New South Wales Government
Independent Planning Commission

Tomingley Gold Extension Project

Mining and Petroleum Gateway Panel

Conditional Gateway Certificate Report

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CONTENTS

DEFINED TERMS

ABBREVIATION	DEFINITION
AIP	NSW Aquifer Interference Policy
AIS	Agricultural Impact Statement
Applicant	Tomingley Gold Operations Pty Ltd
BC Act	NSW *Biodiversity Conservation Act 2016*
BSAL	Biophysical Strategic Agricultural Land
BSAL Protocol	*Strategic Regional Land Use Policy – Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (NSW Government, 2013)
DPIE Water	Department of Planning, Industry and Environment - Water
Draft Groundwater Assessment	Draft Tomingley Gold Extension Project Groundwater Assessment, prepared by Jacobs Group Australia Pty Ltd, dated July 2021
EIS	Environmental Impact Statement
EP&A Act	*Environmental Planning and Assessment Act 1979*
EBPC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Gateway Application	Gateway Certificate Application for the Tomingley Gold Extension Project (GA-15823373)
Gateway Panel	Mining and Petroleum Gateway Panel NSW
Gateway Report	Gateway Certificate Application Supporting Documentation, dated August 2021
GDE	Groundwater Dependent Ecosystems require access to groundwater on a permanent (obligate) or intermittent (facultative) basis to meet all or some of their water requirements so as to maintain their communities of plants and animals, ecological processes and ecosystem services (Doody et al. 2019).
IESC	Commonwealth Independent Expert Scientific Committee
Material	Material listed in Section 5 of this report
Mining SEPP	*State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*
MLAA	Mining Lease Application Area
Mtpa	Million tonnes per annum
MWPH	Minister for Water, Property and Housing
NRAR	Natural Resources Access Regulator
Project	Tomingley Gold Extension Project
SAR	San Antonio and Roswell deposits
Site	The Tomingley Gold Extension site, as defined in Section 2 of this report
SMU	Soil Mapping Units
SSD	State significant development
RSF	Residue Storage Facilities

1 INTRODUCTION

1. On 16 August 2021, Tomingley Gold Operations Pty Ltd (**Applicant**) applied for a Gateway Certificate (GA-15823373) (**Gateway Application)** for the proposed Tomingley Gold Extension Project (**Project**).
2. The Gateway Application has been submitted to the Mining and Petroleum Gateway Panel (**Gateway Panel**) pursuant to Part 4AA of the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (**Mining SEPP**) because a mining lease is required for the Project and the Site includes land classified as Biophysical Strategic Agricultural Land (**BSAL**).
3. Prof Neal Menzies, as Chair of the Gateway Panel, nominated himself, Dr Clinton Foster PSM, and Mr Hugh Middlemis to constitute the Panel determining the Gateway Application in accordance with clause 17Q of the Mining SEPP.
4. In accordance with clause 17H(2)(b) of the Mining SEPP, this report states the Gateway Panel's reasons for the formation of the opinion in the Gateway Certificate issued on this day for the Project (and the reasons for the making of any recommendations included in the Certificate).
5. The terms of reference for the Gateway Panel in determining this Gateway Application are those set out in clauses 17H(4) and 17H(5) of the Mining SEPP.

2 THE SITE

6. The Gateway Application relates to the Tomingley Gold Extension Site, located immediately to the south of the village of Tomingley, in the Narromine Shire Local Government Area, in central-western NSW.
7. The Gateway Application area (**Site**) is defined in the Gateway Certificate Application Supporting Documentation, dated August 2021 (**Gateway Report**). Section 1.6 of the Gateway Report states that the Site is consistent with the Mining Lease Application Area (**MLAA**), which was selected to:

   • *adjoin ML1684 and MLA602;*

   • *include all mining-related activities, including adequate buffer zones;*

   • *exclude, to the extent practicable, non-mining related activities such as the proposed realigned Newell Highway.*
8. The Site is depicted in **Figure 1 (Locality Plan)** and **Figure 2 (Site Plan)** below, which shows the Site and BSAL assessment area.

