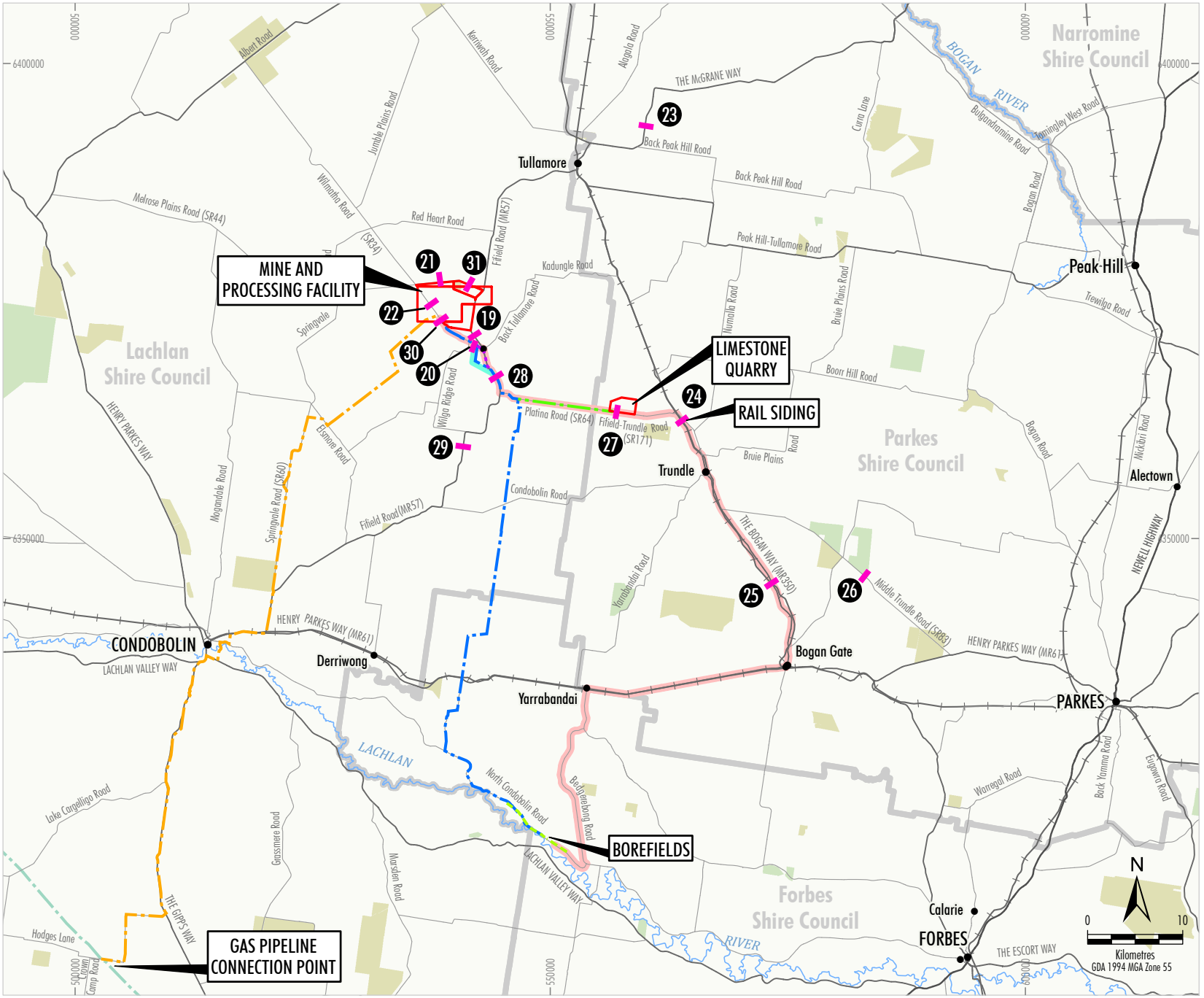

LEGEND

- NSW National Parks and Wildlife Service
- State Forest
- Local Government Boundary
- Railway
- Mining Lease Application Boundary
- Existing Gas Pipeline
- Approved Gas Pipeline
- Approved Water Pipeline
- Approved Limestone Quarry Water Pipeline
- Approved Borefield Infrastructure Corridor
- Modified Water Pipeline Alignment Option
- Approved Fifield Bypass
- Short-term Water Transport Route
- Traffic Survey Location

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

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Traffic Survey Sites

Figure 28

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- The McGrane Way [MR357] – extends north-east from north of Tullamore to Narromine. The McGrane Way intersects The Bogan Way near Tullamore.
- Fifield-Trundle Road [SR171]/Platina Road [SR64] – provides an east-west link between The Bogan Way near Trundle to Fifield Road [MR57] south of Fifield.
- Fifield Road [MR57] – extends between Henry Parkes Way east of Condobolin to Tullamore.
- Wilmatha Road [SR34] – extends north-west from Fifield and past the mine site.
- Middle Trundle Road [SR83] – links Henry Parkes Way approximately halfway between Parkes and Bogan Gate to The Bogan Way south of Trundle.
- Yarrabandai Road – links The Bogan Way north-west of Forbes and The Bogan Way at Trundle.
- Noakes Road – links Yarrabandai Road approximately 24 km south of Henry Parkes Way to Bedgerabong Road at Bedgerabong.
- Bedgerabong Road – intersects with North Condobolin Road (which provides access to the borefields) approximately 15 km west of Bedgerabong.

Existing Traffic Volumes

Traffic survey data in the Project area are summarised in Table 18 and the traffic survey locations are shown on Figure 28.

Further details on the road survey data are provided in Appendix E.

Table 18 Surveyed Average Traffic

Site[1]	Road	Survey Location	Peak Hour (vehicles per hour)	Daily (vehicles per day)	Heavy Vehicles (%)	Survey Timing
19	Fifield Road	Between Tullamore and Fifield	21	185	9.5	November 2016
20	Slee Street	In Fifield	26	246	28.5	
21	Melrose Plains Road	East of Wilmatha Road	2	13	49.4	
22	Wilmatha Road	South of Melrose Plains Road	2	21	38.1	
23	The McGrane Way	North of Back Peak Hill Road	14	124	24.1	
24	The Bogan Way	Between Trundle and Fifield-Trundle Road	43	367	19.3	January to March 2017
25	The Bogan Way	Between Bogan Gate and Middle Trundle Road	41	388	24.0	
26	Middle Trundle Road	Between The Bogan Way and Henry Parkes Way	17	118	22.0	
27	Fifield-Trundle Road	Between The Bogan Way and Platina Road	11	78	17.9	
28	Fifield Road	Between Slee Street and Platina Road	28	253	28.9	
29	Fifield Road	Between Platina Road and Springvale Road	20	198	35.4	
30	Wilmatha Road	North of Sunrise Lane	2	19	15.8	
31	Melrose Plains Road	Between Fifield Road and Wilmatha Road	4	11	27.3	

Source: After Appendix E.

[1] Refer to Figure 28 for locations.

Review of the data indicates that existing daily and peak hour traffic volumes are low and the peak periods occur in the morning and in the mid to late afternoon (Appendix E).

The proportion of heavy vehicles varies significantly across road network (9.5% to 49.4%). The total number of heavy vehicles on the road network is low, however, as the background traffic volumes are low (Appendix E).

Roadway Capacity

Austroads (2013) defines theoretical capacities for two-way two lane rural roads. Taking into account the proportion of heavy vehicles, the peak hourly flows on the road network around the Project are very low in comparison to the Austroads (2013) theoretical capacities and a detailed assessment of midblock road capacity is not warranted (Appendix E).

Intersection Performance

There are no intersection operation capacity concerns in the vicinity of the Project (Appendix E).

Road Safety

A review of RMS accident data in the vicinity of the Project during the period 1 January 2011 to 14 November 2016 was undertaken by GTA Consultants (Appendix E). This review indicated that:

- no accidents were reported on Springvale Road, Wilmatha Road, Platina Road, Fifield-Trundle Road, Melrose Plains Road;
- no accidents were reported on the component of the proposed water transport route south of the Henry Parkes Way including North Condobolin Road, Bedgerabong Road and Yarrabandai Road;
- accident rates on Henry Parkes Way, The Bogan Way, The McGrane Way and Fifield Road are below accident rates described as being typical by the RMS for rural roads (RTA, 2004); and
- accident rates on Middle Trundle Road are above accident rates described as being typical by the RMS for rural roads (RTA, 2004), although is not considered to reflect any particular issue with that road, rather that the road is not indicative of the routes used in the calculation of average crash rates.

4.9.2 Potential Impacts

Potential road transport impacts of the Modification on traffic generation, roadway capacity and safety are assessed in Appendix E and summarised below.

The key potential road transport impacts of the Modification would be associated with:

- changes to process input and product road transport requirements (Section 3.6.2), including:
  - increased sulphur transport from 260,000 tpa to 350,000 tpa;
  - increased limestone transport from 790,000 tpa to up to 990,000 tpa;
  - sourcing of up to approximately 560,000 tpa of the required limestone from third party suppliers;
- limited heavy vehicle use of The McGrane Way (Section 3.6.2); and
- short-term road transport of water from the borefield to the mine site during the construction phase (Section 3.9.3).

As ammonium sulphate product would be backloaded in trucks transporting sulphur between the rail siding and the mine site (Section 3.6.4), no additional heavy vehicle movements would be required to transport this new product.

Although the Modification would include the construction of additional Project infrastructure (e.g. water treatment plant and surface water extraction infrastructure), the road transport requirements and potential impacts during the modified construction phase would remain generally consistent with the approved Project (with the exception of the short-term road transport of water) (Appendix E).

Project Traffic Generation

Table 19 summarises the approved and estimated predicted modified Project daily vehicle movements (traffic in both directions).

Table 19 Approved Project and Predicted Modified Two-way Weekday Traffic

Scenario	Daily (vehicles per day)		
	Light	Heavy	Total
Approved Project	263	207	470
Modified Project	424	212	636

Source: After Appendix E.

The Modification would not result in a significant change to the number of Project heavy vehicle movements (Table 19). The proposed increase in heavy vehicle movements associated with the transport of higher volumes of limestone and sulphur would be partly offset by a reduction in other heavy vehicle delivery trips, and changes to some of the transport characteristics assumed in Modification 2 (Masson Wilson Twiney Pty Ltd, 2005) (Appendix E).

The estimated light vehicle generation of the modified Project is higher than that of the approved Project, primarily as a result of changes in the assumptions regarding the workforce present on site and its travel characteristics (Appendix E).

Clean TeQ would minimise the number of heavy vehicles movements by maximising the use of rail transport and consolidating materials and product transport where practicable.

Cumulative Traffic Increases

In order to conservatively consider the potential impacts of the Modification in the context of potential background traffic growth, an annual baseline growth rate has been considered.

Based on the traffic survey data (Table 18), a 2% per annum baseline traffic growth rate was applied to the existing traffic volumes (Appendix E).

GTA Consultants (2017) conducted a review of other significant proposed and approved projects in the area and considered that traffic from these projects did not need to be added to potential background traffic growth.

Table 20 presents the predicted traffic flows on key roads including additional Project traffic flows and estimated background traffic growth. Figure 29 shows the locations of traffic forecast sites.

Roadway Capacity

Austroads (2013) defines a Level of Service as a qualitative measure describing operational conditions within a traffic stream (in terms of speed, travel time, freedom to manoeuvre, safety and convenience) and their perception by motorists and/or passengers. Level of Service A provides the best traffic conditions, with no restriction on desired travel speed or overtaking. Level of Service B to D describes progressively worse traffic conditions. Level of Service E occurs when traffic conditions are at or close to capacity.

Level of Service B is forecast on the road network around the modified Project during peak periods. Level of Service B represents good operating conditions (Appendix E).

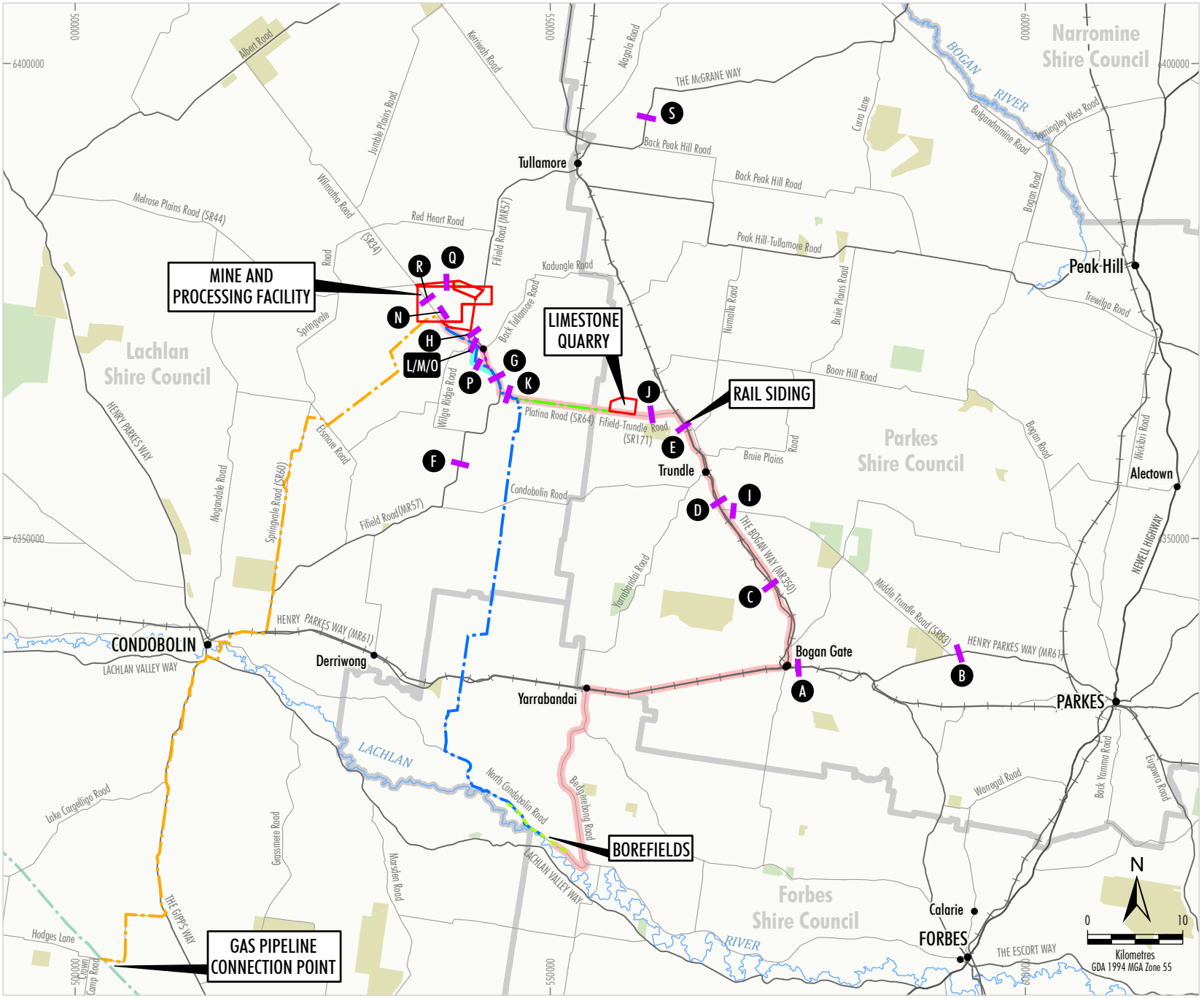
Intersection Performance

GTA Consultants (2017) considered that formal peak hour intersection analysis for key intersections was not warranted given the low predicted traffic volumes.

No capacity concerns regarding the operation of key intersections are expected for the modified Project (Appendix E).

Road Upgrades

The proposed road upgrades for the modified Project are outlined in Section 3.14.



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
- Modified Water Pipeline Alignment Option
- Approved Fifield Bypass
- Short-term Water Transport Route
- Traffic Forecast Location

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

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Traffic Forecast Locations

Figure 29

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Table 20 Predicted Cumulative Two-way Weekday Traffic

Site[1]	Road	Location	Approved Project			Modified Project		
			Light	Heavy	Total	Light	Heavy	Total
A	Henry Parkes Way	East of Bogan Gate	1,024	297	1,321	1,024	345	1,369
B		East of Middle Trundle Road	1,122	912	2,034	1,161	968	2,129
C	The Bogan Way	North of Henry Parkes Way	355	146	501	360	194	554
D		North of Middle Trundle Road	624	171	795	668	227	895
E		North of Trundle	543	119	662	611	175	786
F	Fifield Road	North of Henry Parkes Way	224	133	357	298	92	390
G		North of Platina Road	474	295	769	616	296	912
H		North of Wilmatha Road	163	65	228	182	69	251
I	Middle Trundle Road	East of The Bogan Way	291	31	322	330	39	369
J	Fifield-Trundle Road	West of The Bogan Way	265	85	350	333	161	494
K	Platina Road	East of Fifield Road	265	175	440	333	217	550
L	Wilmatha Road	West of Slee Street	282	211	493	443	216	659
N	MPF Access Road	East of Wilmatha Road	263	207	470	424	212	636
O	Slee Street	In Fifield	470	291	761	612	292	904
Q	Melrose Plains Road	East of Wilmatha Road	10	4	14	10	4	14
S	The McGrane Way	North of Black Peak Hill Road	114	36	150	114	40	154

Source: After Appendix E.

