include:
 - a. Revised predictions of final void water levels for each proposed pit achieved through the regular groundwater model updates and development of associated pit lake water balance models, utilising pit inflow data gathered during mining.
 - b. Incorporation of climate and rainfall variability into the risk assessment for potential final void water levels to identify the risk of overtopping. This should include use of groundwater modelling, water balance modelling (e.g. GoldSim) and void water quality modelling.
 - c. Long-term contaminant (e.g. metals and salinity) modelling within pit lakes of each final void, with initial concentrations informed by groundwater quality monitoring. Long-term void water quality models could be supported by water pathway (long-term fate and sediment interaction) modelling to identify areas at risk following mine closure.
 - d. A monitoring network suitable to identify any contaminant seepage from the final voids.
 - e. Utilising the above, determine final void geometries which minimise the risk of voids becoming contaminated or saline water sources or through-flow systems to the surrounding environment. Consideration should be given to backfilling or partial backfilling as well as

identifying engineering solutions to reduce the risks posed by the final landform and each of the three proposed final voids.

Surface water

9. Key measures to manage the residual concerns from the IESC's 10 December 2015 advice are listed in response to Question 1. Additional measures are provided below which would support the IESC's above advice as well as the outcomes of the proponent's REMP.
 - a. Given the proponent proposes to locate environment dams, with associated overflow release points within the catchment of Spring Creek, installation of additional flow gauges on Spring Creek should be considered. This may include consideration of the installation of automatic samplers to collect water quality samples during first flush and high flow events.
 - b. The proponent should clarify the difference between release points from the proposed and existing environmental dams and the licenced discharge points.
 - c. Water quality sampling points should be established downstream of proposed discharge points and at each of the current and proposed environment dam release points located in the catchments of Spring Creek (ED1) and the tributary of Lagoon Creek (ED2, ED4 and ED5).
 - d. Figures within the proponent's REMP should show the locations of all proposed sampling locations, including historic sites which will continue to be monitored for the length of the proposed project.
 - e. The proponent should review the adequacy of surface water sampling locations to ensure locations are representative of upstream, downstream, control and reference sites. For example, there are currently no monitoring locations identified on the northern tributary of Lagoon Creek.
 - f. In addition to the identified physico-chemical variables measured during each sampling event, field observations such as nature of flow (i.e. low, medium, high) and weather conditions should also be recorded.
 - g. Details should be provided on what action will be taken if guideline values are exceeded (e.g. follow-up sampling and implementation of subsequent mitigation measures).

Groundwater Monitoring and Impact Management Plan (GMIMP)

10. The progress report for the proponent's GMIMP (SLR, 2016b) provides the preliminary groundwater monitoring network for the proposed project. The IESC notes the GMIMP is an early draft. However, the proponent should include the following within the final document:
 - a. Install or adopt existing groundwater monitoring bores to use as indicators of early warning of drawdown propagation. Early-warning bores should be suitably located between the proposed project and an environmental/economic objective or asset. Early-warning bores could also be used to validate the groundwater model's drawdown predictions.
 - b. An outline of the proposed methodology to assess groundwater connectivity between each hydrogeological unit using nested bore arrays (to support identification of impact to overlying and underlying hydrogeological units).
 - c. A methodology to undertake groundwater quality monitoring to determine existing groundwater conditions within the proposed project area with a particular focus on the region in the immediate vicinity of where the proposed open cut pits are to be located. These data

should be gathered prior to and during the early stages of mining and could build on any existing groundwater quality monitoring that occurs at the existing New Acland operation.

- d. Details of the proposed ongoing groundwater monitoring, including identification of physical groundwater conditions, analytes, contaminants and physico-chemical properties to be monitored.
- e. An outline of the ongoing fault hydrogeological studies to be undertaken as mining progresses.

