24 May 2018

Clay Preshaw
NSW Department of Planning and Environment
GPO BOX 39
SYDNEY NSW 2001

Dear Clay,

RE: CLEAN TEQ SUNRISE PROJECT MODIFICATION 4 – RESPONSES TO ADDITIONAL INFORMATION REQUESTS

Please find below a response to the Department of Planning and Environment's (DP&E's) request for additional information relating to the Clean TeQ Sunrise Project (the Project) Modification 4 Environmental Assessment (the EA) and Clean TeQ's Response to Submissions Report outlined in the letter dated 23 March 2018.

1. Heavy Vehicle Haulage

Issue

DP&E requested consideration of alternative processing methods that would reduce or eliminate the demand for limestone.

Response

Limestone is required to neutralise low pH product and waste streams in the processing facility. The pH of these product and waste streams are low due to the application of sulphuric acid under high pressure and temperature to leach nickel, cobalt and scandium in the acid leach circuit stage of the processing facility (refer to Section 3.6.1 of the EA). This process is known as pressure acid leach (PAL). The Modification does not propose a change to the approved PAL processing methodology.

The PAL processing methodology has successfully been adopted by all other nickel-cobalt projects with a similar ore type to the Project (i.e. 'high iron' nickel-cobalt laterite). Clean TeQ considers it to be the only proven commercially viable processing methodology available to leach nickel, cobalt and scandium from the ore at the Project.

Issue

DP&E requested additional justification for selective mining (if alternative processing methods are not viable).

Response

Although the mining method for the modified Project would be unchanged from the approved Project (i.e. conventional open cut mining method), mining would be undertaken in a more selective manner which would initially increase the processing facility feed ore grade (Section 3.4.2 of the EA).

Selective mining is proposed to improve control of the ore characteristics of the processing facility feed to minimise variation in the grade and therefore sulphuric acid demand. Controlling the variation in these two parameters is required to minimise processing facility operational costs and maximise nickel, cobalt and scandium recovery.

Selective mining would involve the following process:

- Identifying the grade characteristics of ore blocks (5 m x 5 m x 2 m) in the mining area.
- Developing a mining schedule that selectively mines the ore blocks such that variation in the characteristics of the ore fed to the processing facility are minimised.
- Directly feeding the ore to the processing facility (rather than reclaiming it from stockpiles) to maintain knowledge of the ore characteristics.

Mining in a more selective manner would allow for a higher ore feed grade, which would allow the Project to reach its approved maximum metal production rate (i.e. up to 40,000 tonnes per annum [tpa] of nickel and cobalt metal equivalents as sulphate precipitate products) earlier in the mine life. This would improve the Project economics as it brings forward metal production and associated revenue.

Issue

DP&E requested detailed information on the impact on the tailings storage facility if all limestone was sourced from the approved limestone quarry.

Response

The modified Project would require additional limestone to neutralise the additional sulphuric acid required in the processing facility (Section 3.6.1 of the EA). To meet this additional limestone demand, it is proposed that up to approximately 560,000 tpa of higher quality limestone from third party suppliers would be used to supplement the Project limestone quarry supply. The combined maximum amount of limestone transported from the Project limestone quarry and third-party suppliers would be 990,000 tpa (Section 3.6.2 of the EA).

If the additional limestone for the modified Project was solely sourced from the Project limestone quarry, the amount of limestone required for the processing facility would increase from 990,000 tpa (as proposed in the EA) to approximately 1,200,000 tpa. This increase would be required as the limestone from the Project limestone quarry would be lower quality (i.e. lower calcium carbonate concentration per mass and therefore lower neutralising capacity) compared to the third-party supplier limestone.

This additional limestone (i.e. 210,000 tpa) would require up to an additional 235,000 cubic metres (m^3) of tailings storage facility capacity per year. Over the Project life, an approximate 10% increase in the tailings storage facility capacity would therefore be required. Based on preliminary investigations, this additional capacity could be obtained via a combination of increased tailings storage facility footprint and height.

The requirement for a larger tailings storage facility would have the following implications:

- additional potential impacts associated with increased surface development area (e.g. land resources, biodiversity, Aboriginal cultural heritage);
- additional potential noise impacts during the tailings storage facility construction as it would be higher;
- additional potential visual impacts;
- higher construction costs associated with the larger tailings storage facility structure; and
- higher operational costs associated with increased tailings pumping costs.

In addition, the additional limestone (i.e. 210,000 tpa) would result in the additional consumption of approximately 200 million litres (ML) of water per year in the tailings storage facility (i.e. evaporation, entrained in deposited tailings).

It is also noted that if the additional limestone for the modified Project was solely sourced from the Project limestone quarry, the following changes to the approved Project limestone quarry would be required:

- surface development area expansion to allow for the recovery of additional limestone required over the Project life; and
- an approximate 50% increase in production rate (i.e. from 790,000 tpa to 1,200,000 tpa).

Issue

DP&E requested consideration of using rail to transport limestone from third party suppliers to the approved rail sliding.

Response

Clean TeQ considers that the partial removal of a relatively minor number of limestone heavy vehicle movements from the road network by adopting rail transport does not justify the significant increase in capital and operating costs and potential environmental impacts associated with the rail transport.

There are a number of existing limestone quarries in the vicinity of Parkes, including the Ezy Lime and WestLime limestone quarries (Figure 1). The transport of limestone via rail from these two third party limestone suppliers to the Project rail siding would require:

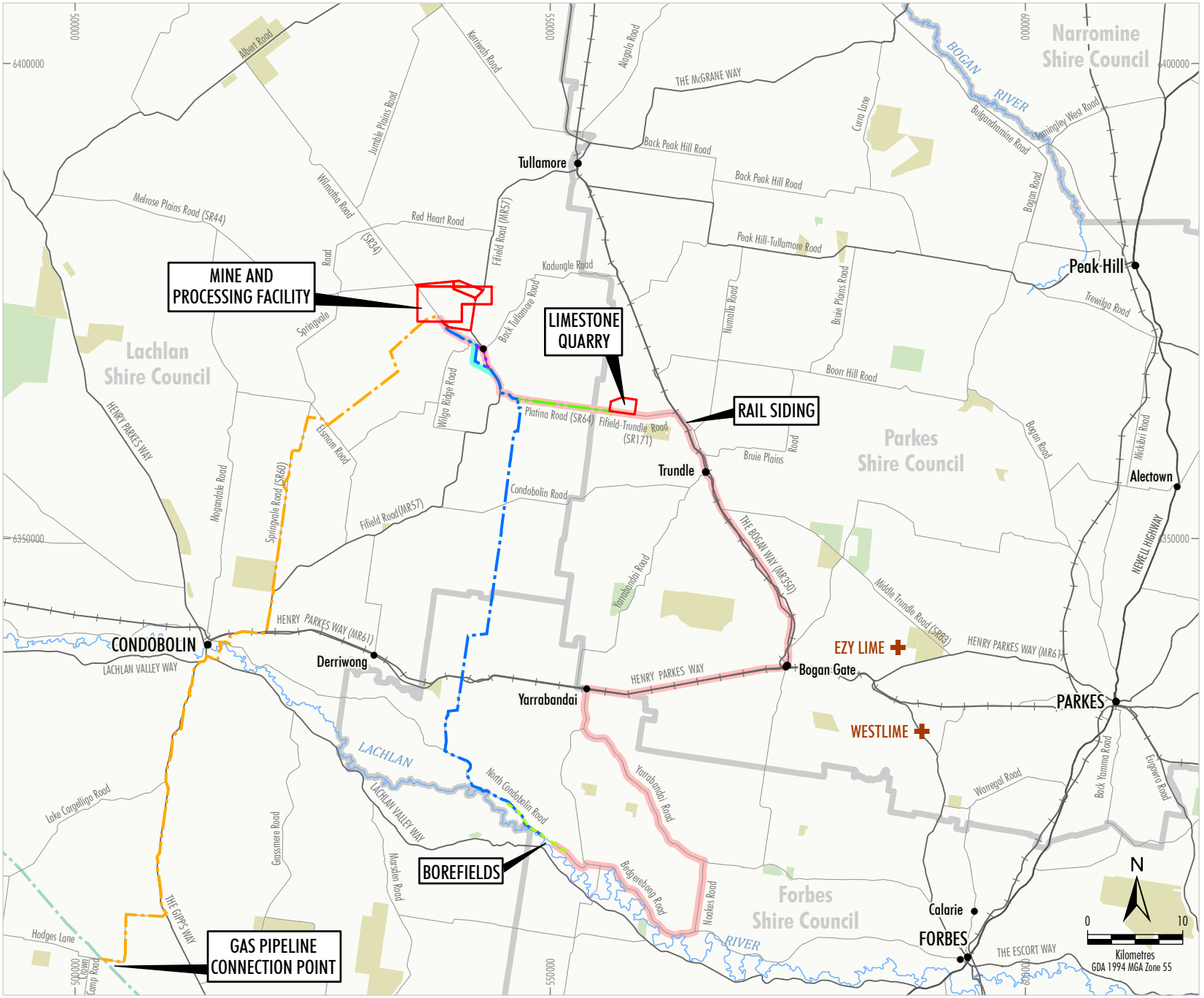
1. development of rail spur(s) from the Orange Broken Hill Railway to third party limestone quarry operations to allow for direct loading of trains at the limestone quarry operations; or
2. development of a train load-out facility (including siding) along the Orange Broken Hill Railway to allow limestone transported by road from the limestone quarry operations to be loaded to trains.