[1] Refer to Figure 29 for locations.

The modified road upgrades are based on recommendations of GTA Consultants (2017) and consultation undertaken with the RMS and relevant councils.

Road Safety Review

The modified Project would not result in significant impacts on the safety of the road network with implementation of management and mitigation measures (Appendix E).

Limited Heavy Vehicle Use of The McGrane Way

Condition 42, Schedule 3 of Development Consent DA 374-11-00 requires that no heavy vehicles use The McGrane Way when travelling to or from the Project, unless otherwise agreed by the Secretary.

The Modification proposes the limited use of The McGrane Way by heavy vehicles. The modified Project would have acceptable impacts on the operation of The McGrane Way with no significant impacts on its performance, capacity, efficiency and safety (Appendix E).

In addition, the proposed very low level of additional heavy vehicle traffic would not warrant any upgrading of The McGrane Way (Appendix E).

Clean TeQ would contribute to the maintenance of relevant sections of The McGrane Way (Section 4.9.3).

Road Transport of Construction Water

As described in Section 3.9.3, prior to the commissioning of the water pipeline (approximately 6 months), water would be transported from the borefields to the mine site by road.

The proposed short-term construction phase water transport route from the borefields to the mine site is shown on Figure 19.

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.

The Road Transport Assessment (Appendix E) 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 (Appendix E).

Clean TeQ would contribute to the maintenance of the proposed short-term construction phase transport route (Section 4.9.3).

4.9.3 Mitigation Measures and Management

Road Upgrades

The proposed road upgrades for the modified Project are outlined in Section 3.14.

The modified road upgrades are based on recommendations of GTA Consultants (2017) and consultation undertaken with the RMS and relevant councils. These modified road upgrades are consistent with the terms of the VPAs that the relevant councils have provided in-principle support for.

Road Maintenance

The proposed road maintenance contributions for the modified Project are outlined in Section 3.14.

Clean TeQ has consulted with the relevant councils regarding the proposed changes to the road safety audit and road maintenance requirements as part of VPA negotiations (Section 1.3).

Road Upgrades and Maintenance Strategy

A Road Upgrades and Maintenance Strategy would be developed in consultation with the RMS, LSC, PSC and FSC for the modified Project in accordance with Condition 43, Schedule 3 of Development Consent DA 374-11-00.

The Road Upgrades and Maintenance Strategy would reflect any changes to Development Consent DA 374-11-00 that arise from the Modification and would include a program for the implementation of the road upgrades and a program for road maintenance.

Traffic Management Plan

A Traffic Management Plan would be developed in consultation with the RMS, LSC, PSC and FSC for the modified Project in accordance with Condition 45, Schedule 3 of Development Consent DA 374-11-00. The Traffic Management Plan would reflect any changes to Development Consent DA 374-11-00 that arise from the Modification and would include:

- details of transport routes to be used by the Project;
- product transport monitoring program;
- limestone transport monitoring program;
- measures to minimise traffic safety issues and disruption to the local community during the construction of the Project; and
- a Road Transport Protocol for all drivers transporting materials to and from the Project.

4.10 Aboriginal Cultural Heritage

As described in Section 4.1, the potential Aboriginal cultural heritage impacts associated with the Modification would be related to additional surface development areas required for the surface water extraction infrastructure, the modified borefields layout and the water pipeline alignment option (Section 3.9) (the additional surface development areas).

An Aboriginal Cultural Heritage Assessment (ACHA) has been prepared for the Modification by Landskape Natural and Cultural Heritage Management (Landskape) and is presented in Appendix F. The ACHA focusses on these additional surface development areas and has been undertaken in consideration of (but not limited to) the following codes, guidelines and regulations (Appendix F):

- *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a);
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b);
- *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010c);
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011);
- *The Burra Charter: The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (International Council on Monuments and Sites, 2013);
- *Aboriginal Cultural Heritage: Standards and Guidelines Kit* (NSW National Parks and Wildlife Service, 1997);
- *Ask First: A Guide to Respecting Indigenous Heritage Places and Values* (Australian Heritage Commission, 2002);
- *Engage Early* (Commonwealth Department of the Environment, 2016);
- NSW *Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects* (NSW Minerals Council, 2010); and
- NSW *National Parks and Wildlife Regulation, 2009.*

The Modification would not change the approved Aboriginal cultural heritage impacts at the other Project components and therefore these Project components have not been considered any further in this section.

4.10.1 Existing Environment

Aboriginal Cultural Heritage Assessment

The ACHA (Appendix F) incorporates relevant information from previous assessments (including for the approved Project), the results of the field surveys and associated consultation with the Aboriginal community, including:

- results from extensive fieldwork and archaeological and cultural investigations previously undertaken at the Project and surrounds;
- search results from the OEH Aboriginal Heritage Information Management System (AHIMS) database and other heritage registers;
- results from extensive consultation with the Aboriginal community regarding archaeological and cultural heritage values; and
- a detailed description of the methods implemented and the results of archaeological and cultural surveys conducted by archaeologists and representatives of the Aboriginal community for the Modification during 2016 and 2017.

The key steps involved in the preparation of the ACHA and associated consultation are described below.

Aboriginal History

Aboriginal people of the Wiradjuri language group were traditionally associated with the region encompassing the Macquarie, Lachlan and Murrumbidgee Rivers (Appendix F). The Wiradjuri appear to have had a semi-sedentary lifestyle, being hunter-fisher-gatherers they were often situated on a particular waterway or drainage catchment area where resources were plentiful (Appendix F).

Aboriginal settlement patterns of the southwest slopes are possibly reflected in the distribution of modified trees (Appendix F). Aboriginal people seem to have spent most of their time situated within close proximity to reliable water sources. Areas that people occupied were also influenced by available food sources, including waterbirds, kangaroos, wallabies, and various plant foods (Appendix F).

An Aboriginal Reserve (reserve number R32512) was gazetted for Aboriginal people on the south bank of the Lachlan River at Condobolin on 13 April 1901. Known as the Condobolin Mission, and later the Willow Bend Mission, the reserve was originally run by the Aborigines Protection Board (later Aborigines Welfare Board). Aboriginal people also resided at a self-managed “fringe camp” at the Murie Reserve, approximately 4 km south of Condobolin, between approximately 1900 and 1970 (Appendix F).

Previous Archaeological Investigations

A number of Aboriginal heritage surveys and assessments have previously been undertaken in the Project area and surrounds, including survey and assessment for the Project. Of relevant to the immediate area include the studies prepared by Appleton (2000, 2005) and Landskape (2017) for the approved Project.

The ACHA prepared by Landskape (2017) as part of an application for an Aboriginal Heritage Impact Permit (AHIP) for the approved Project, covered a portion of the additional surface development areas and included extensive surveys and community consultation.

A detailed description of the investigations and surveys undertaken in the additional surface development areas and surrounds is provided in Appendix F.

Previously Recorded Aboriginal Heritage Sites

Appleton (2000, 2005) identified 14 Aboriginal cultural heritage sites in or near the approved Project area. These comprised one stone artefact scatter, eight isolated finds of stone artefacts, four scarred trees and a site complex with stone artefacts, hearths, a scarred tree and hundreds of flaked lithics (Appendix F).

A more recent assessment undertaken by Landskape (2017) identified an additional 13 Aboriginal heritage sites in or near the approved Project area, including two stone artefact scatters, eight isolated finds of stone artefacts, two stone quarries and a scarred tree (Appendix F).

The closest of these Aboriginal cultural heritage sites located approximately 1 km east of the surface water extraction infrastructure and modified borefields are two isolated finds (AHIMS site numbers 43-2-0049, 43-2-0050). Table 21 provides a summary of Aboriginal heritage sites previously identified within proximity to the additional surface development areas.

Table 21 Summary of Previously Identified Aboriginal Heritage Sites Proximal to the Modification Area

AHIMS	Site Name	Site Type	Easting[1]	Northing[1]
43-2-0050	North Condobolin Road ISO2	Isolated stone artefact	550643	6317884
43-2-0049	North Condobolin Road ISO1	Isolated stone artefact	550673	6317994

[1] GDA94 (Zone55).

As development of the approved Project is yet to recommence, these sites are not actively managed. However, upon recommencement of works these sites would be managed consistent with the requirements of the AHIP #C0003049.

Community Consultation

Consultation for the Modification was undertaken in consideration of the OEH policy *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a) and clause 80c of the NSW *National Parks and Wildlife Regulation, 2009*.

Table 22 summarises the main stages of the Aboriginal heritage consultation process undertaken for the Modification. A detailed account of the consultation process (including consultation records and a detailed consultation log) is provided in Appendix F.

Table 22 Summary of Aboriginal Heritage Consultation Undertaken for the Modification

Date	Consultation Conducted
Notification of Project and Registrations	
2 December 2016	Modification notifications were sent to the Central West Local Land Services, Condobolin LALC, LSC, National Native Title Tribunal, Native Title Services Corporation Limited, OEH, Office of the Registrar, NSW *Aboriginal Land Rights Act, 1983*, and Peak Hill LALC to identify relevant organisations with a potential interest in the Modification.
6 December 2016 – 18 January 2017	Responses to the above request were received from the Office of the Registrar, NSW *Aboriginal Land Rights Act, 1983*, the OEH, National Native Title Tribunal and LSC.
6 January 2017 & 18 January 2017	Letters seeking registrations of interest were sent to the Aboriginal parties identified by the above step.
11 January 2017	A public notice was placed in the Koori Mail inviting interested Aboriginal parties or groups to register.
18 January 2017	A public notice was placed in the Condobolin Argus inviting interested Aboriginal parties or groups to register.
22 February 2017	The list of RAPs for the Modification, along with the written notifications and public notice, were provided to the OEH, the Condobolin LALC and the West Wyalong LALC.
Proposed Methodology Review and Information Session	
14 February 2017	The Proposed Methodology for undertaking the ACHA was distributed to the RAPs for review and comment.
20 February 2017	An invitation was extended to all RAPs to attend an information session on 8 March 2017 to discuss the Modification and Proposed Methodology.
8 March 2017	Information session held at the Condobolin RSL Club to provide RAPs with an additional opportunity to raise any cultural issues or comments/perspectives regarding the Modification or the Proposed Methodology.
16 March 2017	Comments and feedback on the relevant submissions of the Proposed Methodology were received from the relevant RAPs.
Field Surveys	
23 February 2016 & 22 March 2017	Aboriginal heritage survey was conducted by archaeologists from Landskape accompanied by representatives of the RAPs. The cultural significance of the Modification area was discussed with attending representatives.
Draft ACHA Review, Information Session and Site Inspection	
9 June 2017	A copy of the draft ACHA was provided to all RAPs for their review and comment. The draft ACHA included survey results, archaeological and cultural significance assessment (based on feedback received during consultation and fieldwork), potential impacts and proposed mitigation and management measures. An invitation was also provided to all RAPs to attend an information session on 22 June 2017 to discuss the findings, provide any information on cultural knowledge/significance, provide an opportunity to comment on the draft ACHA and to take part in a site inspection of a selection of identified Aboriginal heritage sites.
22 June 2017	Information session and on-site inspections offered to all RAPs on 22 June 2017.
June/July 2017	Comments received on the draft ACHA were considered and included in the ACHA.

Consultation with the RAPs regarding the approved Project and the Modification has been extensive and involved various methods including public notices, onsite meetings, written and verbal correspondence, archaeological survey attendance and on-site inspections.

Additional information regarding consultation undertaken with the Aboriginal community is provided in Section 1.3.

Survey Design and Methodology

The field investigation of the additional surface development areas was undertaken in two campaigns. The first was completed on 23 February 2016, and the second was completed on the 22 March 2017.

The additional surface development areas were inspected on foot, and the field teams examined the ground surface for any archaeological traces such as stone artefacts, hearths, hearthstones, shells, bones and mounds. All mature trees in the areas of proposed disturbance were inspected for scarring or carving by Aboriginal people. Particular attention was paid to areas with high ground surface visibility such as along stock and vehicle tracks and in scalds, gullies and other eroded areas.

The survey sampled the geographic extent of the additional surface development areas.

Archaeological Findings

No Aboriginal heritage sites were identified in the additional surface development areas, despite the intensive nature of the survey and the generally fair conditions of surface visibility (Appendix F). The lack of identifiable Aboriginal heritage sites may be attributable to past land use of the additional surface development areas as previous land clearing and agricultural activities are likely to have destroyed any pre-existing Aboriginal heritage sites (Appendix F).

The sediments of the additional surface development areas had been well enough exposed by agricultural activities, road and channel construction, vehicular traffic and wind and water erosion to determine that no archaeological material was present on the surface nor is likely to be buried beneath the soil (Appendix F).

Archaeological and Cultural Heritage Values

During the archaeological surveys the attending RAPs did not identify any specific locations within the additional surface development areas as being of exceptionally high or specific cultural significance. However a number of sites were identified in the surrounding areas (e.g. Mulgutherie Mountain) as being of specific value to the Aboriginal community. These sites are outside of the additional surface development areas and hence would not be subject to impacts by the modified Project.

RAPs identified the additional surface development areas as a place that Aboriginal people had occupied in the past. Generally, the Aboriginal representatives viewed all the Aboriginal cultural heritage sites as significant because they preserve a record of how and where people lived in the past.

The Lachlan River and its adjacent plains are considered to be of particular cultural significance to the Aboriginal community. Several of the RAPs involved in the assessment advised that the river areas have special significance to the Aboriginal community. Local Aboriginal people previously and still visit the Lachlan River for significant social events including meetings, fishing, mussel collecting and family outings.

4.10.2 Potential Impacts

Direct and Indirect Impacts

No Aboriginal heritage sites were identified within the additional surface development areas, so no known Aboriginal heritage sites, items or values would be potentially impacted by the Modification.

Although the additional surface development areas were sufficiently surveyed, there remains the potential to uncover previously unidentified Aboriginal heritage within and in immediate proximity to the additional surface development areas (Appendix F). Such previously unidentified features, should they occur, would probably be isolated finds or low-density concentrations of stone artefacts (Appendix F).

A strategy for managing any newly identified Aboriginal objects during the modified Project is considered further in Section 4.10.3.

Cumulative Impacts

Given that no Aboriginal heritage sites have been identified in the additional surface development areas, coupled with the low potential for such heritage to occur, the Modification would not increase cumulative impacts to Aboriginal cultural heritage in the region.

4.10.3 Mitigation Measures and Management

The mitigation, management and monitoring measures detailed below have been developed in consultation with the RAPs, in consideration of the cultural and archaeological significance of the Aboriginal heritage sites predicted to be impacted, and the cultural significance of the broader area.

Heritage Management Plan

A Heritage Management Plan would be developed in consultation with the RAPs and the OEH for the Project in accordance with Condition 40, Schedule 3 of Development Consent DA 374-11-00. The Heritage Management Plan would reflect any changes to Development Consent DA 374-11-00 that arise from the Modification and would be developed prior to the commencement of any surface development works which would harm known Aboriginal heritage sites in the additional surface development areas.

Aboriginal Heritage Impact Permit

Clean TeQ would submit application for a new AHIP under section 90 of the *National Parks and Wildlife Act, 1974* (and/or a variation application to the existing approved AHIP #C0003049).

General Management Measures

The following general management measures would be undertaken to manage Aboriginal heritage during the life of the modified Project (Appendix F):

- Ongoing consultation would be undertaken with the RAPs over the life of the modified Project. Appropriate Aboriginal representation would be facilitated during archaeological fieldwork (e.g. salvage of artefacts prior to disturbance).
- Protocols would be developed that prescribe the involvement of the RAPs in cultural heritage works conducted under the Heritage Management Plan. The intent of this would be to focus on RAPs or RAP groups that represent the wider Aboriginal community.
- Clean TeQ would provide opportunities for Aboriginal community members to access known Aboriginal heritage sites located on company-owned land (e.g. for cultural reasons or as part of scheduled field activities). Such access would be subject to Work Health and Safety requirements.
- A communication protocol would be developed that describes clear methods of communication, including expectations of suitable notification and response time, between the proponent and the RAPs.
- All relevant contractors and staff engaged for the modified Project who may have interactions with Aboriginal heritage sites would receive heritage awareness training as part of the induction process prior to commencing work on-site.
- Should any skeletal remains be detected during the course of the Modification, work with the potential to impact the remains would cease immediately and the find would be reported to the relevant authorities (including the Police, the OEH and RAPs). Subject to the Police requiring no further involvement, the management of any Aboriginal skeletal remains would be determined in consultation with the DP&E, the OEH and the RAPs.
- Erosion and sediment control works would be undertaken in consideration of known Aboriginal heritage sites and management measures.