Date of advice	14 December 2016
Source documentation available to the IESC in the formulation of this advice	<p>Australian Groundwater and Environmental Consultants (AGE), 2014. <i>Groundwater Model Peer Review New Acland Mine – Stage 3</i>. Report for New Acland Coal Pty Ltd. June 2014. (Appendix C of Appendix N, AEIS)</p> <p>BMT WBM, 2016a. <i>Receiving Environment Monitoring Program for New Acland Mine. Report prepared for New Hope Group</i>: R.B21788.002.00.New_Acland_REMP_Design_Document.docx. February 2016.</p> <p>BMT WBW, 2016b. <i>New Acland Mine – Receiving Environment Monitoring Program - Pre-Release Survey 2015</i>. Report for New Hope Group: R.B21788.001.00.prereleaseREMP 2015.docx. February 2016.</p> <p>Department of Environment and Heritage Protection, 2015. <i>Draft Environmental Authority – New Acland Coal Mine</i>. State of Queensland. 14 July 2015.</p> <p>Department of State Development, Infrastructure and Planning [DSDIP], 2014. <i>New Acland Coal Mine Stage 3 project. Coordinator-General’s evaluation report on the environmental impact statement</i>. State of Queensland. December 2014.</p> <p>New Hope Group, 2016. <i>Response to IESC 2015-073: New Acland Coal Mine Stage 3 (EPBC 2007/3423) – Expansion</i>. Submission to Department of the Environment. March 2016.</p> <p>New Acland Coal, 2014a. <i>New Acland Coal Stage 3 Project Environmental Assessment documents, EIS</i>. January 2014.</p> <p>New Acland Coal, 2014b. <i>New Acland Coal Stage 3 Project Environmental Assessment documents, Additional information to the EIS</i>. August 2014.</p> <p>SLR, 2016a. <i>NAC03 Fault Hydrogeological Investigation Program, October 2016 Status Report</i>. Report for New Hope Group: 620.11303-L02-v1.0.docx. 24 October 2016.</p> <p>SLR, 2016b. <i>NAC03 GMIMP [Groundwater Monitoring and Impact Management Plan], October 2016 Status Report</i>. Report for New Hope Group: 620.11303-L03-v1.0.docx. 24 October 2016.</p> <p>SLR, 2016c. <i>NAC03 Landholder Make Good, October 2016 Status Report</i>. Report for New Hope Group: 620.11303-L01-v2.0.docx. 24 October 2016.</p> <p>SLR, 2016d. <i>New Acland Stage 3 Project Groundwater Model Update, Phase 1 Completion Report (Numerical Model Scoping Report)</i>. Report for New Hope Group: 620.11499-L01-v2.0docx. 24 October 2016.</p>

**References
cited within the
IESC's advice**

- ANZECC/ARMCANZ 2000. *Australian Guidelines for Water Quality Monitoring and Reporting. National Water Quality Management Strategy (NWQMS)*. Canberra: Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.
- Ghadiri H and Rose CW [eds.], 1992. *Modelling Chemical Transport in Soils: Natural and Applied Contaminants*. CRC Press, Boca Raton, Florida, USA.
- IESC, 2015. *Information Guidelines for the Independent Expert Scientific Committee advice on coal seam gas and large coal mining development proposals* [Online]. Available: <http://www.iesc.environment.gov.au/system/files/resources/012fa918-ee79-4131-9c8d-02c9b2de65cf/files/iesc-information-guidelines-oct-2015.pdf>.
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Attachment A: Summary of proponent's response to, and how it addresses, technical matters in regulator's request from October 2016