The modified Project would include the road transport of limestone from third party limestone suppliers to the Project via an approved Project heavy vehicle route (i.e. Henry Parkes Way; The Bogan Way; Fifield-Trundle Road; Platina Road; Fifield Road; and Wilmatha Road). Rail transport would only remove limestone heavy vehicle movements from Henry Parkes Way and The Bogan Way as the limestone would still need to be transported via road from the Project rail siding to the mine (i.e. along Fifield-Trundle Road, Platina Road, Fifield Road and Wilmatha Road). Rail transport would therefore only remove the proposed third-party limestone heavy vehicle movements from the Henry Parkes Way and The Bogan Way which are existing arterial roads designed and approved for heavy vehicle use.

GTA Consultants (2017) assessed the potential road transport impacts associated with the modified Project (including the road transport of limestone) and concluded that no significant impacts on the performance capacity, efficiency and safety of the road network are expected to arise as a result of the modified Project. It is also noted that Clean TeQ would contribute to the maintenance of this component of the road network in accordance with a Voluntary Planning Agreement for the Project.

Furthermore, a Pedestrian Access Review (GTA Consultants, 2018) considered the pedestrian environment along The Bogan Way through Trundle (Forbes Street) and found no major issues which would require immediate upgrading to the pedestrian and vehicular environment in Trundle as a result of Project, although potential improvements to some aspects of the existing environment were identified. A Road Noise Assessment (Renzo Tonin, 2018) was also undertaken and found that there would be no exceedances of relevant road noise criteria in Trundle as a result of modified Project.

The rail spur(s) required to link the third-party limestone quarries to the Orange Broken Hill Railway would be in the order of 3 to 6 km in length (depending on the route) and would have an estimated capital cost (including loading facility) of approximately $9 million to $12 million. The development of a train load-out facility is estimated to cost in the order of $6 million.



LEGEND

- NSW National Parks and Wildlife Service
- State Forest
- Local Government Boundary
- Railway
- Existing Gas Pipeline
- Mining Lease Application Boundary
- Approved Gas Pipeline
- Approved Water Pipeline
- Approved Limestone Quarry Water Pipeline
- Approved Borefield Infrastructure Corridor
- Approved Fifield Bypass
- Proposed Water Pipeline Alignment Option (MOD 4)
- Proposed Short-term Water Transport Route (MOD 4)
- Limestone Quarry

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land and Property Information (2017); Office of Environment and Heritage NSW (2017)

CLEAN TEQ SUNRISE PROJECT

Regional Location and Location of Potential Third Party Limestone Suppliers

Figure 1

CTL-16-02 Mod4_Limestone JL_201A

Rail transport would also result in a significant increase in operating costs due to the additional limestone handling required. Rail transport direct from the third-party limestone quarries would require the loading and unloading of trains and the subsequent loading and unloading of trucks (i.e. double handling). If the limestone was transported by rail from a train load-out facility, limestone would need to be loaded and unloaded from trucks twice and from trains once (i.e. triple handling). Limestone transported by road would only need to be loaded and unloaded once.

Notwithstanding the above, the transport of limestone via rail from third party limestone suppliers to the Project rail siding may not even be logistically feasible as the utilisation of the rail network and Project rail siding by approved Project trains (e.g. sulphur deliveries) would not allow for regular shuttles between third party limestone quarries and the Project rail siding.

The development of the rail spur(s) or train load-out facility would also result in additional potential environmental impacts including:

- Surface development impacts – Aboriginal cultural heritage, biodiversity, land resources and water resources.
- Amenity impacts – rail noise, air quality (loading and unloading) and visual.

Issue

DP&E requested consideration of a staged approach to the transportation of limestone from third party suppliers (e.g. a potential reduction in third party supply later during the operation of the mine).

Response

Clean TeQ has investigated the feasibility of transporting limestone from third party suppliers during the construction phase to minimise limestone transport requirements during the operational phase.

Assuming that limestone is transported from third party suppliers at the proposed maximum rate (i.e. 560,000 tpa) and stockpiled at the mine site over the two year construction period, a reduction of approximately 55,000 tpa in limestone demand over the 21 year mine life could be possible. This equates to a reduction of approximately 6 movements per day from the proposed maximum of 52 movements per day).

Although transporting limestone from third party suppliers during the construction phase could minimise limestone transport requirements during the operational phase (see above), it is noted that road upgrades are proposed to be undertaken during the construction phase so that the Project heavy vehicle routes are suitable for the proposed Project heavy vehicle requirements (e.g. AB-triples for limestone transport).

In addition, transporting limestone from third party suppliers during the construction phase would negatively impact Project economics as it brings forward limestone purchase costs.

Issue

DP&E requested additional justification for the proposed short-term road transport of water during the construction phase.

Response

The proposed short-term road transport of water from the Project borefield to the mine site would be undertaken for a short period (approximately six months) during the initial construction phase while the water pipeline is being constructed. The water trucks would operate six days per week during daylight hours only, with between 23 and 35 deliveries per day (GTA Consultants, 2017).

The short-term road transport of water would allow for construction to commence at the mine site before the water pipeline has been constructed. This would bring forward the commencement of construction (and subsequent operations) by approximately six months, which would improve the Project economics. The earlier construction and operations commencement would also bring forward employment opportunities associated with the Project.

GTA Consultants (2017) assessed the potential road transport impacts of the short-term water transport and concluded that the overall impacts of the short-term road transport of water would be small. The predicted traffic would be well within the capacity of the existing roads and it would not exacerbate any existing safety concerns along the route.

It is noted that Parkes Shire Council, in its submission on the Modification, stated:

> *Council supports the Short-term Water Transport Route which utilises State and Regional Roads within Parkes Shire.*

The Forbes Shire Council did not raise the short-term road transport of water from the Project borefield to the mine site in its submission on the Modification.

2. Potential Water Impacts

Issue

DP&E requested further details on the scope and extent of likely impacts resulting from the Modification.

Response

The potential surface and groundwater impacts of the Modification are assessed in the EA. A summary of the potential surface and groundwater impacts resulting from the Modification is provided in Table 1.

Table 1: Summary of the Potential Surface and Groundwater Impacts

Project Component	Surface Water	Groundwater
Mine Site	• Potential changes to approved surface water flows associated with the progressive development of the modified mine and associated capture and re-use of drainage from operational disturbance areas. As the Modification would not increase the extent of the approved surface development area and would only include minor changes to the water management system (e.g. diversions), no significant change to the approved flow impacts in the drainage lines in the vicinity of the mine site and negligible change to the approved flow impacts in Bullock Creek and the Bogan River would be expected. • Potential changes to approved surface water quality associated with the progressive development of the modified mine (e.g. surface water runoff from disturbed areas could potentially contain sediments, dissolved solids, oil, grease, metals and salts). The Modification is predicted to have no change to the approved potential surface water quality impacts with the implementation of the existing water management performance measures and controls.	• Potential changes to approved groundwater flow and quality impacts associated with seepage from the modified tailings storage facility. These are discussed further in Section 5. • No changes to groundwater flow impacts associated with the open cut pits as they are not proposed to change.
Water Supply	• Potential surface water flow impacts associated with the licensed extraction from the Lachlan River. As all extraction from the Lachlan River would be conducted in accordance with the licensed entitlements issued by the Department of Industry – Water, and in accordance with the rules in the *Water Sharing Plan for the Lachlan Regulated River Water Source, 2016*, impacts to the Lachlan River water source are not anticipated to be of any significance, as licensed water extractions are regulated by upstream releases from Wyangala Dam.	• No changes to groundwater impacts as no change to the Project borefield is proposed.

Issue

DP&E requested a breakdown of the amount of water proposed for extraction from the Project borefield over the life of the modified Project, with particular consideration to the late submissions.

Response

The Modification would not change the approved groundwater extraction from the Project borefield.

The Project borefield demand during the approximate two year construction phase would be in the order of 600 million litres per year (ML/year).

Once the operations phase commences, the Project water demand would increase to approximately 9 ML/day or 3,135 ML/year. The addition of surface water to the Project water supply, would potentially reduce the volumetric allocations required to be obtained from the Project borefield.

The extraction of groundwater from the Project borefield would be undertaken in accordance with relevant licences (i.e. groundwater licences currently held by Clean TeQ).

Responses to the submissions from members of the community in March 2018 are provided in Enclosure A.

Issue

DP&E requested further consideration is given to the potential impacts on groundwater quality associated with seepage from the tailings storage facility.

Response

Refer to Section 5.

3. Consideration of Potential Social Impacts

Issue

DP&E requested an assessment of the potential social impacts of the modification, particularly in relation to the communities of Trundle and Fifield.

Response

The Modification would not significantly change potential social impacts associated with the approved Project (including Trundle and Fifield).

Potential social impacts associated with the approved Project include:

- Employment opportunities – the Project will provide employment opportunities that would help maintain a stable economic base in the region.
- Opportunities for businesses – the Project is expected to give rise to incremental flow-on impacts on the regional economy associated with additional disposable income and direct benefits to businesses and their employees in the region associated with additional operating expenditures.
- Population changes – the Project will likely result in increased population associated with people moving to the region to work at the Project.

- Housing availability – any population increase in the region associated with the Project may increase demand for housing stock resulting in increased property values.
- Social Infrastructure – any population increase in the region associated with the Project may generate increased demand on social infrastructure (e.g. health care services, emergency services, childcare, education centres, etc.).
- Amenity – the Project would result in potential amenity impacts (e.g. noise, air quality, visual).
- Social Sustainability – the Project would support economic stability and community confidence in the region.
- Quality of Life/Wellbeing and Sense of Place – Project employment would contribute to individual and household well-being for employees and their families, and contribute to economic development in the region. Potential impacts on sense of place are likely to be limited to residents in the immediate vicinity of the mine site.