- Any additional Aboriginal heritage sites which may be identified during the development of the modified Project would be recorded and registered with the OEH in consultation with the RAPs. Should additional Aboriginal heritage sites be identified, they would be managed in accordance with the measures described in the Heritage Management Plan.

4.11 Historic Heritage

As described in Section 4.1, the potential historic heritage impacts associated with the Modification would be related to additional surface development areas required for the surface water extraction infrastructure, the modified borefields layout and the water pipeline alignment option (Section 3.9) (the additional surface development areas).

The Modification would not change the approved historic heritage impacts at the other Project components and therefore these Project components have not been considered any further in this section.

4.11.1 Existing Environment

A European Heritage Survey and Assessment has been previously prepared for the Project (Heritage Management Consultants, 2000).

Heritage Management Consultants (2000) did not identify any historic heritage site of significance along the water pipeline or in the vicinity of the borefields.

During completion of the field investigation of the additional surface development areas for the ACHA (Section 4.10), project archaeologist Dr Matt Cupper from Landskape examined the area for historic heritage items. No historic heritage items were observed in the additional surface development areas.

4.11.2 Potential Impacts

As no historic heritage items were observed within the additional surface development areas, there would be no impacts to historic heritage items associated with the Modification.

4.11.3 Mitigation Measures and Management

A Heritage Management Plan would be developed in consultation with the OEH for the Project in accordance with Condition 40, Schedule 3 of Development Consent DA 374-11-00. The Heritage Management Plan would reflect any changes to Development Consent DA 374-11-00 that arise from the Modification and would be developed prior to the commencement of any surface development works and would include protocols for the management of any previously unidentified historic heritage items.

4.12 Biodiversity

As described in Section 4.1, the potential biodiversity impacts associated with the Modification would be related to additional surface development areas required for the surface water extraction infrastructure, the modified borefields layout and the water pipeline alignment option (Section 3.9) (the additional surface development areas).

The Modification would not change the approved biodiversity impacts at the other Project components and therefore these Project components have not been considered any further in this section.

4.12.1 Existing Environment

The existing environment relevant to biodiversity of the additional surface development areas is discussed below based on the results of database and literature reviews as well as field surveys and assessment.

The biodiversity surveys for the additional surface development areas (Appendices G and H) were completed prior to the commencement of the *Biodiversity Conservation Act, 2016* (BC Act).

Modified Borefields and Surface Water Extraction Infrastructure

The flora and fauna in a study area surrounding the modified borefields and surface water extraction infrastructure was surveyed by AMBS Ecology & Heritage Pty Ltd (AMBS) (2017a, Appendix G) on 30 August 2016, 4 November 2016 and 6 June 2017. In consideration of the minor extent of the proposed disturbance and limited habitat present, survey techniques included vegetation mapping, searches for threatened flora and fauna habitat assessment. This survey approach is consistent with DEC and Department of Primary Industries (DPI) (2004).

The location of the modified borefields and surface water extraction infrastructure largely comprises of cultivated land which is grazed by sheep and dominated by exotic plants (Figure 30; Plate 1). In some previously cleared locations adjacent to the River Red Gum Woodland, there is regeneration of River Red Gum (*Eucalyptus camaldulensis*) occurring (Figure 30; Plate 2). River Red Gum Woodland (also called *River Red Gum – Lignum very tall open forest or woodland wetland on floodplains*) occurs more extensively along the Lachlan River (Plate 3). This riparian vegetation has been subject to historical clearance and recent grazing which has degraded the understorey and introduced exotic plants (Plate 3).

No threatened flora species or ecological communities listed under the BC Act or *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) were recorded during the surveys. Further none are considered to potentially occur due to the absence of suitable habitat (AMBS, 2017a) (Appendix G) and lack of nearby database records (after Atlas of Living Australia [ALA], 2017a; OEH, 2017b).

Source: AMBS

Plate 1 Cultivated Land

Source: AMBS

Plate 2 River Red Gum Regeneration

Source: AMBS

Plate 3 River Red Gum Woodland

LEGEND

- Property Boundary
- Approved Project
- Transfer Station
- Water Pipeline
- Borefield Infrastructure Corridor *
- Potential Borefield Location
- Approximate Location of Production Bore (not constructed)
- Production Bore (constructed)
- Monitoring Bore
- Modified Project
- Transfer Station
- Pump Station
- Access Road
- Water Pipeline
- Borefield Infrastructure Corridor *
- Surface Water Infrastructure Corridor *
- Approved Water Pipeline Section no longer required
- Approved Borefield Infrastructure Corridor section no longer required
- Vegetation Mapping
- River Red Gum - Lignum very tall Open Forest or Woodland Wetland on Floodplains
- River Red Gum - Lignum very tall Open Forest or Woodland Wetland on Floodplains (Regenerated)
- Cultivated Land
- Road

* Infrastructure Corridor includes linking pipline, access road and electricity transmission line.

Source: AMBS (2017); NSW Land & Property Information (2016); Ivanplats Syerston (2005)

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Modified Borefields General Arrangement - Vegetation Mapping

Figure 30

The Brown Treecreeper (eastern subspecies) (*Climacteris picumnus picumnus*) (a small bird listed as 'Vulnerable' under the BC Act) has been previously recorded in the River Red Gum Woodland at the locality (AMBS, 2017a) (Appendix G). The Brown Treecreeper (eastern subspecies) has a wide distribution in NSW. A number of other threatened birds and arboreal mammals listed under the BC Act potentially use the River Red Gum Woodland, noting however, that the habitat resource on which these species generally predominantly rely (e.g. mature trees and trees with hollows) are not likely to be adversely impacted by the Modification. Further, no threatened species under the EPBC Act have been recorded within 15 km of the modified borefields and surface water extraction infrastructure (OEH, 2017b).

No threatened flora or fauna populations listed under the BC Act are likely to occur.

The Modification includes extraction of water from the Lachlan River (Plate 3). The Lachlan River is recognised as part of the *Aquatic Ecological Community in the Natural Drainage System of the Lowland Catchment of the Lachlan River Endangered Ecological Community* listed under the *Fisheries Management Act, 1994* (FM Act).

The lower Lachlan River is also recognised habitat for the Sliver Perch (*Bidyanus bidyanus*) (listed as 'Vulnerable' under the FM Act) (DPI, 2016), although it is noted that the only natural occurring self sustaining population of this species occurs in the Murray River, and its anabranches and tributaries (DPI, 2017). No threatened populations listed under the FM Act are likely to occur in the lower Lachlan River.

Alternative Water Pipeline Option

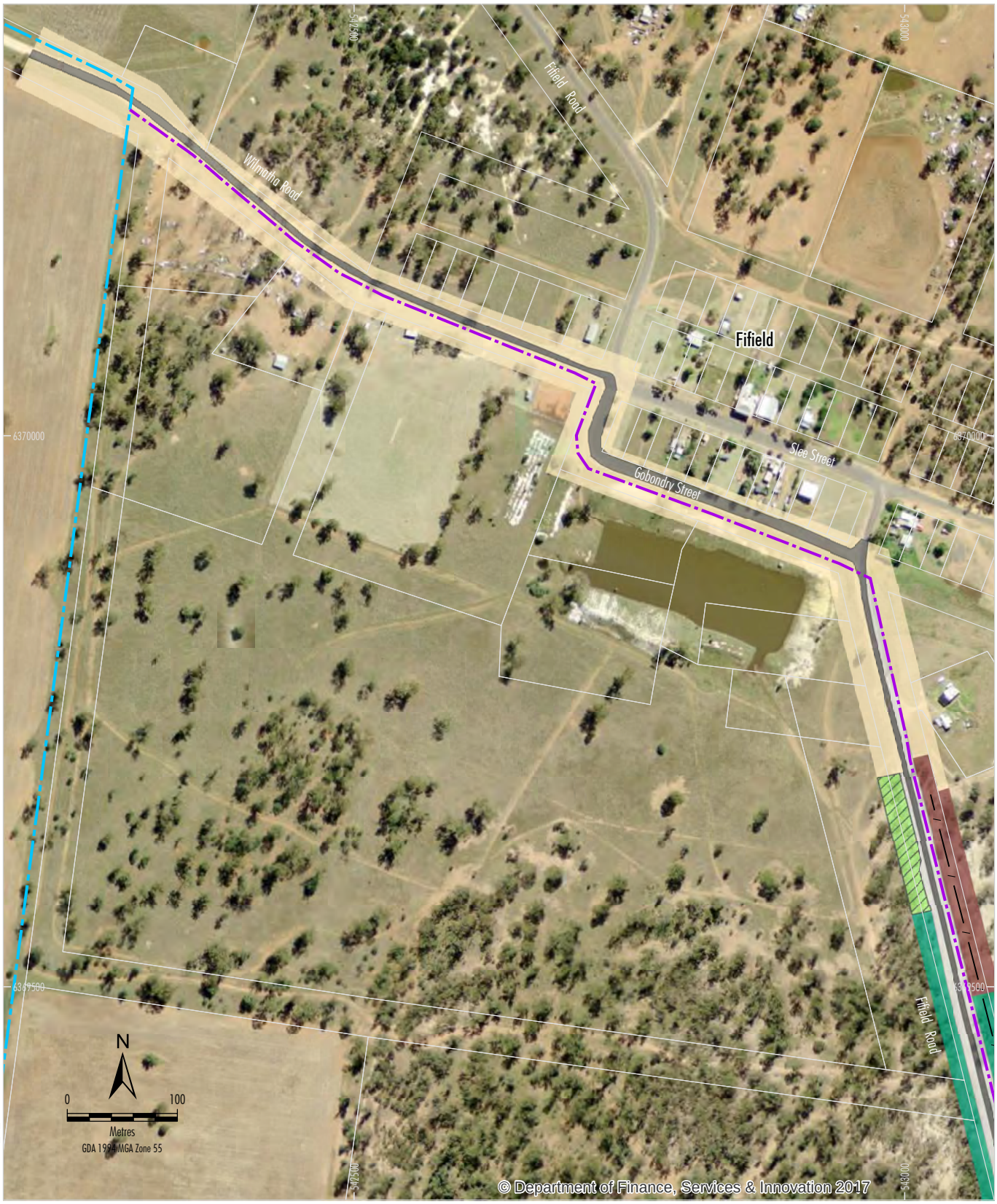
The flora and fauna in a study area surrounding the alternative water pipeline option was surveyed by Dr Colin Driscoll (Hunter Eco, 2017) (Appendix H) and AMBS (2017b in Hunter Eco, 2017 – Appendix H). In consideration of the proposed surface development associated with the alternative water pipeline option (i.e. no clearance of native vegetation communities), survey techniques included vegetation mapping and searches for threatened flora. This survey approach is consistent with DEC and DPI (2005).

The survey identified previously cleared road verges along Wilmatha Road, Gobondry Street and Fifield Road in which the alternative water pipeline option could be constructed (i.e. avoiding the need to clear any areas of native vegetation communities) (Figures 31a to 31c; Plate 4). No threatened flora species or ecological communities listed under the BC Act or EPBC Act were recorded in the cleared road verge where the alternative water pipeline option would be located (Hunter Eco, 2017) (Appendix H).

Native vegetation adjacent to the road verge (which is not proposed to be disturbed) was also surveyed by Hunter Eco (2017, Appendix H) and AMBS (2017b in Hunter Eco, 2017 – Appendix H). The native vegetation comprises Western Grey Box (woodland and derived native grassland) and Mugga Ironbark Woodland (Figures 31a to 31c). The Western Grey Box (woodland and derived native grassland) is equivalent to the following threatened ecological communities (Figures 31a to 31c):

- *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions Endangered Ecological Community* (Inland Grey Box Woodland EEC) listed under the BC Act; and
- *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia Endangered Ecological Community* (Grey Box Woodlands and Derived Native Grasslands EEC) listed under the EPBC Act.

Prior to the surveys by AMBS (2017b in Hunter Eco, 2017 – Appendix H), no threatened flora species were known to occur in the locality (after ALA, 2017b; OEH, 2017c). Three threatened flora species were identified in the Western Grey Box Woodland, namely *Tylophora linearis* (approximately 60 plants), Winged Peppercress (*Lepidium monoplocoides*) (approximately 50 plants) and *Austrostipa wakoolica* (one plant) (AMBS, 2017b in Hunter Eco, 2017 – Appendix H) (Figures 31a to 31c).



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LEGEND

- Approved Water Pipeline
- Modified Water Pipeline Alignment Option
- Property Boundary
- Fence

Vegetation Mapping

- Mugga Ironbark Woodland
- Western Grey Box Woodland
- Mostly Bare Earth under Trees
- Cleared Land
- Road Verge
- Road
- Grey Box EEC (TSC Act and EPBC Act)

Source: Hunter Eco (2017); NSW Land & Property Information (2017)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

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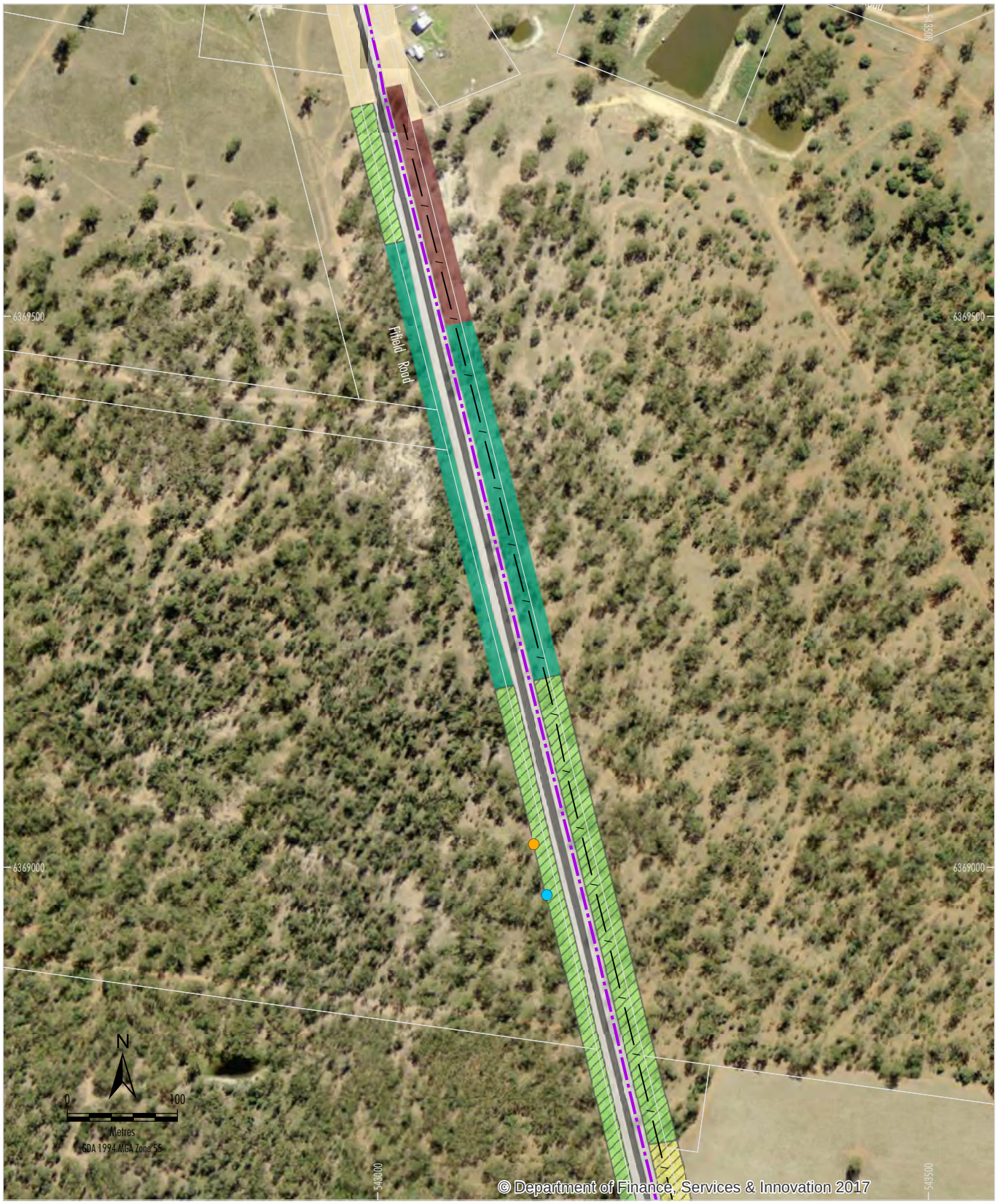
Modified Water Pipeline Alignment Option - Vegetation Mapping

Figure 31a



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LEGEND

Modified Water Pipeline Alignment Option
Property Boundary
Fence

Vegetation Mapping

Mugga Ironbark Woodland
Western Grey Box Woodland
Western Grey Box Derived Native Grassland
Mostly Bare Earth under Trees
Cleared Land
Road Verge
Road
Grey Box EEC (TSC Act and EPBC Act)

Threatened Flora Records

Lepidium monoplocoides
Tylophora linearis

Source: Hunter Eco (2017); NSW Land & Property Information (2017)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