Regulator information matter requested (20 October 2016)	Technical matters addressed/provided in proponent's response to regulator	Any information gaps or further needs? Forward process suitable?
a) Local geology, including faults which impact on how groundwater impacts move away from the mine	Addressed. Geological maps show location of known and corresponding modelled faults. Preliminary field work on faulting and their effects on groundwater have been provided (e.g. water levels on both sides of faults). Groundwater modelling drawdown predictions provided for 'with faults' and 'without faults' groundwater models.	Information provided addresses the request made by ESD. Verification of fault with strike to the southeast needed if it is to be included in the model. Analysis of groundwater behaviour associated with this fault to determine if a barrier/conduit. However, running model without faults addresses this uncertainty.
b) Groundwater monitoring, including faults which impact on how groundwater impacts move away from the mine	Addressed. Preliminary groundwater monitoring at one fault provided. Pump test proposed to be undertaken and results made available before end 2016. Gravity survey to be completed before end 2016. Groundwater monitoring network (for one fault in the southeast of proposed project area) and future proposed drilling locations provided.	The forward process is suitable. Groundwater behaviour and drilling information provided are for a single fault. Could be applied to other faults with significant throw displacements (i.e. those that fully/mostly truncate stratigraphy). Particularly those faults that are predicted to have the greatest effect on groundwater flows. Results from fault hydrogeological study should be incorporated in groundwater model updates required by Queensland Coordinator-General's Condition 12.
c) Groundwater modelling, including the timeframes for an update and more conservative estimates of impacts	Addressed. However, details of the proposed process for modelling of water quality within final voids was not provided. The EIS model was re-run with the horizontal flow barriers that represent the faults removed. The resulting drawdown was presented for the alluvium, basalt, Upper Walloon Coal Measures and the underlying Marburg Sandstone. These were overlaid with the EIS model runs to show the comparison. The full forward scope for the groundwater model update is outlined in section 5.2 of the Groundwater Model Update Phase 1 Completion Report. Model update due for completion mid 2017.	The forward process for groundwater modelling contains actions to improve model predictions. Additional measures listed in response to IESC Advice Question 2 should be incorporated into model update to improve future predictions. Limited detail on void related impact predictions. Forward scope of groundwater modelling provides limited detail on process to characterise water quality within voids, to assess trends in water quality over time and does not identify options for mitigation or management. Additional information on voids and final landform management in body of Advice.

Attachment A: Summary of proponent's response to, and how it addresses, technical matters in regulator's request from October 2016

Regulator information matter requested (20 October 2016)	Technical matters addressed/provided in proponent's response to regulator	Any information gaps or further needs? Forward process suitable?
d) Landholder make good agreements and how these have/will be implemented	Addressed. Details of make good arrangements provided. Make good arrangements are required through the Queensland Coordinator-General's conditions. Timing of make good water arrangements, determining impact and dispute resolution are outlined in the October 2016 Landholder Make Good Status Report (SLR, 2016c).	Forward process suitable – follows requirements set out in the Queensland Coordinator-General's Report.
e) Surface water management, including a copy of the receiving environment monitoring plan required under state approvals	Partially addressed. REMP, dated February 2016, submitted Pre-released survey of sampling event undertaken in November 2015 including results of a water quality, sediment quality and aquatic ecology survey. Survey represents a snap-shot in time, frequency of sampling should be increased to gather data representative of existing conditions. This could occur before or during the early mine operation.	Further water quality sampling needed to establish current conditions within Lagoon Creek and Spring Creek. Frequent sampling also needed to inform water quality within sedimentation dams and environmental dams. Sampling locations also should be reviewed. Additional information on surface water monitoring and management in body of Advice.
f) Contextualisation of regional water resources	Addressed. The IESC understands this refers to water inflows into the proposed mine, and water use in the region, both differentiated by source aquifer. Information to address this matter was provided in the Landholder Make Good Status update (SLR, 2016c). The proponent identified 536 groundwater licenses with a total private groundwater allocation of 36 621 ML per year. The proponent holds a 1624 ML per year allocation, plus an additional 710 ML per year from the Helidon Sandstone which is currently unused.	The baseline assessment is complete for all bores predicted to be impacted within the first year of operations (priority 1), and 88 per cent of bores predicted to be impacted within the first 4 years of operation (priority 2). Further baseline assessments are scheduled for the remaining priority 1 and 2 landholder bores by the end of 2016. Priority 3 and 4 bores are proposed to be fully assessed before the end of 2017. Therefore, under the proposed forward work plan, all landholder bores are to be assessed for their baseline conditions by the end of 2017. This will provide contextualisation on the region surrounding the project area and landholder's groundwater use vs allocation. Regional groundwater use detailed in SLR 2016c based on bores/properties surveyed for the Landholder Baseline Assessment Program, the Queensland Department of Natural Resources and Mines allocations database and the anecdotal use (in per cent) of those allocations.