The Modification is primarily related to changes to the mine site to improve the overall efficiency of the Project that would not significantly change the social impacts associated with the approved Project summarised above. In particular, the Modification would not change the size of the approved construction or operational workforce which are the key driver of the potential social impacts summarised above.

No significant changes to the social impacts associated with the approved Project are expected in Fifield as a result of the Modification. The potential amenity impacts of the modified Project (e.g. noise, air quality, visual) were assessed in the EA and no exceedances of relevant criteria were predicted.

Potential changes to the social impacts in Trundle would be due to the increased heavy vehicle movements associated with the proposed third-party limestone. This change has the potential to result in amenity and quality of life/wellbeing and sense of place impacts.

A Road Noise Assessment (Renzo Tonin, 2018) was undertaken and found that there would be no exceedances of relevant road noise criteria in Trundle as a result of modified Project.

Clean TeQ also commissioned GTA Consultants (2018) to conduct a Pedestrian Access Review in consultation with community members to consider the potential implications of the modified Project traffic on pedestrian safety in Trundle. GTA Consultants (2018) concluded:

> *Overall, the review found that the existing pedestrian and vehicular environment in Forbes Street is generally satisfactory, with no major issues which would require immediate upgrading to meet current standards. Some aspects of the pedestrian and vehicular environment could however be improved to mitigate the issues identified and described in this report.*

Considering the forecast modified Project traffic in the context of the review of the existing pedestrian and vehicular environment in Forbes Street, it is considered unlikely that a significant deterioration in the safety of that environment would result with the modified Project. No major issues are therefore anticipated which would require immediate upgrading to meet current standards.

As for the existing conditions, some aspects of the pedestrian and vehicular environment could however be improved to mitigate the existing issues identified and described in this report. The recommended treatments are:

- *a modified kerb extension treatment near 61/63 Forbes Street;*
- *a modified kerb extension treatment between Croft Street and East Street;*
- *threshold treatments at the northern and southern entries to Trundle;*
- *speed reduction warning signs on the northern and southern approaches to Trundle; and*
- *audit of heavy vehicles and consultation with the Trundle community within 12 months of commencement of operations at the Project.*

Clean TeQ proposes to implement all of the recommendations of the Pedestrian Access Review (GTA Consultants, 2018) in consultation with the Parkes Shire Council.

In addition, Clean TeQ will prepare a Traffic Management Plan for the Project in consultation with Roads Maritime Services, Parkes Shire Council, Lachlan Shire Council and Forbes Shire Council in accordance with Condition 45, Schedule 3 of Development Consent DA 374-11-00 that will include measures to minimise disruption to local road users. The Traffic Management Plan would also include a Road Transport Protocol that would include measures to ensure adherence to designated transport routes and manage appropriate driver behaviour including adherence to speed limits, safe overtaking and maintaining appropriate distances between vehicles (i.e. a Driver Code of Conduct).

Clean TeQ considers that with the implementation of the management measures outlined above, the Modification would not significantly change potential social impacts associated with the approved Project in Trundle.

Issue

DP&E requested additional information on Clean TeQ's engagement process with the community.

Response

Clean TeQ has consulted with the community regarding the Modification during the preparation of the EA and will continue to consult with the community during the Modification assessment phase. The Community Relations team resides in the region and is active across the three local shires of Lachlan, Forbes and Parkes.

Community consultation initiatives to date have included:

- the Community Consultative Committee (CCC) includes representatives from Lachlan, Forbes and Parkes Shire Councils, local business chambers, community representatives and the Wiradjuri Condobolin Corporation. The CCC has met three times since its inception in September 2017 (inaugural meeting in October 2017, fourth meeting scheduled for 30 May 2018) and has been provided updates on the Project and the Modification (including presentation by Ramboll [air quality specialist] regarding the Air Quality Assessment prepared for the Modification);
- advertised community meetings held to discuss the Project, the Modification and specific issues (e.g. potential road transport impacts in Trundle, Project borefield);
- community liaison shopfronts established in Trundle and Condobolin to provide opportunities for the local community to learn more about the Project and the Modification;
- meetings with affected landholders (near neighbours, Fifield, Platina Road, Project borefield area, Trundle district and Project rail siding) to discuss the Project, potential impacts, management measures and monitoring;
- meetings with community groups and organisations, including but not limited to the Trundle & District Progress Association, Trundle Central School, Wiradjuri Condobolin Corporation, Lachlan Valley Water;
- regular advertised community drop-in sessions held in Trundle and Fifield, including Forbes (May 2018), to provide stakeholders with access to information;
- mayoral site tour of the Project – attended by the Mayors of Lachlan, Forbes and Parkes Shire Councils;
- frequent meetings with the Lachlan, Forbes and Parkes Shire Councils: Mayor, General Manager and relevant managers;
- information displays presented at community events (e.g. Trundle Show, Tullamore and Condobolin) and again scheduled for 2018;
- community newsletters, eNews and fact sheets distributed to the community and made available on the Clean TeQ website;
- Project updates (including links to relevant information) provided via the Facebook;
- advertisement of employment opportunities and an online registration form to support expressions of interest in employment and business opportunities;
- participation in local community events.

5. Waste Management

Issue

DP&E requested additional information on the proposed management of waste, including identifying facilities with sufficient capacity to accept the waste.

Response

The Modification would not significantly change waste generation or management at the Project. All waste generated at the Project would be disposed of at an appropriately licensed landfill in accordance with Condition 54, Schedule 3 of Development Consent DA 347-11-00.

Clean TeQ has identified a number of appropriately licensed landfills in the region that could receive waste from the Project (subject to Clean TeQ entering into a commercial agreement with the landfill operator).

Clean TeQ has consulted with the LSC regarding Project waste management and it is understood that the LSC currently has capacity and could accept Project waste at its existing landfill in Condobolin. Clean TeQ will continue to consult with the LSC regarding the potential use of this landfill for the Project.

Also, in accordance with Condition 54, Schedule 3 of Development Consent DA 347-11-00, Clean TeQ would:

- implement all reasonable and feasible measures to minimise the waste generated by the development;
- classify all waste in accordance with the EPA's (2014) *Waste Classification Guidelines*;
- store and handle all waste generated on site in accordance with its classification; and
- not receive or dispose of any waste on site.

6. Additional Agency Comments

Issue

DP&E requested Clean TeQ's response to additional agency comments, including the comments from the Department of Industry and Roads and Maritime Services.

Response

Enclosure B contains Clean TeQ's response to the Department of Industry's and Roads and Maritime Services' additional submission.

Yours sincerely,

CLEAN TEQ HOLDINGS LIMITED

JOHN HANRAHAN
ENVIRONMENTAL & APPROVALS LEAD – CLEAN TEQ SUNRISE PROJECT

Clean TeQ Holdings Limited ABN 34 127 457 916
12/21 Howleys Rd, Notting Hill VIC 3168 Australia I PO Box 227, Mulgrave VIC 3170 Australia
T: +61 3 9797 6700 F: +61 3 9706 8344 E: info@cleanteq.com

ENCLOSURE A
RESPONSES TO COMMUNITY SUBMISSIONS RECEIVED IN MARCH 2018

Table A1. Response to Community Submissions Received in March 2018

Issue ID No.	Issues Raised	Response
1	Concerns were raised regarding the assessment of potential groundwater impacts of the Project.	The Project is approved to extract approximately 6,390 million litres per year (subject to obtaining relevant Water Licences under the *Water Management Act, 2000*). As the Modification does not propose any change to the approved Project borefield extraction rate, no further assessment of potential groundwater impacts (e.g. revised groundwater modelling) has been undertaken for the Modification. Notwithstanding the above, **Clean TeQ will be developing a contemporary groundwater model** to inform the Project borefield operational strategy component of the Groundwater Management Plan. Condition 30(c), Schedule 3 of Development Consent DA 347-11-00 requires that prior to the commencement of construction, a Groundwater Management Plan must be prepared in consultation with DI-Water and the EPA, and to the satisfaction of the DP&E. Clean TeQ has commenced preparation of a Groundwater Management Plan for the construction phase of the Project consistent with the Development Consent. As part of the preparation of the Groundwater Management Plan, Clean TeQ is developing a groundwater monitoring program, and trigger levels and reporting requirements. The Development Consent specifically requires the Groundwater Management Plan to include these items (amongst other things): • groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts associated with the development in the vicinity of the Project borefield; • a program to monitor and report on the impacts of the development on the groundwater supply of any potentially affected landholders, particularly around the Project borefield; and • a plan to respond to any exceedances of the groundwater assessment criteria, and mitigate any adverse impacts of the development. To inform the Project borefield operational strategy component of the Groundwater Management Plan (e.g. trigger levels, management measures), Clean TeQ will be undertaking a Groundwater Works Program including: • Bore census to identify groundwater users in the vicinity of the Project borefield in consultation with local groundwater users. • Develop expanded groundwater monitoring program that can include local groundwater users. • Additional hydrogeological testing (e.g. pump tests). • Develop contemporary groundwater model.
2	Concerns were raised regarding the perceived lack of compensatory measures for potential impacts to privately owned bores.	Condition 28, Schedule 3 of Development Consent DA 347-11-00 requires Clean TeQ to provide a compensatory water supply to anyone whose basic landholder water rights (as defined in the *Water Management Act, 2000*) are adversely and directly impacted as a result of the development. This supply must be provided in consultation with Department of Industry – Water, and to the satisfaction of the Secretary. In addition, Clean TeQ will be developing a Groundwater Management Plan in accordance Condition 30(c), Schedule 3 of Development Consent DA 347-11-00. As outlined above, the Groundwater Management Plan will include: • groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts associated with the development in the vicinity of the Project borefield; • a program to monitor and report on the impacts of the development on the groundwater supply of any potentially affected landholders, particularly around the Project borefield; and • a plan to respond to any exceedances of the groundwater assessment criteria, and **mitigate any adverse impacts of the development**.