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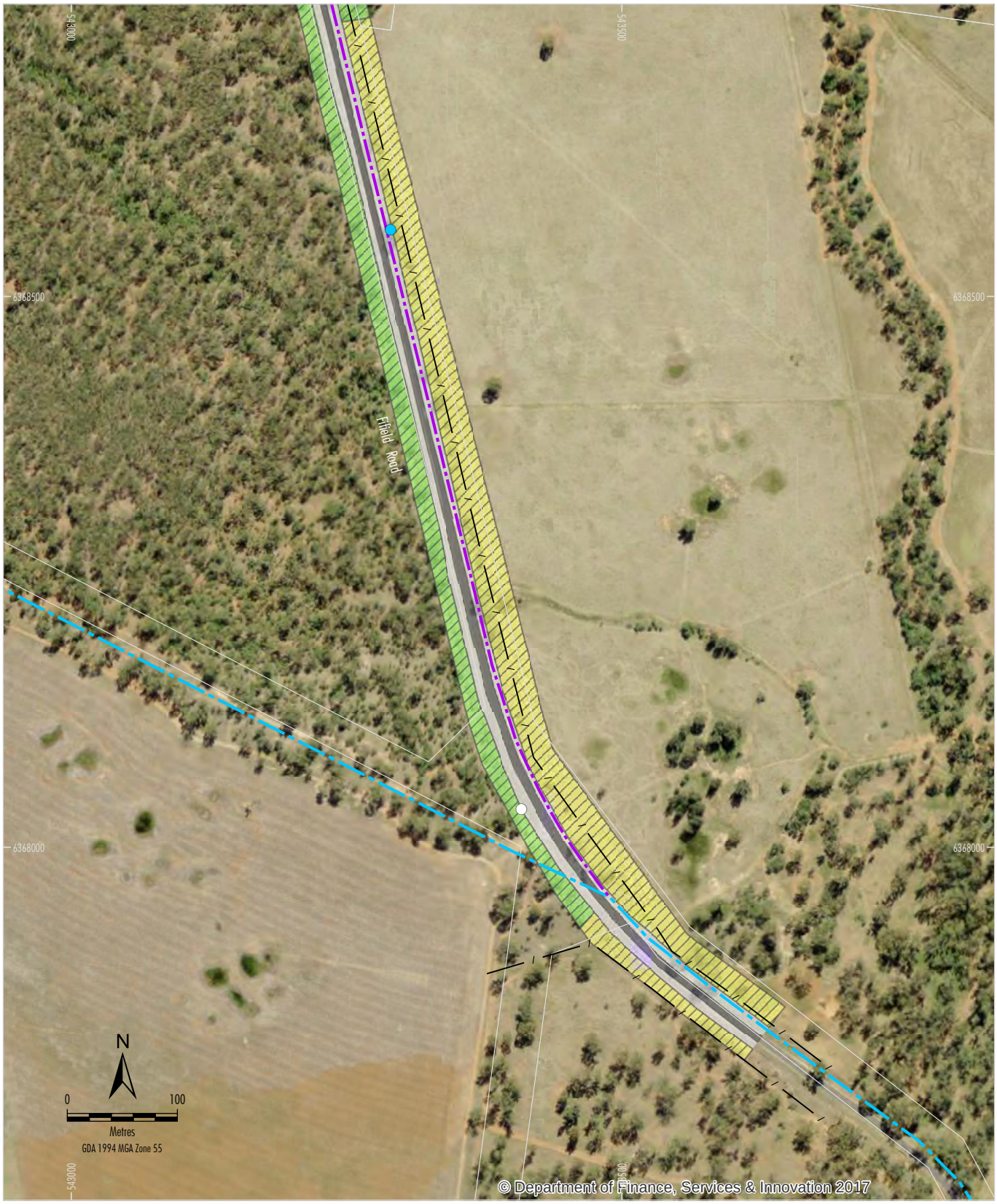
Modified Water Pipeline Alignment Option - Vegetation Mapping

Figure 31b



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LEGEND

- Approved Water Pipeline
- Modified Water Pipeline Alignment Option
- Property Boundary
- Fence

Vegetation Mapping

- Western Grey Box Woodland
- Western Grey Box Derived Native Grassland
- Road Verge
- Road
- Grey Box EEC (TSC Act and EPBC Act)

Threatened Flora Records

- *Austrostipa wakoolica*
- *Tylophora linearis*

Source: Hunter Eco (2017); NSW Land & Property Information (2017)
NSW Imagery: © Department of Finance, Services & Innovation (2017)

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SYERSTON PROJECT MODIFICATION 4

Modified Water Pipeline Alignment Option - Vegetation Mapping

Figure 31c

Source: Hunter Eco

Plate 4 Example of the Cleared Road Verge along Fifield Road

Native vegetation adjacent to the road verge (which is not proposed to be disturbed) is known habitat for threatened fauna species such as Superb Parrot (*Polytelis swainsonii*), Grey-crowned Babbler (eastern sub-species) (*Pomatostomus temporalis temporalis*) and Brown Treecreeper (eastern subspecies) (Driscoll pers comm. 2017). These birds have a wide distribution in NSW. No additional threatened fauna species have been recorded in the locality based on a review of databases (after ALA, 2017b; OEH, 2017c).

No threatened flora or fauna populations listed under the BC Act are likely to occur in the locality.

4.12.2 Potential Impacts

The potential direct, indirect and cumulative impacts on biodiversity are assessed below considering the *Draft Guidelines for Threatened Species Assessment* (DEC and DPI, 2005) in accordance with the requirements for a modification under Part 3A of the EP&A Act.

Direct Impacts

Vegetation and Habitat Clearance

The modified borefields are located in existing cleared, previously cultivated, paddocks (Figure 30). These components of the additional surface development areas would have no direct or indirect adverse impacts on native biodiversity.

The proposed pump station would be constructed near the Lachlan River, necessitating clearance of understorey and groundcover within an area of regenerating River Red Gum Woodland. The proposed surface water infrastructure corridor would be located through the mapped River Red Gum Woodland (Figure 30). However, the proposed pump station (and pipeline to the Lachlan River) has been specifically sighted in a location where no mature River Red Gums (i.e. trees old enough to flower) would be cleared.

The surface water infrastructure corridor between the proposed pump station and the modified transfer station would be constructed within a 35 m wide corridor, specifically sighted to minimise clearance of River Red Gum Woodland regeneration. The indicative alignment of the surface water infrastructure corridor is shown on Figure 30. The alignment would be finalised during detailed design of the Project, however the access road and water pipeline would not involve the disturbance of any mature trees.

In total, approximately 0.31 ha of native vegetation (groundcover and understorey) would be cleared for the Modification (all of which is associated with the proposed pump station and surface water infrastructure corridor) (Table 23). This area of clearance is very minor considering River Red Gum Woodland occurs extensively along the Lachlan River. There would be no fragmentation or disruption to the connectivity of habitat along the river.

Table 23 Summary of Native Vegetation Clearance

Vegetation Community	BC Act	EPBC Act	Clearance Area (ha)[1]
Regeneration (River Red Gum – Lignum very tall open forest or woodland wetland on floodplains)	Not listed	Not listed	0.15
River Red Gum – Lignum very tall open forest or woodland wetland on floodplains	Not listed	Not listed	0.16
		Total	**0.31**

[1] No mature trees would be cleared.

The alternative water pipeline option would be constructed in previously cleared areas along Wilmatha Road and Gobondry Street (through Fifield) and along Fifield Road (Figures 31a to 31c). The alternative water pipeline option would be mostly constructed along the eastern side of the road (Figure 31a and 31b), but would cross to the western side of the road in the southern section, to specifically avoid clearance of Western Grey Box derived native grassland (Figure 31c).

The cleared road verge comprises bare gravel, exotic plants and native grasses. No native vegetation communities mapped by Hunter Eco (2017, Appendix H) would be cleared for the alternative water pipeline option. Once the pipeline is constructed, the disturbed areas would be subject to progressive rehabilitation and natural regeneration.

Minimal habitat resources would be cleared as a result of the Modification (e.g. overstorey regeneration, understorey, midstorey and groundcover). No mature trees, hollow bearing trees or dead trees (stags) would be removed.

Threatened Species and Threatened Ecological Communities under the BC Act and EPBC Act

No threatened species or threatened ecological communities listed under the BC Act and/or EPBC Act would be directly impacted as a result of the Modification. Indirect impacts are assessed below.

SEPP 44 – Koala Habitat Protection

FSC Local Government Area (LGA) (in which the modified borefields is located) is an LGA relevant to *State Environmental Planning Policy No 44—Koala Habitat Protection* (SEPP 44) for the Koala (*Phascolarctos cinereus*).

SEPP 44 defines 'potential koala habitat' as an area of native vegetation where the trees of the types listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. River Red Gum (*Eucalyptus camaldulensis*), which occurs in the River Red Gum Woodland, is a Koala preferred tree species listed in SEPP 44.

As described above, the proposed pump station (and pipeline to the Lachlan River) has been specifically sighted in a location where no mature River Red Gums (i.e. trees old enough to flower) would be cleared.

Indirect Impacts

Threatened Flora and Threatened Ecological Communities under the BC Act

As described in Section 4.12.1, there are no threatened flora species or threatened ecological communities under the BC Act known to occur near the Modified Borefields.

Inland Grey Box Woodland EEC listed under the BC Act was recorded along Fifield Road (outside of the alternative water pipeline option alignment). Three threatened flora species were identified in the Inland Grey Box Woodland EEC, namely *Tylophora linearis,* Winged Peppercress (*Lepidium monoplocoides*) and *Austrostipa wakoolica* (AMBS, 2017b in Hunter Eco, 2017 – Appendix H) (Figures 31a to 31c).

The Inland Grey Box Woodland EEC and these three threatened flora species would not be adversely impacted during construction of the alternative water pipeline option because:

- the alternative water pipeline option would be progressively constructed over a short term (e.g. less than 12 months);
- no clearance (including laydown areas) would be permitted further than 5 m from Fifield Road towards the Grey Box Woodland;
- additional dust would only be temporarily generated during installation of the alternative water pipeline option (e.g. trenching and burial); and
- the risk of soil erosion would be reduced by active progressive rehabilitation and natural regeneration following construction.

Threatened Fauna under the BC Act

The River Red Gum Woodland adjacent to the surface water extraction area has the potential to provide habitat for threatened fauna under the BC Act. Threatened woodland birds and bats are likely to inhabit the River Red Gum Woodland which occurs more extensively along the Lachlan River.

The Grey Box Woodland and Mugga Ironbark Woodland adjacent to the water pipeline alignment option provides habitat for threatened woodland birds under the BC Act, such as the Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*) and Brown Treecreeper (eastern subspecies).

The Modification is unlikely to indirectly impact any threatened fauna under the BC Act as potential indirect impacts would be localised and managed (Section 4.12.3).

Threatened Species and Communities under the FM Act

As described in Section 3.9.2, to improve the water supply security of the Project, it is proposed to diversify supply sources by including extraction of surface water from the Lachlan River. Clean TeQ will seek to purchase existing water allocations for the Lachlan River under the Water Sharing Plan for the Lachlan Regulated River Water Source.

As described in Section 4.12.1, the Lachlan River is an endangered ecological community under the FM Act and potential habitat for the Sliver Perch. The Modification is not likely to significantly adversely impact threatened species and communities under the FM Act given the minor clearance of native riparian vegetation (approximately 0.31 ha – Table 23) and use of existing water allocations. Potential impacts on aquatic ecology would be reduced by:

- locating the proposed pump station back from the bank of the river (to reduce the potential for bank erosion), and an underground pipeline would connect the proposed pump station to the river;
- the risk of soil erosion would be reduced by active progressive rehabilitation and natural regeneration following pipeline construction;
- installing a suitable self-cleaning screen that would reduce the intake of fish at the pump inlet; and

- starting the pump slowly and then ramping up velocity to reduce the likelihood of fish in the vicinity of the intake being drawn into the pump.

Threatened Species and Communities under the EPBC Act

The Modification would not adversely impact any threatened species and communities under the EPBC Act because no threatened flora species or communities listed under the EPBC Act occur in the Modification areas and potential indirect impacts would be managed (Section 4.12.3).

Hence, there would be no significant impact on threatened species and communities listed under the EPBC Act as a result of the Modification.

Weeds

The Modification areas are largely in cleared areas dominated by exotic plants (Appendices G and H). Activities that could spread weeds during construction include soil disturbance, vehicle movements and movement of soil. Disturbed areas provide a substrate in which weed species may grow.

Weeds would be managed in accordance with the *Biosecurity Act 2015* and consideration of the *Central West Regional Strategic Weed Management Plan 2017 – 2022* (Central West Local Land Services, 2017).

Animal Pests

The Modification is unlikely to result in an increase in animal pests.

Bushfire Risk

A change in natural fire frequency can impact natural ecosystems. Accidental bushfires could potentially start in a variety of ways if not appropriately managed (e.g. from machinery or vehicles traversing dry grass).

Cumulative Impacts

Cumulative impacts are considered to be the total impact (direct and indirect) on the environment that would result from the incremental impacts of the Modification added to other existing impacts.

The direct and indirect impacts from the Modification area would not substantially increase existing impacts given the small area of native vegetation to be cleared (approximately 0.31 ha – Table 23).

4.12.3 Impact Avoidance and Mitigation Measures

Considerable effort has been made by Clean TeQ to avoid and mitigate impacts on biodiversity from the Modification. The small amount of native vegetation clearance required for the surface water extraction infrastructure (0.31 ha – Table 23), is due to the need for the proposed pump station to be located near the Lachlan River. Table 24 provides a summary of the impact avoidance and mitigation measures.

The modified Project would maintain biodiversity values and not result in significant adverse impacts on any threatened species and communities under the BC Act, FM Act or EPBC Act. As such, no biodiversity offset is proposed considering DEC and DPI (2005) and DPI (2013).

A Biodiversity Management Plan would be developed in consultation with the OEH for the Project in accordance with Condition 35, Schedule 3 of Development Consent DA 374-11-00. The Biodiversity Management Plan would reflect any changes to Development Consent DA 374-11-00 that arise from the Modification and would include detailed management measures, performance and completions criteria and a monitoring program.

4.13 Visual

As described in Section 4.1, the potential visual impacts associated with the Modification would be related to changes to the mine site layout (e.g. increased tailings storage facility footprint).

Table 24 Impact Avoidance and Mitigation Measures

Aspects	Impact Avoidance and Mitigation Measures
Modified Borefields	The proposed transfer station and associated access road, water pipeline and linking pipeline are located in existing cleared, previously cultivated, paddocks.
	The proposed pump station (and pipeline to the Lachlan River) has been specifically sighted in a location where no mature River Red Gums (i.e. trees old enough to flower) would be cleared.
	The surface water infrastructure corridor between the proposed pump station and the modified transfer station has been sighted mostly on cleared, previously cultivated, paddocks to minimise clearance regenerating River Red Gum Woodland and trees.
	The proposed pump station has been sighted away from the bank of the river, and an underground pipeline would connect the proposed pump station to the river.
	A self-cleaning screen would be installed on the proposed pump station that would reduce the intake of fish at the pump inlet.
	The pump on the proposed pump station would be started slowly and then ramping up velocity to reduce the likelihood of fish in the vicinity of the intake being drawn into the pump.
Alternative Water Pipeline Option	The alternative water pipeline option would be constructed in the cleared areas along Wilmatha Road and Gobondry Street (through Fifield) and along Fifield Road.
	The alternative water pipeline option would be progressively constructed over a short term (e.g. less than 12 months).
	No clearance (including laydown areas) would be permitted further than 5 m from Fifield Road towards the Grey Box Woodland.
	Additional dust would only be temporarily generated during installation of the alternative water pipeline option (e.g. trenching and burial).
General	Contractors would be made aware of clearing limits.
	Bushfire management measures would be implemented in accordance with Condition 49, Schedule 3 of Development Consent DA 374-11-00 and would include the site being suitably equipped to fight fires; develop asset protection in accordance with the Rural Fire Service's Planning for Bushfire Protection 2006; and consultation with the Rural Fire Service.
	Weeds would be managed in accordance with the NSW *Biosecurity Act 2015* and consideration of the Central West Regional Strategic Weed Management Plan 2017 – 2022 (Central West Local Land Services, 2017).
	The risk of soil erosion would be reduced by active progressive rehabilitation and natural regeneration following construction.

The Modification would not change the approved visual impacts at the other Project components and therefore these Project components have not been considered any further in this section.

4.13.1 Existing Environment

A Visual Assessment was prepared for the Project by Resource Strategies (2000) and described the potential visual impacts of the Project in the context of the sensitivity of surrounding viewpoints.

The regional visual character of the mine site is characterised by cleared agricultural land for the majority and an area of remnant bushland to the south-west of the site. Previous mining areas exist to the south-east of the mine site, within the north-eastern portions of the site and also to the north-east of the site (Resource Strategies, 2000).

The small village of Fifield is located approximately 4.5 km to the south-east, with Condobolin (the largest nearby town) located approximately 45 km to the south-west (Figure 1).