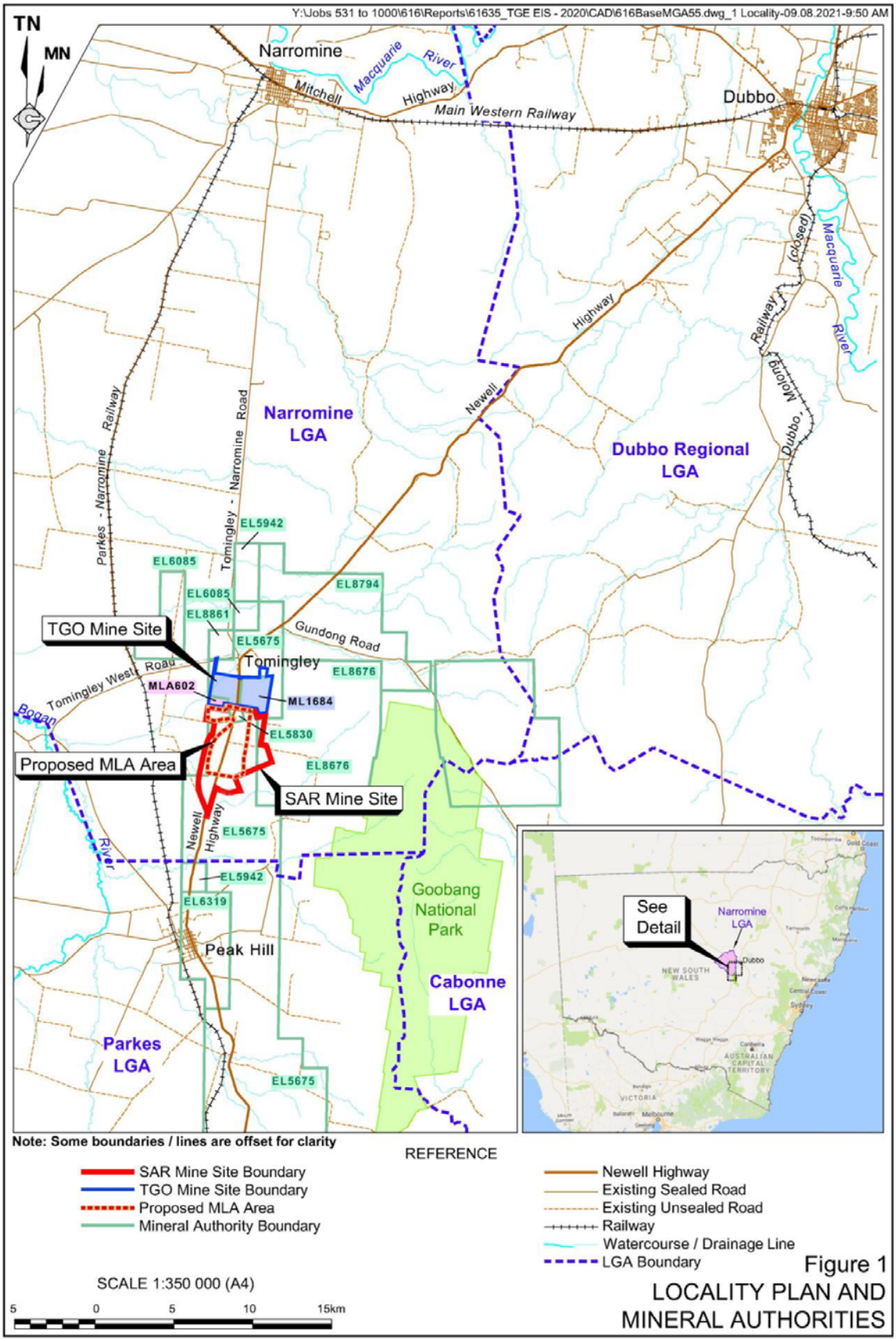

Figure 1: Locality Plan (*source: Gateway Report*)