Issue ID No.	Issues Raised	Response
3	It was suggested that the Project water supply be sources from surface water rather than groundwater.	The Modification proposes the addition of licensed surface water extraction from the Lachlan River to improve water supply security. The addition of surface water to the Project water supply, would have a potential benefit to then reduce the volumetric allocations required to be obtained from the Project borefield.

ENCLOSURE B

RESPONSES TO ADDITIONAL AGENCY COMMENTS

Table C1. Responses to Additional Agency Comments

Issue ID No.	Agency	Issues Raised	Clean TeQ Response
1	Department of Industry	*Further assessment is requested to demonstrate whether there is a predicted change in the beneficial use category of the aquifer greater than 40m from the activity, and if so whether it will prevent the long term viability of the dependent ecosystem or existing water supply works.*	Coffey (2018) has undertaken modelling of the potential tailings storage facility seepage and considered the predicted seepage impacts against the requirement of the *NSW Aquifer Interference Policy* (NSW Government, 2012). Coffey (2018) concluded the following: *Given the effectiveness of the engineering controls (>97% control) and very low infiltration rate, only small or negligible vertical or lateral seepage outflows are predicted from the modified TSF. In addition, the approved open cut pits would act as a sink and continue to collect the majority of seepage from the TSF which contains a finite volume of water (i.e. seepage would not continue to migrate from the TSF in the long-term).* *Given the above, the modified TSF is not expected to lower the beneficial use category of the groundwater source beyond 40 m of the activity and therefore the relevant AIP minimal impact consideration would be met.* *In addition, the modified TSF would not prevent the long-term viability of a GDE, significant site or affected water supply works because (Section 5.4):* • *The potential for impacts on the closest privately-owned groundwater bore (i.e. GW028264), at a distance of greater than 5 km, would be negligible;* • *Other privately-owned bores to the north west of the TSF are located upgradient from the TSF and on the other side of the open cut pits and therefore are unlikely to be impacted;* • *There are no identified aquatic GDEs and only low potential vegetation (terrestrial) GDEs in the vicinity of the mine and therefore the potential effects on terrestrial vegetation GDEs would, if any, be negligible; and* • *There are no known groundwater dependent culturally significant sites in the vicinity of the mine.* The Coffey (2018) report is provided in Attachment A.
2	Department of Industry	*The Surface Water Management Plan should be prepared in consultation with DPI Fisheries and DoI Water and should include* • *detailed designs of the pump and proposed diversion screen on the intakes structure at the Lachlan River;* • *habitat assessment and appropriate management measures to demonstrate that threatened species habitat will note be impacts by the proposed development.*	Clean TeQ would prepare a Surface Water Management Plan in accordance with Condition 30(b), Schedule 3 of the Development Consent DA 374-11-00 and would include: • detailed designs of the pump station (including the diversion screen on the intakes); and • a threatened fish species habitat assessment in the vicinity of the pump station; and • management measures to minimise potential impacts on threatened fish species.
3	Department of Industry	*The pump station should be constructed in accordance with the Guidelines for Controlled Activities on Waterfront Land.*	Clean TeQ would design and construct the proposed pump station in accordance with the requirements of the *Guidelines for Controlled Activities on Waterfront Land, 2012* (Department of Primary Industries Office of Water, 2012).

Issue ID No.	Agency	Issues Raised	Clean TeQ Response
4	Department of Industry	*The Groundwater Management Plan should be prepared in consultation with DoI Water.*	Clean TeQ would prepare a Groundwater Management Plan in consultation with Department of Industry – Water and the Environment Protection Authority in accordance with Condition 30(c), Schedule 3 of the Development Consent DA 374-11-00.
5	Roads and Maritime Service	*…I note the applicant concurs with the comments made by Roads and Maritime in its submission dated 15 December 2017, with exception to the level of upgrade to the intersection of Middle Trundle Road and Henry Parkes Way (MR61). Roads and Maritime notes the applicant proposes to upgrade the intersection to include a Basic Right (BAR) turn treatment instead of the required Channelised Right turn treatment Short [CHR(s)].* *Roads and Maritime reiterates that the intersection needs to be upgraded to include a CHR(s). In maintaining this position the following facts are relevant:* • *The requirement to provide a CHR(s) treatment (or historical equivalent) has been a condition of consent for the full production phase since approval of the original proposal in 2001. Since that time, traffic volumes on Henry Parkes Way have not decreased.* • *The Austroads Guide to Road Design is a guide only to assist in determining appropriate road and roadside treatments. Other factors such as speed, sight distance, topography, climatic conditions and vehicle types also need to be taken into consideration.* • *At this location, the speed zone is 100km/h and is 450 metres west of a creek crossing. Henry Parkes Way on approach to the intersection (eastern approach) has a 1.5 -2.0% grade after a right turn curve. On the western side, the road has a 1.0% grade before a left turn curve. During cooler months, fog periods are common in this area with lower areas, such as creeks, maintaining fog coverage for longer periods through the day.* • *The proposal will involve platoons of vehicles arriving at the intersection and turning right to attend site before a shift change.* *Given mine staff will be using the intersection at times of the day when visibility is poor (due to darkness and/or fog), the mix of light and heavy vehicles (up to 36.5 metres in length) operating on this part of the road network and the likelihood of mine related small buses and light vehicle platoons using the intersection, Roads and Maritime's position is the CHR(s) treatment is appropriate and needed to provide a high level of road safety for all users of the road at this location.*	The Road Transport Assessment (Appendix E of the EA) prepared by GTA Consultants (2017) includes an assessment of the forecast cumulative traffic movements of the modified Project at the intersection of Henry Parkes Way and the Middle Trundle Road against the Austroads (2017) warrants for rural road intersection treatments. GTA Consultants (2017) concluded that the existing Basic Auxiliary Right treatment is sufficient for the modified Project. GTA Consultants (2017) did however recommend that the shoulders be sealed and signage and line marking at the intersection be upgraded. Notwithstanding the above, Clean TeQ would upgrade the intersection of Henry Parkes Way and the Middle Trundle Road to a Channelised Right Turn Short [CHR(s)] treatment.

ATTACHMENT A

SEEPAGE ASSESSMENT

Level 19, Tower B, 799 Pacific Highway
Chatswood
NSW 2067 Australia

t: +61 2 9406 1000
f: +61 2 9406 1002

coffey.com

22 May 2018

Our ref: 754-SYDGE216741-AA_Rev2

Clean TeQ Holdings Limited
PO Box 227
Mulgrave VIC 3170

Attention: John Hanrahan

Dear John,

Clean TeQ Sunrise Project Modification 4 – Response to EA Groundwater Submissions

1. Introduction

The Clean TeQ Sunrise Project (the Project) (previously known as the Syerston Project) is an approved nickel cobalt scandium mining project situated approximately 350 kilometres (km) west northwest of Sydney, near the village of Fifield, New South Wales (NSW). Scandium21 Pty Ltd owns the rights to develop the Project. Scandium21 Pty Ltd is a wholly owned subsidiary of Clean TeQ Holdings Limited (Clean TeQ).

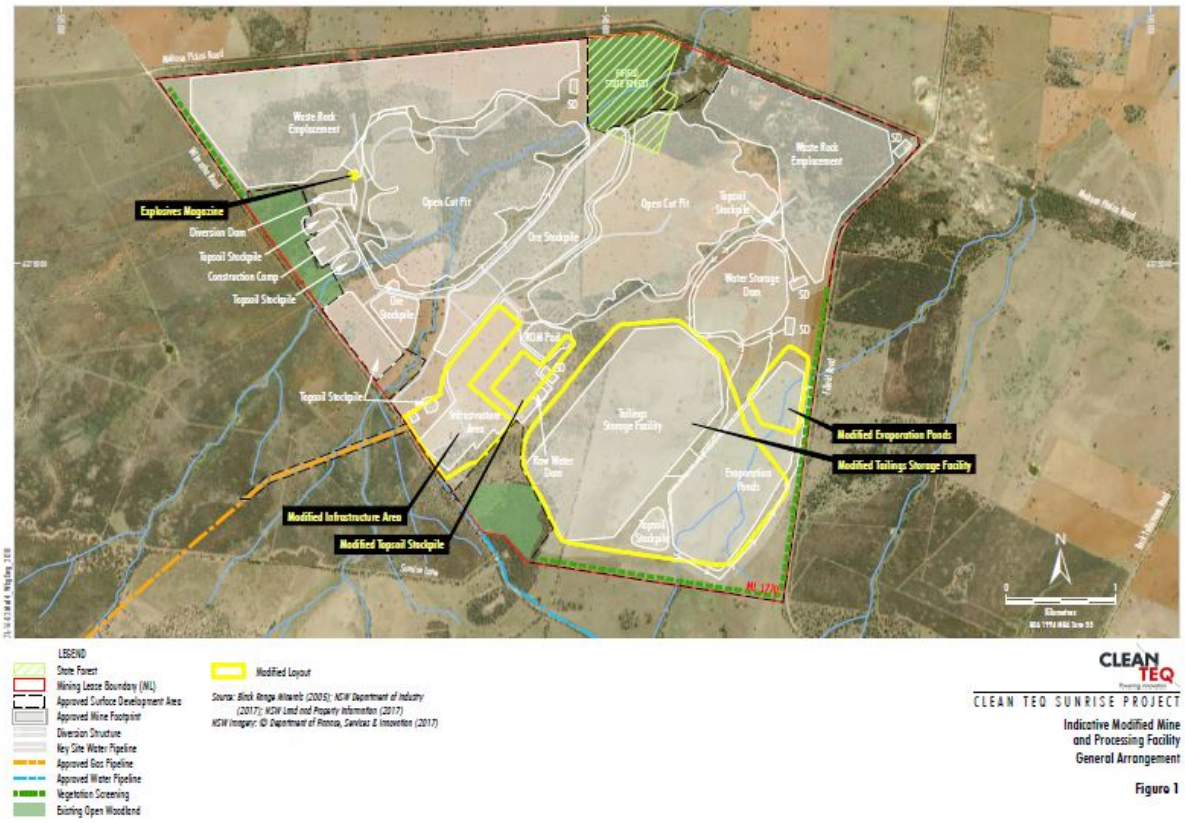
Development Consent DA 374-11-00 for the Project was issued under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) in 2001. In November 2017, Clean TeQ submitted an application to modify Development Consent DA 374-11-00 to allow for the implementation of opportunities to improve the overall efficiency of the Project identified in a Project Optimisation Study completed earlier in 2017 (the Modification). The Modification includes an increase in capacity of the approved tailings storage facility (TSF) to hold an anticipated increase in tailings volume. Figure 1 shows the extents of the approved and modified TSF layouts.