The topography of the area is relatively flat with the greatest expressions of relief being Boona Mountains approximately 20 km to the west and Gobondry Mountains approximately 10 km to the east (Resource Strategies, 2000).

Views of the mine site from the surrounding region are limited due to the lack of public vantage points, the relatively flat topography and shielding roadside vegetation (Resource Strategies, 2000).

The southern portion of the mine site is visible from Fifield Road when heading north from Fifield and from Wilmatha Road when heading in both approaches to the mine site. The northern view is limited due to vegetation along the northern boundary of the site.

4.13.2 Potential Impacts

The Modification would be generally consistent with the nature and scale of the approved Project.

Notwithstanding, elements of the Modification considered to have the potential to have more material visual impacts include the following:

- the footprint of the tailings storage facility would increase (Section 3.7.1);
- the height of the tailings storage facility would slightly increase from 310 m AHD to 314 m AHD (Section 3.7.1)
- the footprint of the evaporation ponds would reduce (Section 3.7.2); and
- mine infrastructure area components would be relocated (Section 3.2).

The tailings storage facility and evaporation ponds would be visible from sections of Wilmatha Road and Fifield Road. Limited views of the tailings storage facility would be available from private dwellings.

The potential visual impacts associated with the increased footprint and height of the tailings storage facility would be somewhat offset by the reduction in the footprint of the evaporation ponds.

The proposed minor changes to the mine infrastructure area components would not be expected to significantly alter the visual impacts of the approved Project from potentially sensitive viewpoints.

Any potential impact associated with night-lighting required for the Project (i.e. for safety reasons) would be similar to those assessed for the approved Project. These potential impacts would be minimised as far as possible through the implementation of mitigation measures described in Section 4.13.3.

Overall, the Modification is expected to result in similar or lower potential visual impacts at the mine relative to the approved Project.

4.13.3 Mitigation Measures, Management and Monitoring

Clean TeQ would implement a number of measures to minimise potential visual impacts at the modified Project:

- A vegetation screen would be established along the southern and eastern boundaries of the mine (Figures 9 to 12) to limit potential views of the Project from Wilmatha Road and Fifield Road, once established.
- The visual appearance of all ancillary infrastructure (including paint colours, specifications and screening) would blend in as far as possible with the surrounding landscape.
- Mine areas would be rehabilitated as soon as practicable following disturbance (Section 5) in order to reduce the contrast between the mine landforms and the surrounding environment.
- Whilst ensuring that operational safety is not compromised, Clean TeQ would minimise light emissions from the Project by select placement, configuration and direction of lighting so as to reduce off-site nuisance effects where practicable.
- All external lighting at the Project would be operated in accordance with AS 4282 (INT):1997 – *Control of Obtrusive Effects of Outdoor Lighting*.

5 Rehabilitation Strategy

A description of the rehabilitation strategy for the modified Project is provided in this section.

The mine site rehabilitation strategy is discussed in Sections 5.1 to 5.5. The rehabilitation strategy for the other Project components is described in Sections 5.6 to 5.8.

5.1 Rehabilitation Objectives and Principals

Condition 55, Schedule 3 of Development Consent DA 374-11-00 outlines the rehabilitation objectives for the Project and these are reproduced in Table 25.

Table 25 Rehabilitation Objectives

Features	Objective
Site (as a whole)	• Safe, stable and non-polluting. • Materials (including topsoils, substrates and seeds of the disturbed areas) are recovered, appropriately managed and used effectively as resources in the rehabilitation of the site. • Final land forms to: – restore native vegetation communities and ecosystem function (in the applicable domains); – sustain intended land use for the post- mining domains; – minimise visual impacts; – be generally in keeping with the natural terrain features of the area; and – incorporate micro-relief. • Incorporate drainage lines consistent with topography and natural drainage where reasonable and feasible.
Final voids	• Minimise: – the size and depth of the final void/s; – the drainage catchment of the final voids; and – risk of flood interaction for all flood events up to and including a 1 in 100 year or 1% annual exceedance probability storm event.
Surface Infrastructure	• To be decommissioned and removed, unless agreed otherwise by the Secretary of the DP&E.
Agriculture	• Land capability classification for the relevant nominated agricultural pursuit for each domain is established and self-sustaining within a reasonable timeframe.
Community	• Ensure public safety. • Minimise the adverse socio-economic effects associated with mine closure.

The rehabilitation principles for the Project include (Black Range Minerals, 2000):

- Preservation of areas of existing vegetation wherever possible.
- Rehabilitation of mine landforms would be progressive and conducted in accordance with approved plans (i.e. Mining Operations Plan and Rehabilitation Management Plan).
- The newly prepared (i.e. topsoiled) landforms would be protected via the construction of moisture-retaining passive drainage systems, water-holding structures (e.g. surface depressions) and, where appropriate, the use of authorised hybrid cover crops to provide initial erosion protection.
- Where possible, revegetated landforms would form an expansion of, and be continuous with, existing woodland areas.

- Outer embankments of the tailings storage facility would be rehabilitated progressively during operational years.
- Livestock would be excluded from rehabilitated areas where agriculture is not the final land use.
- Rehabilitation concepts should be flexible and allow for adjustments, based on trials.

5.2 Rehabilitation of the Modified Mine Site

In accordance with Condition 56, Schedule 3 of Development Consent DA 374-11-00, Clean TeQ would rehabilitate the site progressively, that is, as soon as is practicable following disturbance.

5.2.1 Post-Mining Land Use and Conceptual Final Land Form

Post-Mining Land Use

The approved post-mining land use is a combination of agriculture (pasture for grazing) and nature conservation (endemic woodland areas) (Black Range Minerals, 2000).

Clean TeQ has assessed potential post-mining land uses (e.g. grazing and native vegetation) taking into account the modified Project, relevant strategic land use objectives of the area in the vicinity of the Project and the potential benefits of the post-mining land use to the environment, future landholders and the community.

Based on this assessment, Clean TeQ proposes the post-mining land use of the modified Project would continue to comprise a combination agriculture (pasture for grazing) and nature conservation (endemic woodland).

The Modification would therefore not change the approved post-mining land uses.

The post-mining land uses are also generally consistent with the relevant objectives of the *Lachlan Shire Local Environmental Plan 2013* (Lachlan LEP) (Section 6.2.2).

Figure 32 illustrates the conceptual rehabilitated final landform and post-mining land uses.

Conceptual Final Landform

Key features of the approved final landform include:

- two final voids;
- two waste rock emplacements to a maximum final elevation of approximately 330 m AHD;
- a tailings storage facility;
- evaporation ponds; and
- water storage dam.

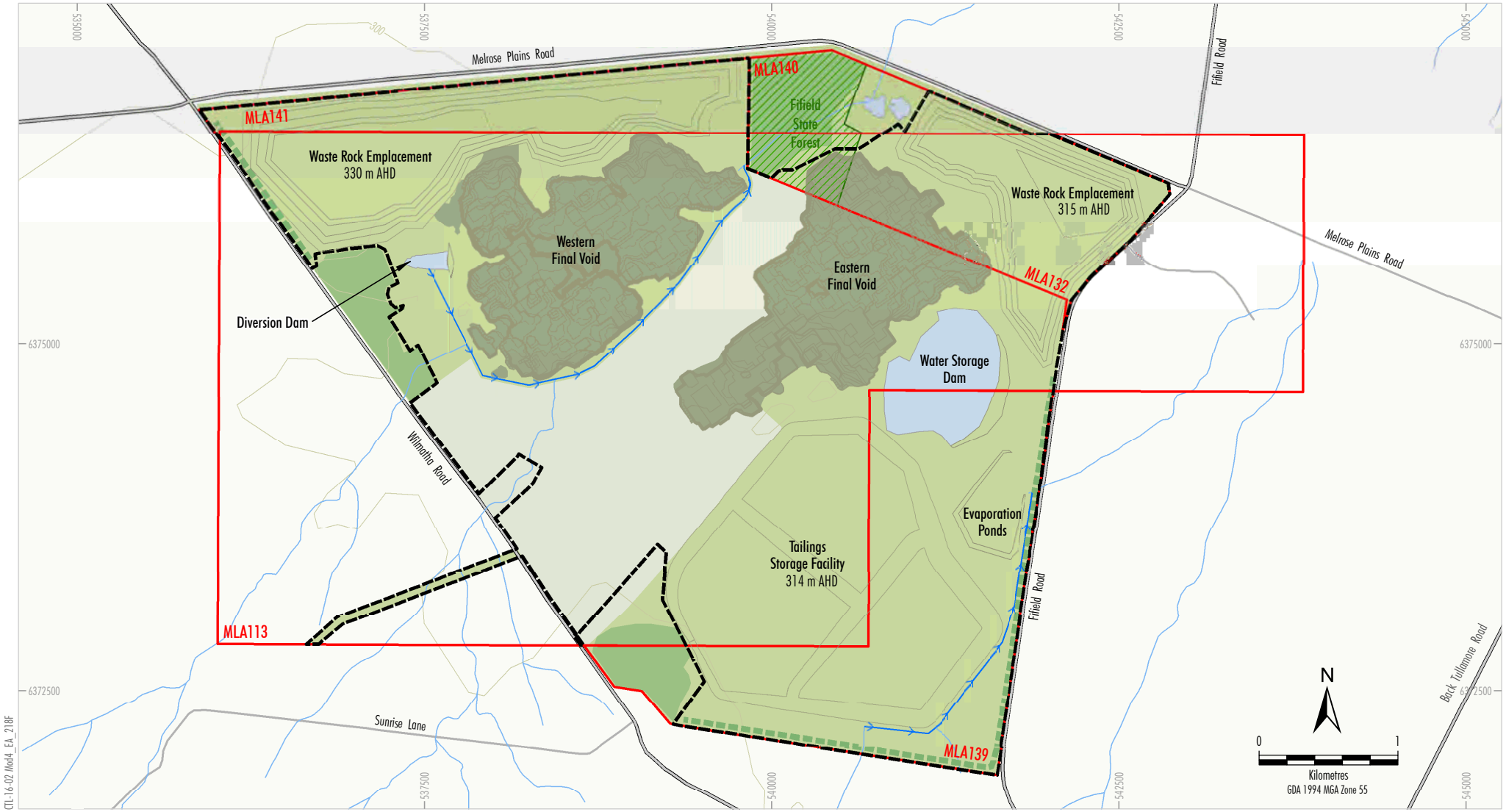
The Modification would result in the following changes to the final landform:

- the footprint of the tailings storage facility would increase (Section 3.7.1);
- the final elevation of the tailings storage facility would slightly increase from approximately 310 m AHD to 314 m AHD (Section 3.7.1); and
- the footprint of the evaporation ponds would reduce (Section 3.7.2).

The Modification would not change the approved final voids or rehabilitated waste rock emplacements.

Figure 32 illustrates the conceptual rehabilitated final landform and post-mining land uses.

Further detail on the final landform is provided in Section 5.2.2



LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Void
- Rehabilitated/Revegetated Endemic Woodland
- Rehabilitated/Revegetated Pasture
- Water Storage
- Existing Open Woodland to be Maintained
- State Forest
- Vegetation Screening
- Diversion Structure

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land & Property Information (2017)

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Modified Mine and Processing Facility
Conceptual Final Landform and Land Uses

Figure 32

5.2.2 Rehabilitation Domains

The *ESG3: Mining Operations Plan (MOP) Guidelines* (NSW Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy, 2013) state that for rehabilitation planning and mine closure it is useful to separate a mines site into smaller conceptual domains.

Conceptual broad scale rehabilitation domains for planning purposes are shown on Figure 33. The conceptual broad scale domains are as follows:

- infrastructure;
- waste rock emplacements;
- tailings storage facility;
- final voids; and
- water management.

Key features within these broad domains and the domain objectives are described below.

The progressive refinement of these domains into sub-domains and the development of associated sub-domain objectives would be presented in the Mining Operations Plan.

Infrastructure Domain

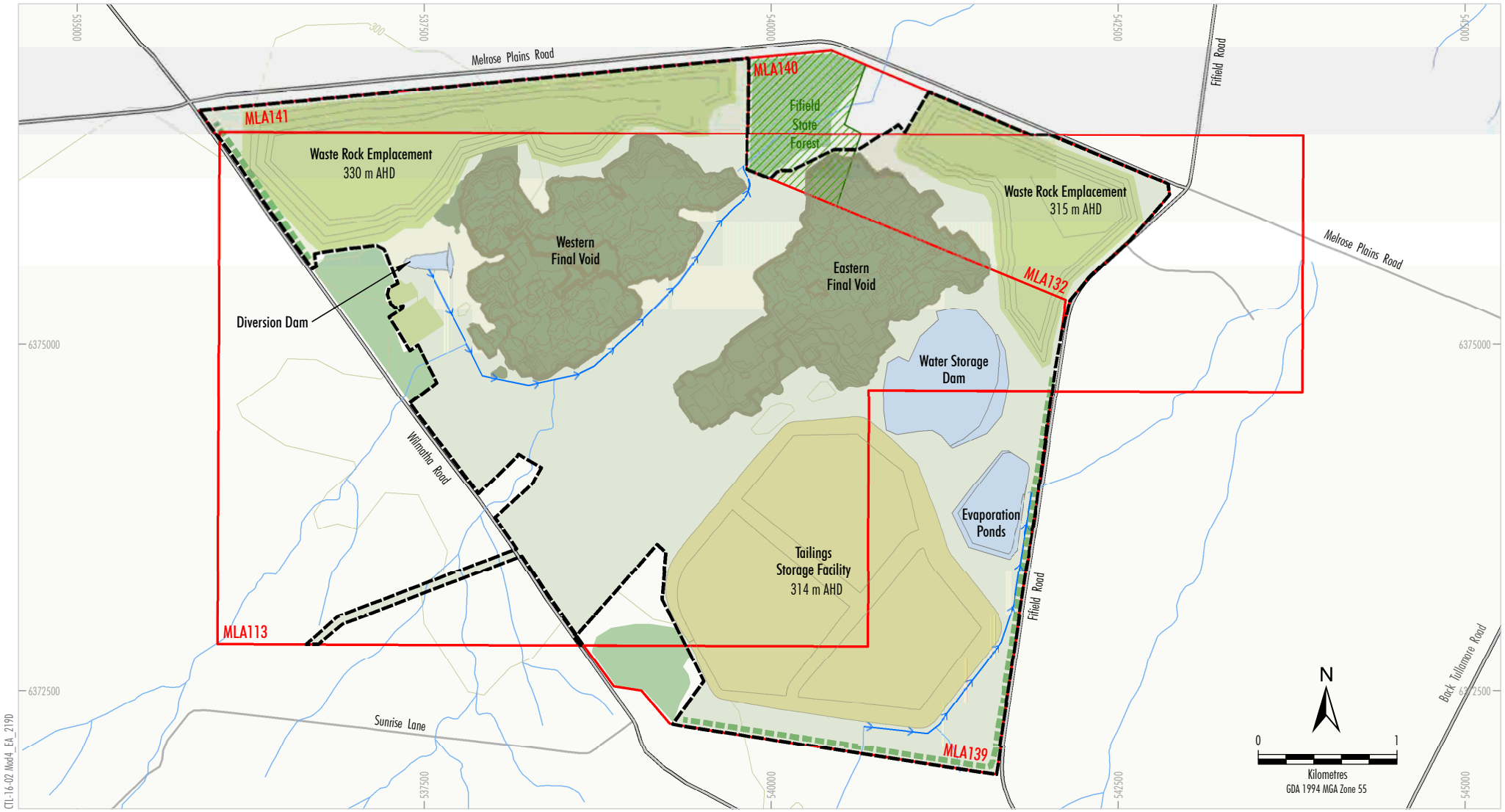
This domain is dominated by the processing facility and general supporting infrastructure. The infrastructure domain would include, but is not limited to:

- processing facility;
- ROM pad ore stockpiles;
- reagent production plants and storage areas;
- gas-fired power plant and associated power distribution infrastructure;
- construction camp;
- concrete batch plant;
- offices, workshops, warehouse, laboratory and amenities buildings and car parking facilities;
- fuel storage areas;
- potable water treatment plant;
- wastewater (including sewage) treatment plant;
- laydown areas;
- access road, internal roads and haul roads; and
- other associated minor infrastructure, plant, equipment and activities.

The Modification would not significantly change the rehabilitation strategy for the infrastructure domain.

The conceptual mine closure and rehabilitation objectives for the infrastructure domain would be:

- Infrastructure with no on-going beneficial use would be decommissioned and removed, unless otherwise agreed by the Secretary of the DP&E.
- Hydrocarbons (petrol, diesel, oils, greases, degreasers and kerosene), explosives, chemicals and liquid and non-liquid wastes unused at the completion of mining would be returned to the supplier in accordance with relevant safety and handling procedures.



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LEGEND

- Mining Lease Application Boundary
- Approved Surface Development Area
- Existing Open Woodland to be Maintained
- State Forest
- Vegetation Screening
- Diversion Structure

Rehabilitation Domains

- Final Voids
- Waste Rock Emplacement
- Tailings Storage Facility
- Infrastructure
- Water Storage

Source: Black Range Minerals (2000); NSW Department of Industry (2017); NSW Land & Property Information (2017)

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SYERSTON PROJECT MODIFICATION 4

Conceptual Broad Scale Rehabilitation Domains

Figure 33

- If there are any contaminated soils associated with the Project, these would be identified and remediated in accordance with the requirements of the NSW *Contaminated Land Management Act 1997*.
- Water management structures and sediment control structures would either be retained as water sources for future land uses or decommissioned and rehabilitated.
- The domain would be profiled to a free-draining landform with runoff reporting to the natural environment and would be revegetated to either endemic woodland or pasture areas.
- An approximate 0.2 m layer of soil would be placed on the landform prior to revegetation (Black Range Minerals, 2000).
- Following rehabilitation, a combination of agriculture (pasture for grazing) and nature conservation (endemic woodland) land uses would occur in the infrastructure domain.

A discussion of the native plant species for revegetation is provided in Section 5.3.3.

Waste Rock Emplacements

Waste rock material generated would be placed either in one of two waste rock emplacements (Figures 9 to 12).

The waste rock emplacements would be up to approximately 20 m and 30 m high (or a maximum elevation of approximately 330 m AHD) (Figures 9 to 12).

The Modification would not significantly change the rehabilitation strategy for the waste rock emplacements domain.

The conceptual mine closure and rehabilitation objectives for the waste rock emplacement domain would be:

- The waste rock emplacement would be profiled to incorporate micro-relief and natural appearing landform features as a component of finalising site landforms and slopes.
- The overall batter slopes of the waste rock emplacements would be 1V:4H with intermediate batter slopes constructed to 1V:3H (Black Range Minerals, 2000).
- Reverse graded berms would be located at approximately 10 m intervals (Black Range Minerals, 2000).
- Batter drainage would be via the reverse-graded berms. The berms would diffusely grade inwards and the surfaces would be kept as rough as possible to maximise absorption, to avoid the use of artificial drainage structures on the batters (Black Range Minerals, 2000).
- Drainage on the top surfaces of the waste rock emplacements would be similarly managed via a series of small shallow basins (i.e. depressions or micro-relief), and endemic woodland vegetation with a high water demand. The use of depressions is aimed at maximising internal drainage without creating permanent ponding (Black Range Minerals, 2000).
- An approximate 0.5 m layer of soil would be placed on the backfilled landform prior to revegetation (Black Range Minerals, 2000).
- Water management structures and sediment control structures would either be retained as water sources for future land uses or decommissioned and rehabilitated.
- Following rehabilitation, conservation (endemic woodland) land use would occur in the waste rock emplacements domain.

A discussion of the native plant species for revegetation is provided in Section 5.3.3.

Final Voids

At the completion of mining, the modified Project final landform would include two final voids (Figures 32 and 33).

Perennial water bodies are not expected to occur in the final voids due to the dominance of evaporation over rainfall at the mine site (Black Range Minerals, 2000).

The Modification would not significantly change the rehabilitation strategy for the final voids domain.

Conceptual mine closure and rehabilitation objectives for the final voids domain would be:

- Mine planning would target minimising the size and depth of the final voids as far as reasonable and feasible.
- Areas of the domain may be revegetated to endemic woodland areas where it is feasible.
- The catchment of the final voids would be minimised with the provision of permanent perimeter bunds, diversion channels and/or bunds/embankment walls.
- The final landform design would provide flood immunity for flood events up to a 1 in 100 year ARI rainfall event.
- Final void access restrictions (e.g. fencing) for safety and exclusion of livestock would be designed and implemented in consultation with relevant authorities.

Tailings Storage Facility

Tailings would be pumped from the processing facility to the tailings storage facility (Figures 9 to 12).

As described in Section 3.7.1, the footprint of the tailings storage facility would increase as a result of the Modification. The final elevation of the tailings storage facility would also slightly increase from approximately 310 m AHD to 314 m AHD.

Other components of the tailings storage facility, such as tailings delivery, underdrainage, seepage collection and decant systems would be generally unchanged.

The design of the modified tailings storage facility would conform to the relevant design (including geotechnical stability) requirements described in Condition 29, Schedule 3 of Development Consent DA 374-11-00. This includes the requirements for permeability of liners, storage capacity and DSC design requirements (Sections 2.8.1 and 2.8.2).

The proposed layout of the modified tailings storage facility and a conceptual cross section through the modified tailings storage facility embankment are provided on Figure 14.

The external batters of the tailings storage facility embankments would be progressively rehabilitated as they become available. Rehabilitation of the top surfaces of the tailings storage could only be undertaken at the completion of its operational life.

Conceptual mine closure and rehabilitation objectives for the tailings storage facility are as follows:

Tailings Storage Facility External Batters

- The overall tailings storage facility external batter slopes would be 1V:4H (Black Range Minerals, 2000).
- Drainage of the external batters would be facilitated by the construction of berms to reverse grade, and be left rough to enhance absorption. The berms would longitudinally fall to low depressions constructed every 50 to 100 m along the berm to cater for high rainfall events (Black Range Minerals, 2000).
- Ripping on the external batters to create surface roughness and absorption prior to revegetation operations would be undertaken.
- An approximate 0.5 m layer of soil would be placed on the backfilled landform prior to revegetation (Black Range Minerals, 2000).

Tailings Storage Facility Top Surface

- The decant area would be allowed to dry and the decant tower would be capped with fill and/or a concrete plug.
- The underdrains and associated sumps would be grouted.
- The tailings discharge pipes and other infrastructure would be dismantled for reuse or disposal.
- A number of surface swale drains would be developed on the top surface to minimise the potential for erosion. The storage surfaces would form contained catchments (i.e. would not spill over the batters).
- Surface materials, a passive drainage regime and revegetation would maximise water storage and/or evapotranspiration (Black Range Minerals, 2000).
- Trials would be undertaken to refine the rehabilitation cover system. Options for surface treatment prior to revegetation would include (Black Range Minerals, 2000):
  - placement of waste rock to serve as a stabiliser and to enhance soil and vegetation trapment;
  - covering the tailings surface directly with variable thicknesses of soil; and
  - direct planting into tailings without the establishment of a soil cover.

Following rehabilitation, conservation (endemic woodland) land use would occur in the tailings storage facility domain.

A discussion of the native plant species for revegetation is provided in Section 5.3.3.

Water Management

The key water management-related landforms at the mine include the evaporation ponds, water storage dam and the diversion structures.

The Modification would include a reduction in the footprint of the evaporation ponds due to the reduction in water volume reporting to the evaporation ponds (Section 3.7.2).

The water storage dam would remain unchanged as a result of the Modification.

The Modification would require a minor change to the southern diversion structure alignment.

Conceptual mine closure and rehabilitation objectives for the water management domain are as follows:

Evaporation Ponds

- The internal partition embankment and the north-eastern external embankment would be breached and profiled to be a free-draining landform with runoff reporting to the natural environment.
- Internal and external embankments and batters would be flattened to a maximum slope of 1V:3H (Black Range Minerals, 2000).
- If there are any contaminated soils associated with the Project, these would be identified and remediated in accordance with the requirements of the NSW *Contaminated Land Management Act 1997*.
- An approximate 0.5 m layer of soil would be placed on the landform prior to revegetation (Black Range Minerals, 2000).
- Following rehabilitation, conservation (endemic woodland) land use would occur on the rehabilitated evaporation ponds.

Water Storage Dam

- It is expected that the water storage dam would be retained as a water storage post-mining (subject to the agreement of the Secretary of the DP&E).
- The external batters would be modified to allow for the collection of runoff.
- An approximate 0.5 m layer of soil would be placed on the external batter of the water storage dam prior to revegetation (Black Range Minerals, 2000).
- Following rehabilitation, conservation (endemic woodland) land use would occur on the external batter of the water storage dam.

Diversions

- The rehabilitated diversions would be safe, stable and non-polluting landform.
- The design would consider long term stability and compatibility with existing hydrological features, landforms and vegetation.

Detailed description of the clean water diversion systems would be included in the Surface Water Management Plan in accordance with Condition 30, Schedule 3 of Development Consent DA 374-11-00.

A discussion of the native plant species for revegetation is provided in Section 5.3.3.

5.2.3 Key Rehabilitation Performance Measures and Strategic Completion Criteria

Key rehabilitation performance measures and strategic completion criteria would be developed for the modified Project. They would be developed with regard to *Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure* (Department of Industry, Innovation and Science, 2016).

The Mining Operations Plan would describe the rehabilitation performance measures and completion criteria including more detailed and quantified criteria where applicable (based on the Development Consent requirements for the modified Project). The rehabilitation performance measures and completion criteria to be included in the Mining Operations Plan would be specific, measureable, achievable, realistic and time-bound.

Over the life of the modified Project, rehabilitation performance measures and completion criteria would periodically be updated and refined in consultation with relevant regulatory stakeholders to reflect evolving site rehabilitation practices and standards.

5.3 General Mine Rehabilitation Practices and Measures

Rehabilitation progress of the modified Project and rehabilitation techniques and materials would be regularly evaluated. The results would inform future rehabilitation initiatives and refinement/amendment of the practices and measures via adaptive management as described below.

5.3.1 Vegetation Clearing Measures

The clearance of vegetation would be undertaken progressively, with the area of vegetation cleared at any particular time generally being no greater than that required to accommodate projected development activities for the next 12 months.

Vegetation clearance protocols would be documented in the Biodiversity Management Plan required by Condition 35, Schedule 3 of Development Consent DA 374-11-00 and the Mining Operations Plan. Key components of the vegetation clearance protocols would include aspects such as the clear delineation of vegetation areas to be cleared, clearing inspections and re-use of cleared vegetation debris in revegetation

5.3.2 Soil Striping and Handling Measures

General soil management practices would include the stripping and stockpiling of soil resources for use in rehabilitation. The objectives of soil resource management would be to:

- identify and quantify potential soil resources for rehabilitation;
- optimise the recovery of usable soil reserves during soil stripping operations;
- manage soil reserves so as not to degrade the resource when stockpiled; and
- establish effective soil amelioration procedures to maximise the availability and suitability of soil reserves for future rehabilitation works.

Soils would be progressively stripped and stockpiled in a manner that minimises the degradation of soil quality, including the following procedures (Black Range Minerals, 2000):

- topsoil and subsoils would be stockpiled separately if different soil horizons are evident;
- stockpiles would not be located in drainage lines or trafficable areas;
- upslope surface water runoff would be diverted around soil stockpiles and ancillary infrastructure;
- stockpiling time would be minimised by prioritising the reuse of these materials;
- stockpiles would be seeded with suitable endemic grass and legume species as soon as practicable after construction, if extended storage is anticipated;
- colonising weed species would be controlled;
- stockpiled soils would be monitored and rejuvenated if necessary; and
- soil stockpiles would be located adjacent to disturbance areas.

The Mining Operations Plan would describe the soil resource management measures that would be used during the Project life.

5.3.3 Selection of Native Plant Species for Woodland Revegetation

Disturbed areas to be revegetated with native vegetation would initially be stabilised with a non-persistent cover crop. Suitable native tube stock and/or seeds would then be planted/sown.

Native species to be planted in revegetation areas would be selected on a site by site basis depending on nearby remnant vegetation associations, soil types, aspect and site conditions.

The list of suitable native plant species to be used in the revegetation of disturbance areas would be documented in the Mining Operations Plan.

5.3.4 Erosion and Sediment Control Works

Erosion and sediment control would be undertaken in accordance with the Surface Water Management Plan (Section 4.8) required by Condition 30, Schedule 3 of Development Consent DA 374-11-00.

Sediment and erosion controls would be periodically updated and regularly reviewed.

Operational sediment and erosion control works would be maintained during the establishment of revegetation. However, once self-sustaining stable final landforms have been achieved within an area, key elements of the operational sediment control structures would either be left as passive water control storages or would be removed and the area would become free-draining.

5.3.5 Land Contamination Management

Mitigation measures to minimise the potential for land contamination at the Project are provided in Section 4.2.

Investigations would be undertaken at mine closure to identify and remediate any contaminated soil materials that may exist (e.g. in infrastructure areas) in accordance with the requirements of the NSW *Contaminated Land Management Act 1997*.

5.3.6 Weed and Pest Control

Project weed and pest control measures are described in Section 4.12.3.

5.3.7 Bushfire Management

Bushfire management measures for the Project are described in Section 4.12.3.

5.4 Mining Operations Plan

The Mining Operations Plan will describe how rehabilitation is undertaken, it will provide rehabilitation performance and completion criteria and address all aspects of rehabilitation including mine closure, final landforms and final land use.

5.5 Rehabilitation Monitoring

Ongoing monitoring and maintenance of rehabilitation areas at the Project would be conducted to assess the:

- progress of rehabilitation areas; and
- the effectiveness of the rehabilitation techniques being used to determine the need for any maintenance and/or contingency measures.

A summary of rehabilitation activities and performance would be provided in the Annual Review.

The rehabilitation monitoring would include:

- recording germination success in endemic woodland and pasture revegetation areas;
- recording pasture establishment success in pasture areas and progression towards suitability for low impact grazing;
- monitoring drains and rehabilitated mine landforms for localised failures or rilling and loss of topsoil after rainfall events;
- identifying potential threats to rehabilitated woodland and pasture areas (e.g. weed invasion, pest species, erosion);
- monitoring the stability of rehabilitated mine landforms; and
- recording key rehabilitation information (e.g. taking photographic records, documenting rehabilitation surveys).

Annual surveys of rehabilitation areas would be undertaken by an appropriately qualified and experienced person to review the progress of rehabilitation and to identify any additional measures required to achieve ongoing progression towards achieving rehabilitation criteria. A monitoring report would be prepared annually that includes a summary of previous monitoring results, results of the current year's monitoring and any planned remedial works, if required. The monitoring results would be summarised in the Annual Review.

The specific rehabilitation parameters and completion criteria would be determined in consultation with relevant government agencies and documented in the Mining Operations Plan.

Clean TeQ would conduct rehabilitation and revegetation trials at the Project with the objective of improving overall rehabilitation outcomes to meet the Project closure objectives and completion criteria.

5.6 Borefields and Surface Water Extraction Infrastructure

The Modification would include:

- minor changes to borefields layout (Section 3.9.1); and
- addition of licensed surface water extraction from the Lachlan River (Section 3.9.2).

The rehabilitation strategy for the modified borefields would however remain unchanged and would be extended to include the surface water extraction infrastructure.

Rehabilitation management strategies post construction that would be implemented include:

- control of weed species; and
- implementation of erosion and sediment control measures.

The following options exist at the decommissioning stage:

- transfer ownership to regional landholders with pump station, bores and transfer stations remaining in working condition; or
- dismantle pump station and cap bores, and remove infrastructure (including borehead facilities).

The decommissioning options would be determined in consultation with landowners and subject to the agreement of the Secretary of the DP&E.

Rehabilitation of the borefields and surface water extraction infrastructure would be undertaken in consultation with immediately affected landowners.

Regeneration of the borefields and surface water extraction infrastructure would reflect the vegetation of the existing environment and would include manage weed species.

5.7 Water Pipeline

The Modification includes an option to modify the water pipeline alignment to follow existing road reserves rather than following the alignment of the approved Fifield Bypass (Section 3.9.4)

The rehabilitation strategy for the alternative water pipeline would however remain unchanged.

The main rehabilitation objectives following construction of the water pipeline are as follows:

- replacement of soil from original location;
- management of weed species;
- management of tree growth; and
- implementation of erosion and sediment control measures.

The following options exist at the decommissioning stage of the water pipeline:

- disconnect and leave the pipeline infrastructure for future use (e.g. town water supply);
- utilise the pipeline for other purposes; or
- dismantle the pipeline and return the area to its former condition.

The final options for pipeline decommissioning are dependent on the future land use requirements of the landowner and local authorities.

If the option to dismantle pipeline infrastructure is selected the following procedures would be followed (Black Range Minerals, 2000):

- remove infrastructure and backfill trenches;
- rehabilitate disturbed areas; and
- provide for stock, native fauna and human safety.

Final rehabilitation objectives would be to (Black Range Minerals, 2000):

- backfill the trenches with soil from the area;
- implement erosion and stabilisation controls at potentially sensitive areas;
- reflect the vegetation of the existing environment; and
- manage weed species.

5.8 Other Project Components

As described in Section 1.2, the Modification would not involve changes to any aspects of the approved limestone quarry, rail siding or gas pipeline.

The approved rehabilitation strategy for these Project components would therefore remain unchanged.

6 Statutory Context

This section outlines the statutory requirements relevant to the assessment of the Modification.

6.1 Applicability of Section 75W of Environmental Planning and Assessment Act, 1979

The Project was approved under Part 4 of the EP&A Act in 2001 (Development Consent DA 374-11-00).

Clause 12 of Schedule 6A of the EP&A Act provides that section 75W of Part 3A of the EP&A Act continues to apply to modification of development consents referred to in clause 8J(8) of the *Environmental Planning and Assessment Regulation, 2000* (EP&A Regulation) following the repeal of Part 3A.