The NSW Department of Industry – Water (DI-Water) as part of its review of the Modification, requested an assessment of the potential seepage impacts associated with the modified TSF Tailings against the requirements of the NSW Aquifer Interference Policy (the AIP) (NSW Government, 2012). In particular, the DI-Water requested the following in its letter to the Department of Planning and Environment dated 16 March 2018:

- *Further assessment is requested to demonstrate whether there is a predicted change in the beneficial use category of the aquifer greater than 40 m from the activity, and if so whether it will prevent the long term viability of the dependent ecosystem or existing water supply works.*

Clean TeQ has requested Coffey Services Australia Pty Ltd (Coffey) to address this DI-Water request.

Figure 1 – Indicative modified mine and processing facility general arrangement



2. Scope of work

Coffey have conducted the following scope of work:

- Review of relevant background data, including:
  - Interceptor drain design in the TSF embankment to intercept potential lateral seepage through the embankment. These drains are separate from and would not be in contact with the liner for the TSF;
  - TSF liner, decant and seepage interception/recovery designs (Golder, 2018a);
  - Tailings deposition schedule (Golder, 2018b);
  - Tailings slurry chemistry;
  - Salinity of groundwater;
  - Tailings and subsurface properties (Golder, 2017);
  - 3-D CAD file of TSF Year 0 to 20; and
  - Groundwater resources map for NSW.
- TSF seepage assessment including the potential for lateral migration taking into account the presence of an interception system and vertical migration taking into account the presence of a low permeability liner;
- Assessment of the potential TSF seepage impacts against the AIP; and
- Preparation of a letter response to the recommendation listed above.

Considering that seepage may occur as both vertical and lateral components and may not be accounted fully using 1-D analytical solutions, a simple 2-D seepage analysis was undertaken for the TSF. The seepage analysis was conducted using Geostudio's SEEP/W suite.

Analytical solutions were used to assess potential impacts from the TSF at the nearest receptor (beneficial user) in view of the AIP requirements.

3. Modified TSF design

The Modification includes an increase in capacity of the approved TSF to hold an anticipated increase in tailings volume (Figure 1). The TSF capacity would be increased by expanding the TSF footprint to approximately 380 hectares (ha) (Figure 1) and the final TSF elevation by approximately 4 metres. Other components of the tailings storage facility, such as tailings delivery, underdrainage, seepage collection and decant systems would be generally unchanged by the Modification.

In accordance with Condition 29, Schedule 3 of Development Consent DA 374-11-00, the design of the TSF would conform to DSC3A Consequence Categories for Dams (Dams Safety Committee [DSC], 2015) and DSC3F Tailings Dams (DSC, 2012).

Tailings would be pumped from the processing facility to the TSF where it would be deposited. Sub-aerial tailings deposition would involve peripheral discharge of tailings from a spigotted ring main located around the perimeter embankment. The method of tailings deposition will facilitate the formation of a decant pond. Decant towers would allow the decanting of supernatant water to the water storage dam for reuse in the processing facility.

In accordance with Condition 29, Schedule 3 of Development Consent DA 374-11-00, the floor and side walls of the tailings storage facility will be designed with a minimum of a:

- 900 millimetre (mm) clay liner with a permeability of no more than 1 x 10^{-9} metres per second (m/s); or
- Synthetic (plastic) liner of 1.5 mm minimum thickness with a permeability of no more than 1 x 10^{-14} m/s (or equivalent).

Interception drains would be located in the TSF embankment to intercept potential horizontal seepage through the embankment. Seepage collected in the interception drains would drain via finger drains to an embankment toe seepage collection drain. The seepage would then flow to a seepage collection sump. The seepage collection sump would be concrete lined and would be located at the north-eastern corner (i.e. downstream) of the TSF. The pumping of TSF seepage to the tailings storage facility decant pond and/or water storage dam is consistent with the approved Project.

Based on forecasted chemical properties of the tailings, the salinity or total dissolved solids (TDS) of the TSF seepage is expected to be around 28,000 mg/L.

4. Background information

4.1. Hydrogeological conditions

The modified TSF would have a footprint of about 380 ha (Figure 1) and is underlain by alluvium of approximately 3 m thickness, followed by highly and slightly weathered ultrabasic intrusive rocks including pyroxenite, gabbro and diorite. The average thickness of the highly and slightly weathered rock stratum are reported as 11 m and 13 m, respectively (Golder, 2017). The depth to fresh rock is close to 30 metres below ground level (m bgl).

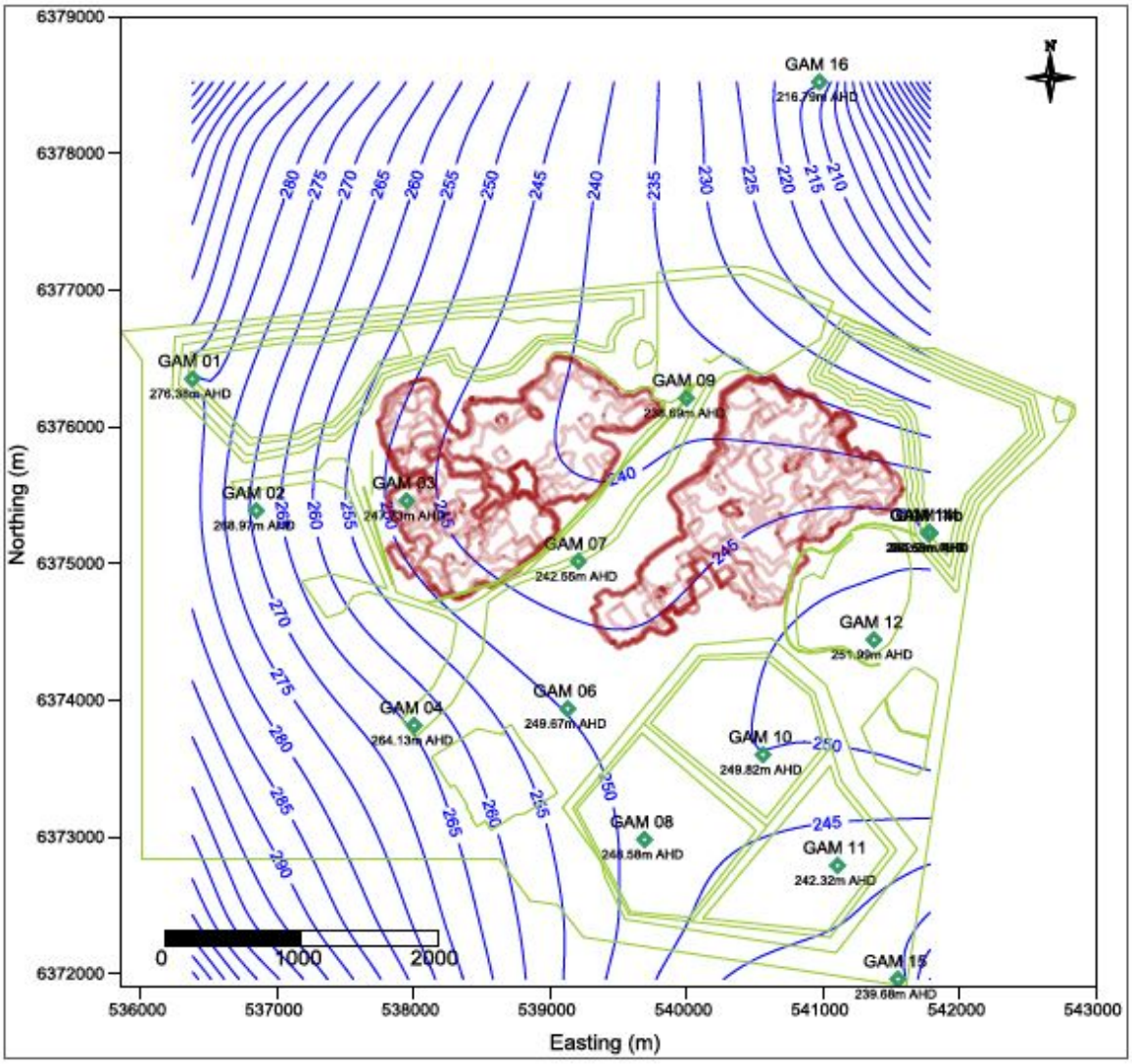
Drawing 1 illustrates the groundwater monitoring network at the mine site. Based on June 2017 groundwater levels, the depth to groundwater underlying the modified TSF footprint ranges from approximately 30 to 50 m bgl (Golder, 2017). The alluvium and highly weathered rock underlying the modified TSF is therefore likely to be unsaturated.