The Project was approved under Part 4 of the EP&A Act in 2001 by development consent under Division 4 of Part 4 of the EP&A Act (relating to State significant development). Therefore Development Consent DA 374-11-00 is a development consent that falls within clause 8J(8)(c) of the EP&A Regulation. That is, section 75W of the EP&A Act continues to apply to modifications to Development Consent DA 374-11-00, notwithstanding its repeal[3].

Approval for the Modification will be sought as a modification to Development Consent DA 374-11-00 under section 75W of the EP&A Act. Section 75W of the EP&A Act relevantly provides:

75W Modification of Minister's approval

(1) In this section:

***Minister's approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.*

***Modification of approval** means changing the terms of a Minister's approval, including:*

(a) Revoking or varying a condition of the approval or imposing an additional condition of the approval, and

(b) Changing the terms of any determination made by the Minister under Division 3 in connection with the approval.

(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.

(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.

(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification...

6.2 Environmental Planning Instruments

6.2.1 Regional Environmental Plan

The *Central West and Orana Regional Plan* (DP&E, 2017) (the CWO Regional Plan) was released in July 2017 and covers the Project area (including the Lachlan, Parkes and Forbes LGAs).

The CWO Regional Plan includes the following vision:

> *The most diverse regional economy in NSW with a vibrant network of centres leveraging the opportunities of being at the heart of NSW*

[3] Part 3A of the EP&A Act (as in force immediately before its repeal) continues to apply for the Project. The description and quotations of relevant references to clauses of Part 3A in this document are as if Part 3A of the EP&A Act is still in force.

The following regionally focused goals are outlined in the CWO Regional Plan to achieve the vision.

- *The most diverse regional economy in NSW*;
- *A stronger, healthier environment and diverse heritage*;
- *Quality freight, transport and infrastructure networks*; and
- *Dynamic, vibrant and healthy communities*.

The modified Project is consistent with the vision and goals in the CWO Regional Plan.

6.2.2 Local Environmental Plans

The Project area is located within the Lachlan, Parkes and Forbes LGAs, which are covered by the Lachlan LEP, *Parkes Local Environmental Plan, 2012* (Parkes LEP) and *Forbes Local Environmental Plan, 2013* (Forbes LEP), respectively.

Lachlan Local Environmental Plan, 2013

The mine, Fifield bypass, gas pipeline and water pipeline components of the approved Project are located in the Lachlan LGA.

The Modification would include changes to the mine (Sections 3.1 to 3.8) and water pipeline (Section 3.9.4). No changes to the Fifield bypass or gas pipeline are proposed as part of the Modification.

The following identifies the provisions in the Lachlan LEP which may have relevance to the Modification.

Mine Site

The majority of the mine site is located in land zoned "RU1" (Primary Production) under the Lachlan LEP. Under the Lachlan LEP, open cut mining is listed as permissible activity with consent on lands zoned "RU1" (Primary Production).

The remaining section of the mine site is located within land zoned "RU3" (Forestry) under the Lachlan LEP. Under the Lachlan LEP, uses authorised under the *Forestry Act, 2012* are permissible without consent on lands zoned "RU3" (Forestry).

The *Forestry Act, 2012* provides for the dedication, reservation, control and use of State forests, timber reserves and Crown lands for forestry and other purposes.

The Project (approved and modified) would involve activities within Fifield State Forest, which is dedicated as a State Forest pursuant to the *Forestry Act, 2012*.

Section 21 of the *Forestry Act, 2012* provides that land within a State Forest is subject to the provisions of the *Mining Act, 1992* and that the exercise of any right under the *Mining Act, 1992* within a State Forest is subject to conditions relating to forestry or the purpose of the reserve.

For the portion of the Project within the Fifield State Forest, Clean TeQ has lodged MLAs (MLA 132 and MLA 140). Activities within Fifield State Forest would be conducted in accordance with the conditions of the relevant mining tenement.

The effect of section 21 of the *Forestry Act, 2012* and the mining tenements to be issued under the *Mining Act, 1992* is that the Project and the Modification are permissible under the Lachlan LEP.

Clause 2.3(2) of the Lachlan LEP provides:

> *The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.*

The consent authority for the Modification is the Minister for Planning (Section 6.1).

The objectives of the "RU1" (Primary Production) zone include:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage the diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

The objectives of the "RU3" (Forestry) zone include:

- *To enable development for forestry purposes.*
- *To enable other development that is compatible with forestry land uses.*

The Modification is consistent with the general objectives of the "RU1" (Primary Production) and "RU3" (Forestry) zones as mining is a primary industry and the Modification would enhance the productivity of the approved mining operations at Project.

The Modification is not expected to change the approved potential impacts on the Fifield State Forest.

The Modification would not significantly alter the compatibility of Project with adjoining land uses.

Water Pipeline Alignment Option

The majority of the water pipeline alignment option (Figure 20) is located in land zoned "RU1" (Primary Production) with a section in Fifield zoned "RU5" (Village) under the Lachlan LEP.

Under the Lachlan LEP, water supply systems is listed as permissible activity with consent on lands zoned "RU1" (Primary Production) and "RU5" (Village).

The objectives of the "RU1" (Primary Production) zone include:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage the diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

The objectives of the "RU5" (Village) zone include:

- *To provide for a range of land uses, services and facilities that are associated with a rural village.*

The Modification is consistent with the general objectives of the "RU1" (Primary Production) zone and is not inconsistent with the objectives of the "RU5" (Village) zone.

The Modification would not significantly alter the compatibility of Project with adjoining land uses.

Forbes Local Environmental Plan 2013

The borefields, surface water extraction infrastructure and water pipeline components of the approved Project are located in the Forbes LGA.

The Modification would include the addition of licensed surface water extraction from the Lachlan River (Section 3.9.2) and minor changes to the borefields layout (Section 3.9.1).

The modified to borefields and surface water extraction infrastructure (Figure 16) are located in land zoned "RU1" (Primary Production) under the Forbes LEP. Under the Forbes LEP, water supply systems is listed as permissible activity with consent on lands zoned "RU1" (Primary Production).

Clause 2.3(2) of the Forbes LEP provides:

> *The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.*

The consent authority for the Modification is the Minister for Planning (Section 6.1).

The objectives of the "RU1" (Primary Production) zone include:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage the diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To provide opportunities for intensive and extensive agriculture in appropriate locations consistent with the environmental capability of the land.*

The Modification is consistent with the general objectives of the "RU1" (Primary Production) zone as the Project is a primary industry and the Modification would enhance the productivity of the existing mining operations at Project.

The Modification would not significantly alter the compatibility of Project with adjoining land uses.

Parkes Local Environmental Plan 2012

The limestone quarry and rail siding components of the approved Project are located in the Parkes LGA.

No changes to the limestone quarry or rail siding are proposed for the Modification and therefore it the Parkes LEP has not been considered further.

6.2.3 State Environmental Planning Policies

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries)* (Mining SEPP) regularises the various environmental planning instruments that previously controlled mining activities and aims to provide for the proper management of and development of mineral resources.

Clause 5(3) of the Mining SEPP gives it primacy where there is an inconsistency between the provisions of the Mining SEPP and the provisions of any other environmental planning instrument (except the *State Environmental Planning Policy (Major Development) 2005*, *State Environmental Planning Policy No. 14 [Coastal Wetlands]* and *State Environmental Planning Policy No. 26 [Littoral Rainforest]*).

Clause 2 – Aims

Clause 2 sets out the aims of the Mining SEPP as follows:

(a) to provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State, and

(b) to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources, and

(b1) to promote the development of significant mineral resources, and

(c) to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources, and

(d) to establish a gateway assessment process for certain mining and petroleum (oil and gas) development:

(i) to recognise the importance of agricultural resources, and

(ii) to ensure protection of strategic agricultural land and water resources, and

(iii) to ensure a balanced use of land by potentially competing industries, and

(iv) to provide for the sustainable growth of mining, petroleum and agricultural industries.

Clause 7 – Permissible Development

Clause 7(1) of the Mining SEPP states that development of any of the following purposes may be carried out only with development consent:

(b) mining carried out:

(i) on land where development for the purposes of agriculture or industry may be carried out (with or without development consent), or

The modified Project activities are on land where development for the purposes of agriculture or industry is permissible under the Lachlan LEP, Parkes LEP or Forbes LEP. Therefore the Modification activities are permissible with development consent.

Clause 12 – Compatibility with Other Land Uses

Clause 12 of the Mining SEPP requires that, before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:

(a) consider:

(i) the existing uses and approved uses of land in the vicinity of the development, and

(ii) whether or not the development is likely to have significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and

(iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and

(b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and

(c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility , as referred to in paragraph (a) (iii).

Existing and approved land use in the vicinity of the Project is generally characterised by agricultural land uses. Land use at the modified borefields and surface water extraction infrastructure (Figure 16) includes agriculture and road reserve. The water pipeline alignment option (Figure 20) would follow existing road reserves. Land adjacent to the road is characterised by agricultural land, vegetated areas and the village of Fifield.

Consideration of the potential impacts of the Project on agricultural and other land uses is summarised in Section 4.2.2.

The modified Project is not incompatible with existing, approved or likely adjoining land uses. As described in Section 4, the modified Project would be operated in a manner as to minimise potential impacts on the environment and alternative land uses on adjoining lands.

The modified Project would stimulate demand in the local and regional economy leading to increased turnover in a range of sectors and increased employment opportunities.

Clean TeQ would implement a progressive rehabilitation program (Section 5) which aims to rehabilitate the site to a state that would minimise the incompatibility of the Project with existing and future land uses in the area. The rehabilitated final landform would incorporate agriculture (pasture for grazing) and construction (endemic woodland).

Clause 14 – Natural Resource Management and Environmental Management

Clause 14(1) of the Mining SEPP requires that, before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the approval should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:

(a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,

(b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,

(c) that greenhouse gas emissions are minimised to the greatest extent practicable.

In addition, clause 14(2) requires that, without limiting clause 14(1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable state or national policies, programs or guidelines concerning greenhouse gas emissions.

The potential impacts of the Modification on groundwater and surface water resources are discussed in Sections 4.7.2 and 4.8.2, including measures to minimise potential impacts which are described in Sections 4.7.3 and 4.8.3.

The potential impacts of the Modification on threatened species and biodiversity are described in Section 4.12.2, including measures to minimise potential impacts which are described in Section 4.12.3.

The estimated modified Project greenhouse gas emissions are described in Section 4.3.4.

Clause 15 – Resource Recovery

Clause 15 of the Mining SEPP requires that:

(1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.

(2) Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.

(3) The consent authority may refuse to grant consent to development if it is not satisfied that the development will be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.

It is in Clean TeQ's financial interest to maximise the efficiency of ore recovery and minimise the generation of process wastes that require disposal.

Clause 16 – Transport

Clause 16(1) of the Mining SEPP requires that, before granting consent for development for the purposes of mining or extractive industry that involves the transport of materials, the consent authority must consider whether or not the consent should be issued subject to conditions that do any or more of the following:

(a) require that some or all of the transport of materials in connection with the development is not to be by public road,

(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,

(c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.

The potential impacts of the Modification on the road transport network are considered in Section 4.9.2. The Road Transport Assessment, conducted by GTA Consultants, 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 (Appendix E).

Clause 16(2) of the Mining SEPP requires that if the consent authority considers that the development involves the transport of materials on a public road, the consent authority must, within seven days after receiving the development application, provide a copy of the application to each roads authority for the road, and the RMS (if it is not a roads authority for the road).

In addition, clause 16(3) of the Mining SEPP requires that the consent authority:

(a) *must not determine the application until it has taken into consideration any submissions that it receives in response from any roads authority or the Roads and Traffic Authority within 21 days after they were provided with a copy of the application, and ...*

Clean TeQ has consulted with the RMS, LSC, PSC and FSC for the Modification (Section 1.3). These authorities are aware of the proposed Modification and the associated use of relevant roads for the modified Project.

Clause 17 – Rehabilitation

Clause 17 of the Mining SEPP requires that before granting consent for development for the purposes of mining, the consent authority must consider whether or not the approval should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.

In particular, the consent authority must consider whether conditions of the consent should:

(a) *require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or*

(b) *require waste generated by the development or the rehabilitation to be dealt with appropriately, or*

(c) *require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under section 145C of the Act and the Contaminated Land Management Act 1997), or*

(d) *require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.*

A comprehensive program would be implemented for the progressive rehabilitation of the additional surface development area, including the remediation of any contaminated soil, if applicable (Section 5).

One of the key Project rehabilitation objectives (Section 5) is the creation of safe, stable, adequately drained post-mining landforms that are consistent with the local surrounding landscape.

The proposed management of waste rock material and tailings is discussed in Sections 3.5 and 3.7.

State Environmental Planning Policy No. 33 (Hazardous and Offensive Development)

Clause 12 of SEPP 33 requires a Preliminary Hazard Analysis to be prepared for developments for the purposes of potentially hazardous industries.

The Preliminary Hazard Analysis must be prepared in accordance with the current circulars or guidelines published by the DP&E and submitted with the development application.

Clause 13 of SEPP 33 requires the consent authority to consider the following when determining an application to carry out development for the purposes of a potentially hazardous or potentially offensive industry:

(a) *current circulars or guidelines published by the Department of Planning relating to hazardous or offensive development, and*

(b) *whether any public authority should be consulted concerning any environmental and land use safety requirements with which the development should comply, and*

(c) in the case of development for the purpose of a potentially hazardous industry—a preliminary hazard analysis prepared by or on behalf of the applicant, and

(d) any feasible alternatives to the carrying out of the development and the reasons for choosing the development the subject of the application (including any feasible alternatives for the location of the development and the reasons for choosing the location the subject of the application), and

(e) any likely future use of the land surrounding the development.

A Preliminary Hazard Analysis has been conducted from the modified Project in accordance with SEPP 33 (Appendix C).

This Preliminary Hazard Analysis was conducted to evaluate the hazards associated with the modified Project in accordance with the general principles of risk evaluation and assessment outlined in the NSW Department of Planning and Infrastructure (DP&I) (now DP&E) *Assessment Guideline: Multi-level Risk Assessment* (DP&I, 2011).

This Preliminary Hazard Analysis also addressed the requirements of the *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (NSW Department of Planning [DoP], 2011a), and has been documented in general accordance with *Hazard Industry Planning Advisory Paper No.6: Hazard Analysis* (DoP, 2011b).

In regard to clause 13(b), consultation has been undertaken with public authorities during the preparation of this EA as described in Section 1.3.

Project alternatives are discussed in Section 7.1.1, which addresses clause 13(d) of SEPP 33.

In regard to clause 13(e), the land surrounding the Project is generally zoned as RU1 (Primary Production) under the Lachlan LEP, Parkes LEP or Forbes LEP (Section 6.2.2) and the Project is generally compatible with the uses that are permissible in adjoining lands.

Consideration of the potential impacts of the Project on agricultural land uses and amenity are assessed in Sections 4.2 to 4.5 and 4.13.

6.2.4 NSW Government Policy

In September 2012, the NSW Government released the following policy documents potentially relevant to the Modification:

- *Strategic Regional Land Use Policy* (NSW Government, 2012a); and
- *Aquifer Interference Policy* (AIP) (NSW Government, 2012b).

Strategic Regional Land Use Policy

As part of the *Strategic Regional Land Use Policy* (NSW Government, 2012a), the NSW Government introduced a 'Gateway Process' for the upfront assessment of the impacts of State Significant mining and coal seam gas proposal on Strategic Agricultural Land.

The Mining SEPP includes mapping of lands identified as Strategic Agricultural Land and none is mapped in the mine site.

The Modification would not change the existing Project MLAs which were submitted in either 1998 or 1999 or require additional MLAs. A Site Verification Certificate or Gateway Certificate is not required for existing mining tenements (clause 20 of Schedule 6A of the EP&A Act).

Notwithstanding the above, the mine site would not be Strategic Agricultural Land as defined in the *Interim protocol for site verification and mapping of biophysical strategic agricultural land* (NSW Government, 2013) because the mine site is not considered to have a reliable water supply as it is located outside:

- reliable rainfall areas mapped by the DPI-Water;
- highly productive groundwater resource areas mapped by the DPI-Water; and

- highly reliable surface water supply mapped by the DPI-Water.

A Site Verification Certificate or Gateway Certificate is not required for project components located outside the mining tenements (clause 17A[2] of the Mining SEPP).

An assessment of potential impacts on agricultural resources is presented in Section 4.2.2.

Aquifer Interference Policy

The AIP has been developed to ensure equitable water sharing between various water users and proper licensing of water taken by aquifer interference activities such that the take is accounted for in the water budget and water sharing arrangements. The AIP also aims to enhance existing regulation, contributing to a comprehensive framework to protect the rights of all water users and the environment in NSW.

The NSW *Water Management Act 2000* defines an aquifer interference activity as that which involves any of the following:

- *the penetration of an aquifer;*
- *the interference with water in an aquifer;*
- *the obstruction of the flow of water in an aquifer;*
- *the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations; and*
- *the disposal of water taken from an aquifer in the course of carrying out mining or any*
- *other activity prescribed by the regulations.*

A Water Management Assessment (Appendix D) that considered potential groundwater impacts associated with the modified mine site has been prepared in consideration of the AIP and the key conclusions are summarised below.

The Modification would not change the operation of the approved borefields and therefore there would be no changes to the approved groundwater impacts associated with the borefields.

Water Source

The AIP requires all water taken by aquifer interference activities to be accounted for within the extraction limits set by the relevant Water Sharing Plan.

The Water Sharing Plan relevant to the mine site is the *Water Sharing Plan for the NSW Murray-Darling Basin (MDB) Fractured Rock Groundwater Sources*.

Baseline Groundwater Conditions

Baseline groundwater conditions are presented in Section 4.7.1 and Appendix D.

Modelling of Potential Impacts

The Water Management Assessment (Appendix D) includes predictive modelling of the groundwater impacts at the mine using a groundwater model. Detail on the development of the groundwater model is provided in Appendix D.

Licensing Requirements

Comparison of Clean TeQ's licence entitlements against the predicted annual licensing requirements shows that adequate licences are available to account for the potential take of water associated with the modified Project (Appendix D).

Post-closure annual licensing requirements are expected to be less than the licensing requirements during operation. Given Clean TeQ currently holds adequate licenses to account for the potential take of water associated with the modified Project, it is expected Clean TeQ will have adequate licences to account for the potential post-closure take of water.

Notwithstanding, the groundwater model would be refined over progression of the mine life in order to more accurately calculate the post-closure licensing requirements associated with the modified Project.

Minimal Impact Considerations

The AIP establishes minimal impact considerations for highly productive and less productive groundwater.

DPI-Water mapping of highly productive groundwater in the vicinity of Project, indicates that no highly productive groundwater is present at the mine. The fractured rock aquifers associated with the mine site are considered to be less productive as testing of groundwater and monitoring bores indicate the yield is less than 5 L/s (Appendix D).

Therefore, the following AIP minimal impact considerations apply for groundwater quality at the mine site and have been considered as part of the Water Management Assessment (Appendix D):

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.*

While the AIP requires 'cumulative assessment' of groundwater impacts, there are no other known or planned future aquifer interference activities proximal to the mine.

As concluded in Section 4.7.2, given there are no privately-owned bores in the mine boundary, no groundwater drawdown impacts are predicted to groundwater users. The nearest registered groundwater user with recorded information is located approximately 7 km from the site, therefore no groundwater quality impacts on groundwater users are predicted due to seepage.

Further, as groundwater quality in the vicinity of the tailings storage facility is brackish, and seepage is constrained by the low permeability of the underlying and adjacent soil and rock, the impact to groundwater quality would be very low (Appendix D).

As described in Section 4.7.1, no aquatic GDEs are mapped at the mine site and areas of low potential for terrestrial GDEs are mapped in the vicinity of the mine site (Appendix D). No significant water level or quality impacts are predicted in the areas mapped as low potential for terrestrial GDEs (Appendix D).

Relevant Mitigation and Contingency Measures

The Groundwater Management Plan will include a process to deal with a complaint received in relation to loss of groundwater supply. Clean TeQ implement the Groundwater Management Plan for the modified Project.

Clean TeQ would monitor and report groundwater extraction as required under the conditions of its water licences.

6.3 Other Applicable Statutory Approvals

The following approvals would be obtained before the modified Project commences:

- modification of the Development Consent DA 374-11-00 issued under the EP&A Act, and any relevant secondary approvals under the Development Consent conditions (e.g. management plans);
- Mining Leases under the *Mining Act, 1992*;
- Mining Operations Plan prepared under the conditions of the Mining Leases;
- a new AHIP under section 90 of the *National Parks and Wildlife Act, 1974* (and/or a variation application to the existing approved AHIP #C0003049);
- an EPL under the POEO Act;

- necessary consents under section 138 of the *Roads Act, 1993* associated with the road upgrades;
- necessary compensation agreements for activities conducted as a component of the Project within Fifield State Forest under the *Forestry Act, 2012*;
- for all relevant Crown land directly affected by the Project, Clean TeQ would enter into necessary leases or licences under the *Crown Lands Act, 1989* and/or reach agreements under section 265 of the *Mining Act, 1992* to allow Project mining activities to occur; and
- relevant WALs, and water supply works and use approvals under the *Water Management Act, 2000* where applicable.

The following NSW Acts may be applicable to the modified Project:

- *Contaminated Land Management Act, 1997;*
- *Crown Lands Act, 1989;*
- *Dams Safety Act, 1978;*
- *Dangerous Goods (Road and Rail Transport) Act, 2008;*
- *Heritage Act, 1977;*
- *Mining Act, 1992;*
- *National Parks and Wildlife Act, 1974*;
- *Pipelines Act, 1967;*
- POEO Act*;*
- *Roads Act, 1993;*
- *Threatened Species Conservation Act, 1995;*
- *Water Management Act, 2000;*
- *Work Health and Safety Act, 2011; and*
- *Work Health and Safety (Mines) Act, 2013.*

Relevant licences or approvals required under these Acts would be obtained for the modified Project as required.

6.4 Environment Protection and Biodiversity Conservation Act, 1999

The EPBC Act defines proposals that are likely to have a significant impact on a matter of national environmental significance as a ‘controlled action’. Proposals that are, or may be, a controlled action are required to be referred to the Commonwealth Minister for the Environment for a determination as to whether or not the action is a controlled action.

Matters of national environmental significance include:

- world heritage properties;
- wetlands listed under the Ramsar Convention;
- listed threatened species and ecological communities;
- listed migratory species protected under international agreements;
- nuclear actions;
- the Commonwealth marine environment;

- national heritage places; and
- water resources, in relation to coal seam gas development and large coal mining developments.

The Project was referred in 2001, and was determined as 'not a controlled action' (EPBC 2001/133).

As described in Section 4.12.2, the Modification would not adversely impact any threatened species and communities under the EPBC Act because no threatened flora species or communities listed under the EPBC Act occur in the Modification areas and potential indirect impacts would be managed. Hence, there would be no significant impact on threatened species and communities listed under the EPBC Act as a result of the Modification.

The other matters of national environmental significance are not relevant to the modified Project.

It is therefore considered that there is no need to refer the Modification to the Commonwealth Minister for the Environment.

7 Conclusion and Modification Justification

7.1 Modification Justification

The Modification involves the implementation of opportunities to improve the overall efficiency of the approved Project that were identified in a Project Optimisation Study undertaken by Clean TeQ.

This EA has demonstrated that the Modification can be implemented with limited additional biophysical and environmental impacts above those already approved at the Project, with the implementation of the mitigation measures described in Section 4.

The modified Project would have substantial economic and social benefits in the region. The modified Project would stimulate demand in the local and regional economy leading to increased turnover in a range of sectors and increased employment opportunities.

7.1.1 Consideration of Alterations

Alternatives to the proposed mining operations, processing operations, limestone supply, mine site layout and water supply and have been considered by Clean TeQ in the development of the Modification. An overview of alternatives to the Modification considered by Clean TeQ is provided below.

Mining Operations

The Modification would include the following changes to the approved mining operations (Section 3.4):

- mining in a more selective manner to initially increase the processing facility ore feed grade; and
- addition of drilling and blasting at the mine site.

No other components of the approved mining operations (e.g. mining method, mining rate, operational hours, open cut pit extent and waste rock management) would change as a result of the Modification.

Selective Mining

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 tpa of nickel and cobalt metal equivalents as sulphate precipitate products) earlier in the mine life. This would improve the Project economics.

Selective mining would also increase the proportion of ore that would be directly fed to the processing facility, which would reduce the amount of ore stockpiling and double-handling required. This would result in a reduction in potential air quality impacts.

Drilling and Blasting

Drilling and blasting is proposed to improve the efficiency of the mining operations. The Optimisation Study identified the potential for blasting in the deeper parts of the open cut pits where harder siliceous material may be encountered and in the gravel borrow pits. It is expected that in these locations, material may not be easily ripped and excavated by mobile equipment. It is therefore proposed to drill and blast this material to maintain the efficiency of mining operations.

Processing Operations

The Modification would include the following changes to the approved processing operations (Section 3.6):

- adoption of the RIP processing method option (i.e. the counter current decantation processing method option is no longer proposed)[4];

[4] The approved Project includes the option to use either the RIP or counter current decantation processing method.

- increased sulphur demand and sulphuric acid production to leach additional nickel, cobalt and scandium from the higher grade ore;
- increased limestone demand to neutralise the additional acid required in the acid leach circuit;
- addition of a crystalliser to the processing facility to extract ammonium sulphate from an existing waste stream for use as a fertiliser product; and
- addition of a water treatment plant to the processing facility to recycle process water and minimise make-up water demand.

No other changes to the approved processing operations are proposed as part of the Modification.

Processing Method

The Optimisation Study considered the two approved processing methods (i.e. RIP and counter current decantation) and determined that the RIP was the preferred processing option as it is anticipated to be more efficient than the counter current decantation method.

The adoption of the RIP processing method would result in the elimination of the 'Extraction Fan over Sulphide Filter Vent', 'Flare Stack' and 'Hydrogen Reformer Stack' emission release points associated with the counter current decantation circuit (Table 3) and would therefore have lower potential air quality impacts.

Increased Limestone and Sulphuric Acid Demand

As described in Section 3.4.2, the nickel and cobalt grade of the processing facility ore feed would initially be higher than previously assumed for the approved Project due to the proposed more selective mining method.

The higher grade in the processing facility feed would require a corresponding increase in sulphuric acid demand in the acid leach circuit from 700,000 tpa to 1,050,000 tpa.

The additional sulphuric acid used in the acid leach circuit would require an increase in limestone demand from 790,000 tpa to up to 990,000 tpa in the tailings neutralisation circuit (Table 3).

No feasible alternatives to leaching the ore with sulphuric acid or neutralising the tailings with limestone slurry were identified.

The increase in sulphuric acid production would generate additional steam for power generation, reducing the Project gas demand (Section 3.10.1). This would improve the Project economics and reduce greenhouse gas emissions.

Ammonium Sulphate Production

The addition of a crystalliser to the processing facility would allow for the extraction of up to 100,000 tpa of ammonium sulphate from an existing waste stream for use as a fertiliser product.

The crystalliser would be a minor addition to the processing facility and would be located within the approved surface development area.

The proposed ammonium sulphate production would result in a beneficial use of an approved waste product that would otherwise report to the tailings storage facility.

Water Treatment Plant

A water treatment plant would be added to the processing facility to allow greater volumes of process water to be recycled and re-used in the processing facility (Section 3.8.4).

The water treatment plant would be a minor addition to the processing facility and would be located within the approved surface development area.

Modelling results indicate that in all scenarios (and with the exception of the short start-up period), the recycled water supply (direct and treated) was able to reliably supply approximately 4 ML/day, or on an annualised basis, 1,451 ML/year.

The addition of the water treatment plant would therefore significantly reduce the make-up water demand of the Project.

Limestone Supply

Additional limestone would be required for the tailings neutralisation circuit (i.e. increased from 790,000 tpa to up to 990,000 tpa) to neutralise the additional sulphuric acid.

Up to approximately 560,000 tpa of limestone from third party suppliers would be used to supplement the limestone quarry supply. The limestone would be transported from external suppliers by road.

The limestone from third party suppliers would have a higher neutralising capacity than the limestone from the limestone quarry. This would mean that less limestone by mass would be required which would reduce the overall road transport requirements and tailings production of the modified Project.

The Road Transport Assessment, conducted by GTA Consultants, 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 (Appendix E).

Mine Site Layout

The Modification would include the following changes to the approved mine site layout (Section 3.2):

- relocation of mine infrastructure;
- increased tailings storage facility capacity; and
- reduced evaporation pond capacity.

Mine Infrastructure Area

The mine infrastructure area would be relocated within the approved surface development area to avoid potential resource sterilisation and improve operational efficiency.

Tailings Storage Facility

The tailings storage facility capacity would be increased to hold increased tailings volume due to the additional limestone required for acid neutralisation. The tailings storage facility footprint would be increased and the construction methodology would change from upstream to downstream. The final elevation of the tailings storage facility would also slightly increase from approximately 310 m AHD to 314 m AHD.

The design of the modified tailings storage facility has been reviewed as part of the Optimisation Study and would conform to the relevant guidelines and requirements described in Condition 29, Schedule 3 of Development Consent DA 374-11-00. This includes the requirements for permeability of liners, storage capacity and DSC design requirements (Sections 2.8.1 and 2.8.2).

Evaporation Ponds

An approved liquid waste stream from the processing facility containing high concentrations of chloride would be separated from other processing facility waste streams and pumped to the evaporation ponds. This would prevent the build-up of chloride in the process water as the water in the evaporation ponds would be evaporated rather than be recycled in the site water management system for reuse in the processing facility.

Due to the reduction in water volume reporting to the evaporation ponds, the footprint of the ponds would be reduced (Figure 8).

Water Supply

The Modification would include the following changes to the approved water supply (Section 3.8):

- addition of licensed surface water extraction from the Lachlan River;
- minor changes to the water pipeline alignment; and

- short-term road transport of water from the borefield to the mine site during the construction phase.

Lachlan River Water Supply

To improve the water supply security of the Project, it is proposed to diversify supply sources by including licensed extraction of surface water from the Lachlan River which is regulated by upstream releases from Wyangala Dam.

For the purposes of assessment, Clean TeQ is seeking approval for up to approximately 350 ML/year surface water extraction from the Lachlan River. It is however noted, that if opportunities were to arise (e.g. during wet climate scenarios) to obtain additional access licences for surface water extraction beyond 350 ML/annum, Clean TeQ would obtain the necessary water licences in accordance with Condition 26, Schedule 3 of the Development Consent. This would have a potential additional benefit to then reduce the volumetric allocations required to be obtained in the Upper Lachlan Alluvial Groundwater Source.

In accordance with Condition 26, Schedule 3 of Development Consent DA 374-11-00, Clean TeQ would ensure that sufficient water is supplied for all stages of the development, and obtain the necessary water licences for the development under the *Water Management Act, 2000*, and if necessary, adjust the scale of development on-site to match its available water supply.

The addition of licensed surface water from the Lachlan River would reduce the reliance on the Project borefields and associated potential groundwater impacts.

Water Pipeline

The approved water pipeline alignment may be modified to follow existing road reserves rather than following the alignment of the approved Fifield Bypass (Figure 20).

As the modified pipeline alignment is located in the existing road reserve (i.e. an existing disturbed area), disturbance of vegetated areas along the approved water pipeline alignment would be avoided if the modified pipeline alignment is adopted.

Construction Water – Short-term Road Transport

During construction and prior to the commissioning of the water pipeline (approximately 6 months), water would be transported from the borefields to the mine site by road.

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.

The Road Transport Assessment (Appendix E) 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 (Appendix E).

7.2 Conclusion

The Modification involves the implementation of opportunities to improve the overall efficiency of the approved Project that were identified in a Project Optimisation Study undertaken by Clean TeQ.

The Modification involves the implementation of these opportunities and would include:

- mining in a more selective manner to initially increase the processing facility ore feed grade;
- addition of drilling and blasting at the mine site;

- adoption of the RIP processing method option (i.e. the counter current decantation processing method option is no longer proposed)[5];
- increased sulphur demand and sulphuric acid production to leach additional nickel, cobalt and scandium from the higher grade ore;
- increased limestone demand to neutralise the additional acid required in the acid leach circuit;
- addition of a crystalliser to the processing facility to extract ammonium sulphate from an existing waste stream for use as a fertiliser product;
- changes to process input and product road transport requirements;
- addition of a water treatment plant to the processing facility to recycle process water and minimise make-up water demand;
- increased tailings storage facility capacity to hold increased tailings volume due to the additional limestone required for acid neutralisation;
- reduced evaporation pond capacity due to the recycling of process water;
- relocation of mine infrastructure to avoid resource sterilisation and improve operational efficiency;
- addition of licensed surface water extraction from the Lachlan River to improve water supply security;
- minor changes to borefield transfer station layout and water pipeline alignment;
- short-term road transport of water from the borefield to the mine site during the initial construction phase; and
- reduced gas demand as the increased sulphuric acid production would generate additional steam for power generation.

The Modification would not involve changes to any aspects of the approved limestone quarry, rail siding or gas pipeline.

This EA has demonstrated that the Modification can be implemented with limited additional biophysical and environmental impacts above those already approved at the Project, with the implementation of the mitigation measures described in Section 4.

The modified Project would have substantial economic and social benefits in the region. The modified Project would stimulate demand in the local and regional economy leading to increased turnover in a range of sectors and increased employment opportunities.

It is therefore considered that the Modification is justified on environmental, economic and social grounds and that an application to modify Project Development Consent DA 374-11-00 under section 75W of the EP&A Act is appropriate.

[5] The approved Project includes the option to use either the RIP or counter current decantation processing method.

8 References

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