The occurrence of groundwater within the bedrock (slightly weathered and fresh rock) is expected to be limited to secondary permeability such as joints, fault/shear zones or other geological discontinuities in the rock mass.

There are no known major saturated palaeochannel aquifers within 10 km of the site (Golder, 2000). An unsaturated palaeochannel located above the water table has been mapped through the mine lease (Golder, 2000). The palaeochannel is up to 1,500 m wide and 35 m deep and passes through the site in a north easterly direction. The alluvium comprises silts, clays, gravels, quartz and rock fragments. The palaeochannel was encountered in boreholes GAM7, GAM9, GAM13 and GAM16.

Figure 2 shows the groundwater level contours for June 2017 (Golder, 2017). At the northern end of the TSF in the vicinity of piezometer GAM10 a groundwater divide is interpreted based on the piezometric surface below. Groundwater flow to the north of the divide is in a north easterly direction, and groundwater flow to the south of the divide is in a south easterly direction.

Figure 2 – Groundwater level contours (m AHD) June 2017 (source: Figure 23 Golder, 2017)



The groundwater salinity was reported as part of groundwater sampling conducted for the Environmental Impact Statement (EIS) (Golder, 2000). Table 1 summarises the range of total dissolved solids (TDS) values for the site.

There is a large variability of groundwater quality on the site, ranging from fresh (GAM1) to saline (GAM11). Fresh groundwater is associated with areas of recharge and the palaeochannel, with increasing salinity with distance from the recharge zones (Golder, 2000). The average salinity based on the values below is 3,236 mg/L.

Table 1 – Groundwater TDS values

Piezometer ID	TDS (mg/L) Sep 1999
GAM1	214
GAM2	528
GAM4	1670
GAM6	4210
GAM7	740
GAM8	7970
GAM9	802
GAM10	3660
GAM11	10100
GAM13	3100
GAM15	2600

Based on the groundwater resources map of New South Wales (Department of Land and Water Conservation, 1998), groundwater at the TSF area is categorised as 'fair to poor stock quality' with expected TDS ranging between 3,000 and 14,000 mg/L.

4.2. Nearest off-site beneficial groundwater users

The nearest off-site beneficial groundwater users are private bores located downgradient from the north eastern site boundary and upgradient from the western site boundary (Drawing 1). The distance to the stock/irrigation bore GW028264 to the north east and downgradient from the TSF is approximately 5.2 km from the toe of the TSF or approximately 2.6 km from the site boundary (ML 1770). The distance to the stock/domestic bore GW057335 to the north west of the TSF is located approximately 5.3 km from the toe of the TSF or approximately 1.8 km from the western site boundary (ML 1770). A map showing the location of these bores is attached as Drawing 1.

Bore GW057335 to the north west of the TSF is located upgradient from the TSF and on the other side of the open cut pits. Bore GW028264 to the north east of the TSF is located downgradient from the TSF and mine site.

The following sections outline our preliminary assessment of the potential impacts to these bores.

Groundwater Dependent Ecosystems (GDEs) are defined as ecosystems whose ecological processes are wholly or partially reliant on groundwater. Information on potential GDEs surrounding the mine site is presented by Golder (2017). In the vicinity of the mine site there are no identified aquatic GDEs and only low potential vegetation (terrestrial) GDEs. Based on the depth to groundwater in the vicinity of the TSF (i.e. 30 to 50 m bgl), it is unlikely that potential groundwater impacts from the mine site will affect terrestrial vegetation in this area.

Based on an Aboriginal Cultural Heritage Assessment conducted for the Project by Landskape (2017), there are no known groundwater dependent culturally significant sites in the vicinity of the mine site.

5. TSF seepage assessment

5.1. Conceptualisation of potential TSF seepage impacts

Groundwater mounding beneath the TSF is anticipated during the operation of the TSF. The alluvial and weathered rock strata underlying the TSF is expected to become saturated as the tailings deposition progresses over time during the life of the Project. Groundwater mounding due to the TSF operation is expected to dissipate as tailings deposition ceases at the TSF at the end of the Project life.

The hydraulic head field on site will also be influenced by the approved open cut pits, with floor elevations of 238 m AHD on the eastern side and 230 m AHD on the western side (i.e. approximately 10 m below the pre-development groundwater table). Groundwater flowing to the north and north east of the TSF would be intercepted by the eastern pit which would act as a groundwater sink. The groundwater divide is likely to change due to a combination of the mounding and sink effects in this area.

TSF seepage mitigation and recovery controls will be adopted including provisions for a geomembrane liner, decant ponds, seepage interception and solution trenches. These engineering controls when implemented (in accordance to their intended designs and purposes), are expected to impede and significantly minimise outgoing vertical and lateral seepage originating from the TSF.

5.2. Methodology and model descriptions

Considering that seepage from the TSF may occur as both vertical and lateral flow components and that these outflows may not be accounted for using 1-D analytical solutions, simple 2-D seepage analysis was undertaken for the TSF using a numerical model. The seepage analysis was conducted using Geostudio's SEEP/W suite.

The final crest and tailings levels were modelled because it is likely to represent a maximum-case scenario whereby the water head is at its highest on the facility. A typical cross-section along the north west embankment of the TSF was used for the analysis. The materials assignment on the TSF was based on the embankment design by Golder (2018a), and illustrated in Figure 3. The adopted parameters and assumptions are presented in Table 2.

Figure 3 – Typical materials zoning within TSF embankment

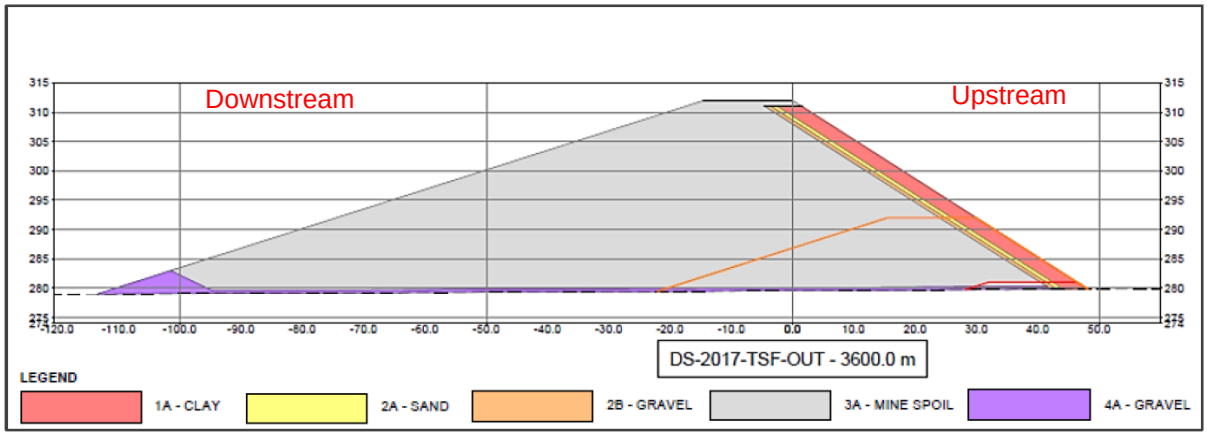


Table 2 – Adopted material properties and model assumptions

Materials	Saturated permeability, k_s (m/s)	Subsurface - strata thickness (m)
Zone 1A – Clay	1×10^{-7}	-
Zone 2A – Sand	1×10^{-4}	-
Zone 2B – Gravel	5×10^{-4}	-
Zone 3A – Mine spoil	1×10^{-6}	-
Zone 4A – Gravel	5×10^{-4}	-
Tailings	1×10^{-7}	-
Geomembrane liner	1×10^{-12}	-
Alluvium	3.2×10^{-6}	3
Highly weathered rock	1×10^{-6}	11
Slightly weathered rock	1×10^{-7}	13
Fresh rock	9×10^{-9}	50*

Notes:

(*) – Assumed strata thickness in the 2D numerical model.

1. Final embankment crest is 312 m AHD, with maximum tailings beach elevation at 311 m AHD (i.e. 1 m freeboard).
2. Tailings beach slope was assumed to be 1%.
3. Pond level at 309.6 m AHD and assumed to be 150 m away from the crest of final embankment.
4. The geomembrane liner was placed as an interface model parameter with no apparent thickness and k of 1×10^{-12} m/s. The k was lowered by 2 orders of magnitude to allow some possibly of leakage, for example, from welding or liner joints. The resulting seepage outflows are therefore best estimates and fall within the likely range of seepage outflows from 1.5 mm geomembrane liner of k 1×10^{-14} m/s and 0.9 m clay of k 1×10^{-9} m/s scenarios.
5. Model extent on the down-gradient end is generally 3 km away from the TSF, which is deemed distant enough to circumvent boundary effects arising from the modelling.

Considering that the final embankment and maximum tailings present a maximum-case scenario (where water head is at its highest and assumed to be at steady-state), the following scenarios were modelled to assess the potential magnitude of seepage outflows from the TSF:

- Case A – TSF at its final crest and maximum tailings levels with no seepage impediment or recovery; and
- Case B – TSF at its final crest and maximum tailings levels with seepage impediment (liner) and recovery (seepage intercept and solution trenches).

5.3. Results of seepage analysis

The results of the analysis are summarised in Table 3 below.

Table 3 – Summary of seepage/flux estimations

Model scenarios	Vertical flux/seepage, F1 ($m^3/s/m$)	Vertical flux/seepage, F2 ($m^3/s/m$)	Total seepage, (F1 + F2) * (m^3/d)	(L/s)	Seepage outflow reduction[#]
Case A	1.94×10^{-6}	4.16×10^{-7}	1477	17.1	-
Case B	5.25×10^{-8}	5.46×10^{-9}	36	0.42	> 97%

Note:

(*) – Total perimeter of TSF footprint is estimated to be 7250 m.

(#) – Theoretical seepage reduction with engineering controls in place against base case (Case A).

F1 seepage/flux through base of TSF.

F2 seepage/flux through TSF embankment.

Seepage outflow is expected to be greater if tailings are more permeable than the adopted permeability of 1×10^{-7} m/s.

The output from the seepage analyses are attached in Appendix A.

5.4. Discussion

Based on the predicted fluxes between Case A and Case B, the reduction effect due to the seepage impediment (liner) and recovery (trenches) is deemed significant (>97%).

This implies that with the engineering controls, when implemented according to the proposed design and provided that the seepage recovery mechanisms are maintained throughout the operations of the TSF, the tailings deposition is expected to incur small or negligible vertical or lateral seepage outflows from the TSF.

The timing of seepage migration from the TSF to the existing water table has also been considered. Allowing for a seepage rate of 36 m^3/day (Case B) over the area of the TSF (approximately 3,800,000 m^2), this corresponds to an infiltration rate of 0.0000095 m/day (36 m^3/day / 3,800,000 m^2). Allowing a specific yield of 0.002 for the unsaturated soil and rock beneath the TSF this would correspond to a downward migration rate of 0.005 m/day. It would therefore take 23 years to saturate a 40 m thick zone between the base of the TSF and the existing water table. This is a time scale comparable to the life of the Project. As a result, seepage is not anticipated to migrate significantly beyond the TSF footprint within the life of the Project.

Beyond the life of the Project, once the TSF seepage has reached the existing water table, the approved open cut pits would act as a sink and continue to collect the majority of seepage from the TSF which contains a finite volume of water (i.e. seepage would not continue to migrate from the TSF in the long-term).

Given the above, the potential for impacts on the closest downgradient privately-owned groundwater bore (i.e. GW028264), if any, would be negligible. Other privately-owned bores to the north west of the TSF are located upgradient from the TSF and on the other side of the open cut pits and therefore are unlikely to be impacted.

There are no identified aquatic GDEs and only low potential vegetation (terrestrial) GDEs in the vicinity of the mine. Notwithstanding, given the depth to groundwater in the vicinity of the mine (i.e. 30 to 50 m bgl), the potential effects on terrestrial vegetation GDEs would, if any, be negligible. In addition, there are no known groundwater dependent culturally significant sites in the vicinity of the mine.

6. Consideration of the AIP

DI-Water mapping of highly productive groundwater in the vicinity of the Project indicates that no highly productive groundwater is present at the mine. In addition, the fractured rock aquifers associated with the mine site are considered to be 'less productive' under the AIP as testing of groundwater monitoring bores indicate the yield is less than 5 litres per second. The following AIP minimal impact consideration therefore applies for groundwater quality at the mine site (Golder, 2017):

1. *Any change in the groundwater quality should not lower the beneficial use category of the groundwater source beyond 40 m from the activity.*
2. *If condition 1 is not met then appropriate studies will need to demonstrate to the Minister's satisfaction that the change in groundwater quality will not prevent the long-term viability of the dependent ecosystem, significant site or affected water supply works.*

The beneficial use of the groundwater within ML 1770 is mining/industrial use.

There is a large variability of groundwater quality on the site, ranging from fresh (GAM1) to saline (GAM11). The average salinity is 3,236 mg/L (Section 4.1). The combination of this variable groundwater quality and poor yield provides limited potential for beneficial use. This is supported by the lack of registered groundwater users in the vicinity of the mine site (Section 4.2).

Given the effectiveness of the engineering controls (>97% control) and very low infiltration rate, only small or negligible vertical or lateral seepage outflows are predicted from the TSF. In addition, the approved open cut pits would act as a sink and continue to collect the majority of seepage from the TSF which contains a finite volume of water (i.e. seepage would not continue to migrate from the TSF in the long-term).

Given the above, the modified TSF is not expected to lower the beneficial use category of the groundwater source beyond 40 m of the activity and therefore the relevant AIP minimal impact consideration would be met.

In addition, the modified TSF would not prevent the long-term viability of a GDE, significant site or affected water supply works because (Section 5.4):

- The potential for impacts on the closest privately-owned groundwater bore (i.e. GW028264), if any, would be negligible;
- Other privately-owned bores to the north west of the TSF are located upgradient from the TSF and on the other side of the open cut pits and therefore are unlikely to be impacted;
- There are no identified aquatic GDEs and only low potential vegetation (terrestrial) GDEs in the vicinity of the mine and therefore the potential effects on terrestrial vegetation GDEs would, if any, be negligible; and
- There are no known groundwater dependent culturally significant sites in the vicinity of the mine.

7. Conclusions

Based on the predicted fluxes between Case A and Case B, the reduction effect due to the seepage impediment (liner) and recovery (trenches) is deemed significant (>97%).

Given the effectiveness of the engineering controls (>97% control) and very low infiltration rate, only small or negligible vertical or lateral seepage outflows are predicted from the modified TSF. In addition, the approved open cut pits would act as a sink and continue to collect the majority of seepage from the TSF which contains a finite volume of water (i.e. seepage would not continue to migrate from the TSF in the long-term).

Given the above, the modified TSF is not expected to lower the beneficial use category of the groundwater source beyond 40 m of the activity and therefore the relevant AIP minimal impact consideration would be met.

In addition, the modified TSF would not prevent the long-term viability of a GDE, significant site or affected water supply works because (Section 5.4):

- The potential for impacts on the closest privately-owned groundwater bore (i.e. GW028264), at a distance of greater than 5 km, would be negligible;
- Other privately-owned bores to the north west of the TSF are located upgradient from the TSF and on the other side of the open cut pits and therefore are unlikely to be impacted;
- There are no identified aquatic GDEs and only low potential vegetation (terrestrial) GDEs in the vicinity of the mine and therefore the potential effects on terrestrial vegetation GDEs would, if any, be negligible; and
- There are no known groundwater dependent culturally significant sites in the vicinity of the mine.

8. Recommendations

Given the effectiveness of the engineering controls (>97% control), the integrity of the liner or clay barrier should be maintained in accordance with design specifications.

The size of the supernatant ponds should be kept to a minimum during the operational phase of the facility to minimise seepage outflow at the base and through the TSF embankment.

A groundwater monitoring regime as required by Condition 30(c), Schedule 3 of Development Consent DA 374-11-00 should be implemented. This will provide baseline groundwater quality at private bores including GW028264 and allow construction and operational monitoring to assess potential changes in groundwater level and quality.

9. References

Dams Safety Committee. 2015. DSC3A Consequence Categories for Dams. November 2015.

Dams Safety Committee. 2012. DSC3F Tailings Dams. June 2012.

Department of Land & Water Conservation. 1998. The NSW Groundwater Quality Protection Policy – A Component Policy of the NSW State Groundwater Policy.

Golder Associates Pty Ltd. 2000. Syerston Nickel Cobalt Project, Environmental Impact Statement Appendix D, Tailings and Site Water Management. Project No. BRM-01\3.16, Document No. Appendix D-D.doc, August 2000.

Golder Associates Pty Ltd. 2017. Syerston Project – Modification 4 Water Management Assessment. Report reference 039-1524361 Rev 2 dated 10 November 2017.

Golder Associates Pty Ltd. 2018a. Definitive Feasibility Study for Tailings Storage Facility, Water Storage Dam, Water Treatment Plant Sludge Pond and Evaporation Pond. Report reference 078-1524361-Rev C dated 16 April 2018.

Golder Associates Pty Ltd. 2018b. Sunrise Project – TSF time phased earthworks quantity estimate. Technical memorandum reference 1788201-055-M-Rev A dated 7 May 2018.

Landskape, division of ML Cupper Pty Ltd. 2017. Syerston Project Aboriginal Cultural Heritage Assessment dated 26 July 2017.

NSW Department of Primary Industries. 2012. NSW Aquifer Interference Policy: NSW Government policy for the licensing and assessment of aquifer interference activities. First published September 2012. ISBN 978 1 74256 338 1.

Further advice on the uses and limitations of this report is presented in the attached document, 'Important information about your Coffey Report'.

Please do not hesitate to contact the undersigned if you have any questions or comments in relation to this letter.

For and on behalf of Coffey

Ross Best
Senior Principal

Attachments

Important information about your Coffey Report

Drawing 1 – Existing groundwater monitoring network and groundwater users – mine site

Appendix A – Seepage analysis outputs

Important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

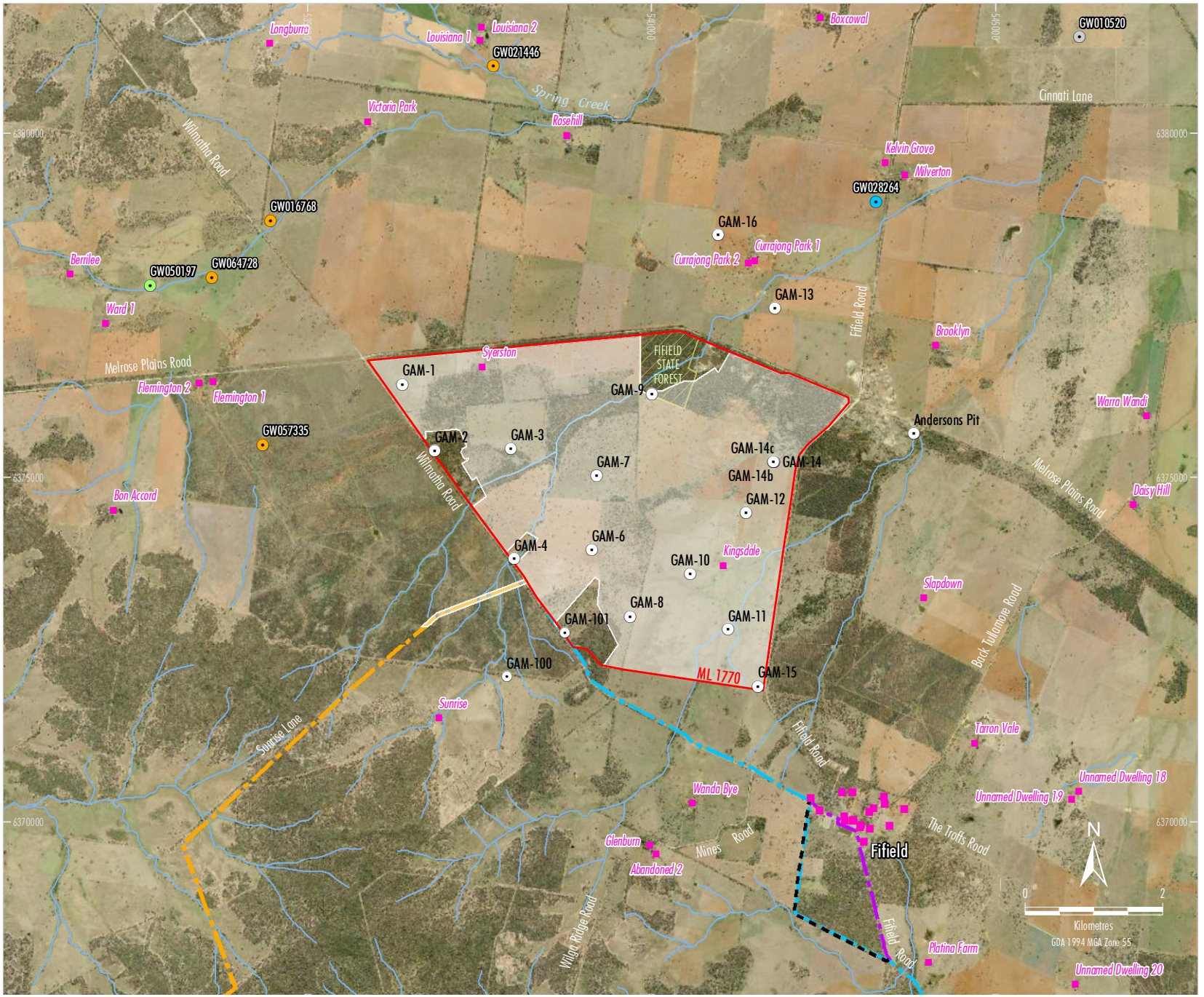
Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.



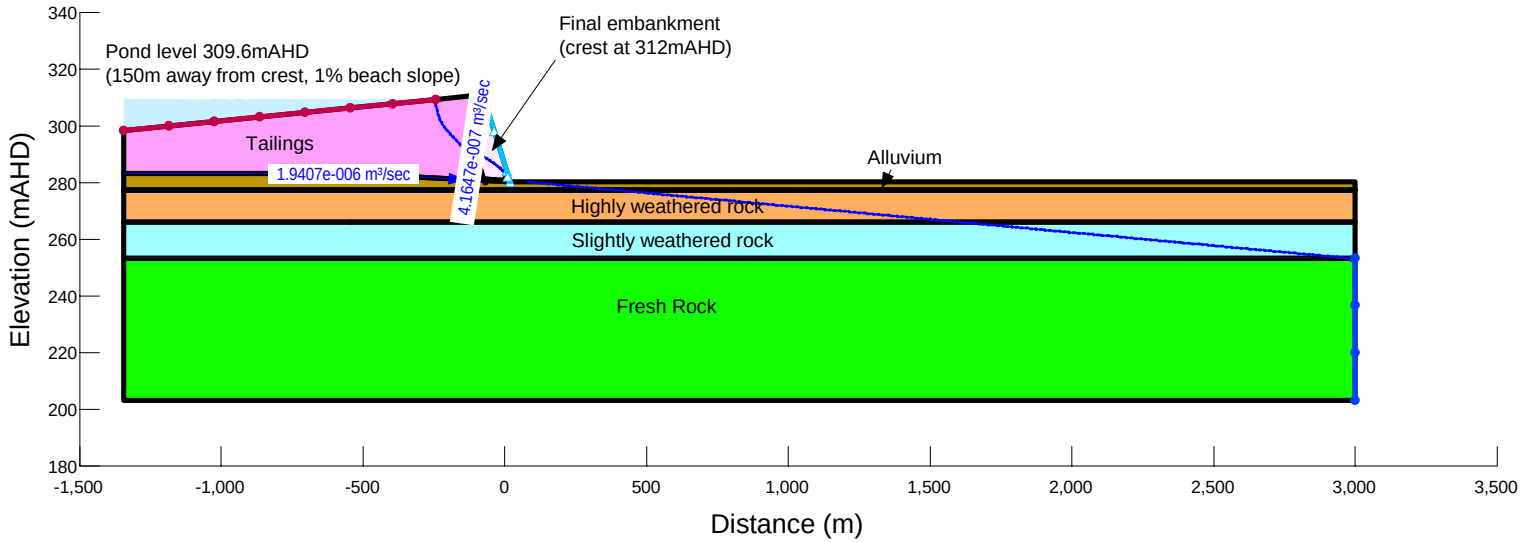
CLEAN TEQ SUNRISE PROJECT

Existing Groundwater Monitoring Network and Groundwater Users - Mine Site

Drawing 1

CTL-16-02 Mod4_SA_201B

Appendix A -
Seepage analysis outputs

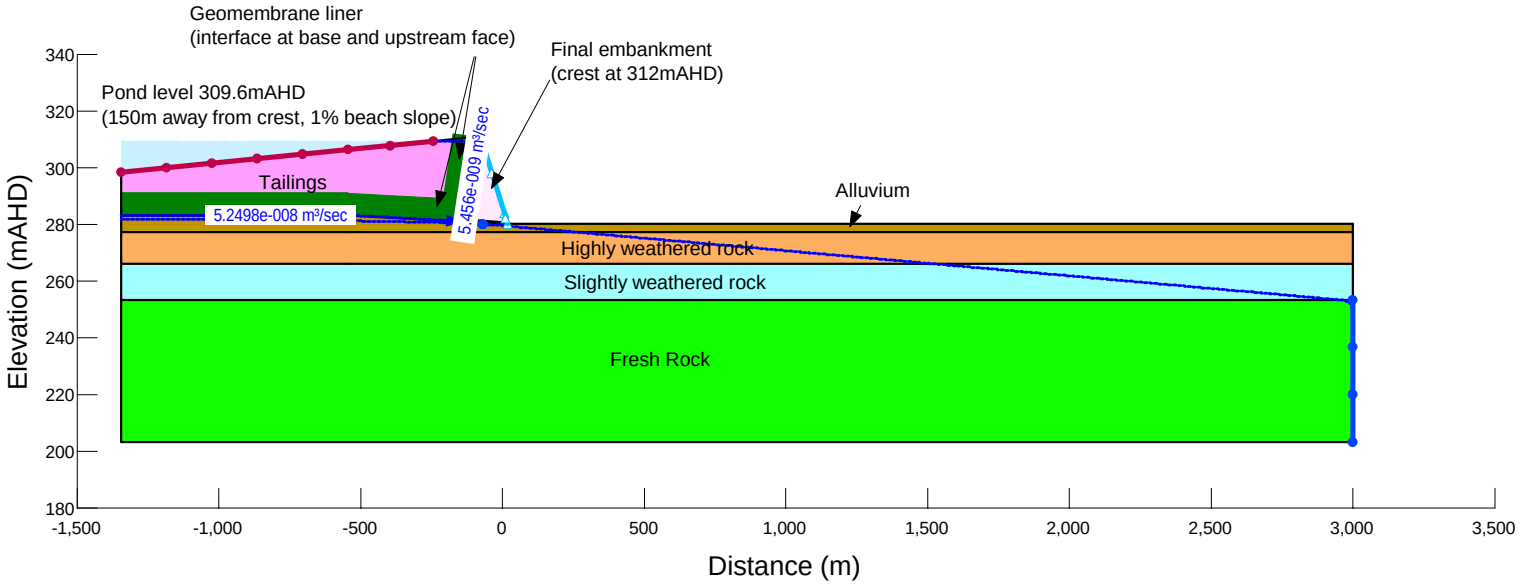


Drawn:	**DL**
Approved:	**CDC/RB**
Date:	**10/05/2018**
Scale:	**AS SHOWN**
Original size:	**A4**

coffey
A TETRA TECH COMPANY

Client:	**SCANDIUM21 PTY LTD**
Project:	**SUNRISE PROJECT - MINE MODIFICATION 4** **RESPONSE TO EA GROUNDWATER SUBMISSIONS**
Title:	**SEEPAGE ANALYSIS - CASE A**

Project no:	**754-SYDGE216741**	Fig no:	**A1**	Rev:	**A**



Drawn:	DL
Approved:	CDC/RB
Date:	10/05/2018
Scale:	AS SHOWN
Original size:	A4

coffey
A TETRA TECH COMPANY

Client:	SCANDIUM21 PTY LTD
Project:	SUNRISE PROJECT - MINE MODIFICATION 4 RESPONSE TO EA GROUNDWATER SUBMISSIONS
Title:	SEEPAGE ANALYSIS - CASE B
Project no:	754-SYDGE216741
Fig no:	A2
Rev:	A