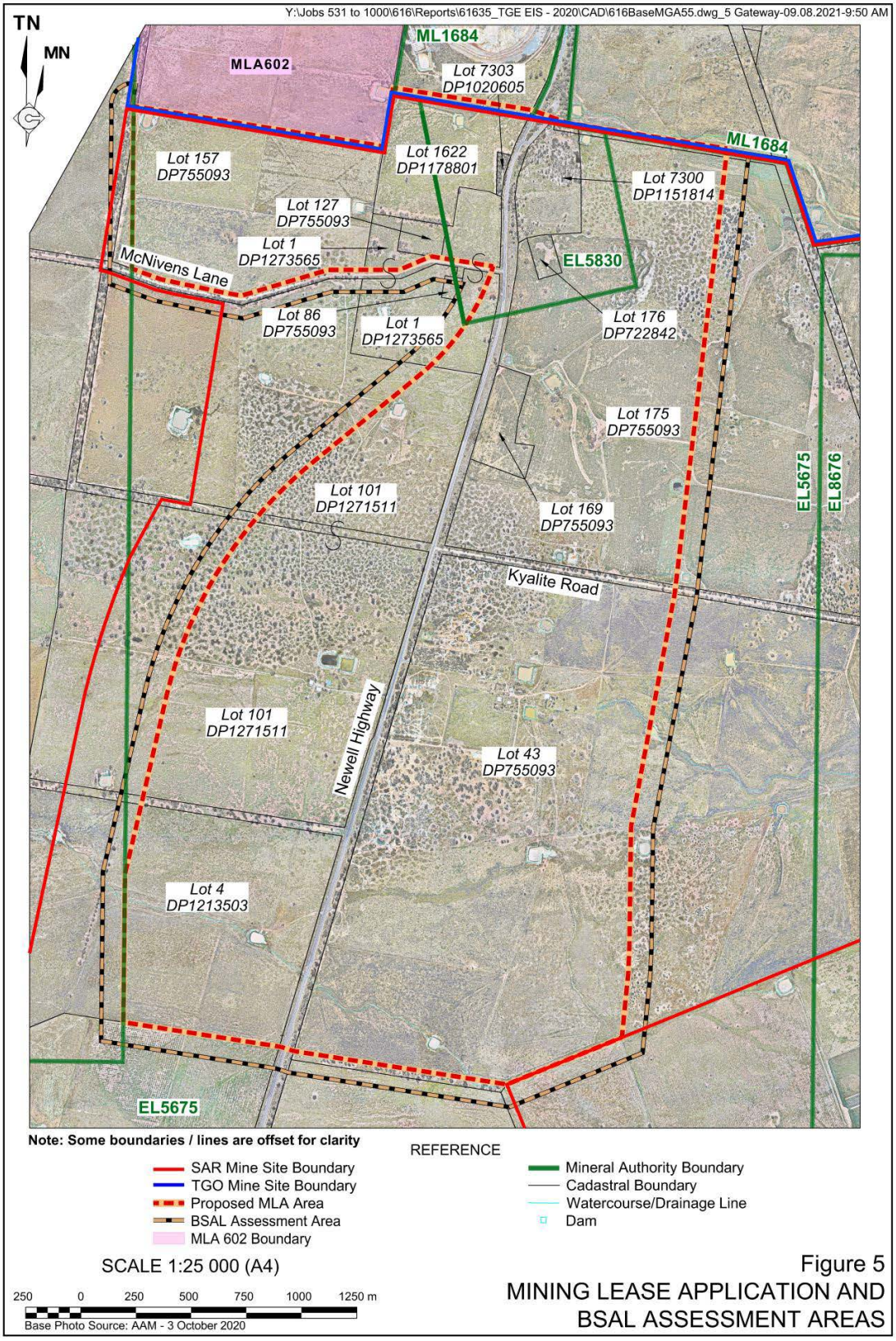

Figure 2: Mining Lease and BSAL Assessment Areas (*source: Gateway Report*)

3 THE GATEWAY APPLICATION

9. The Gateway Application relates to an existing State significant development (**SSD**) application (Tomingley Gold Extension Project, SSD-9176045).

10. The Project is described in Section 2 of the Gateway Report, with the proposed mine layout included as **Figure 3** below.

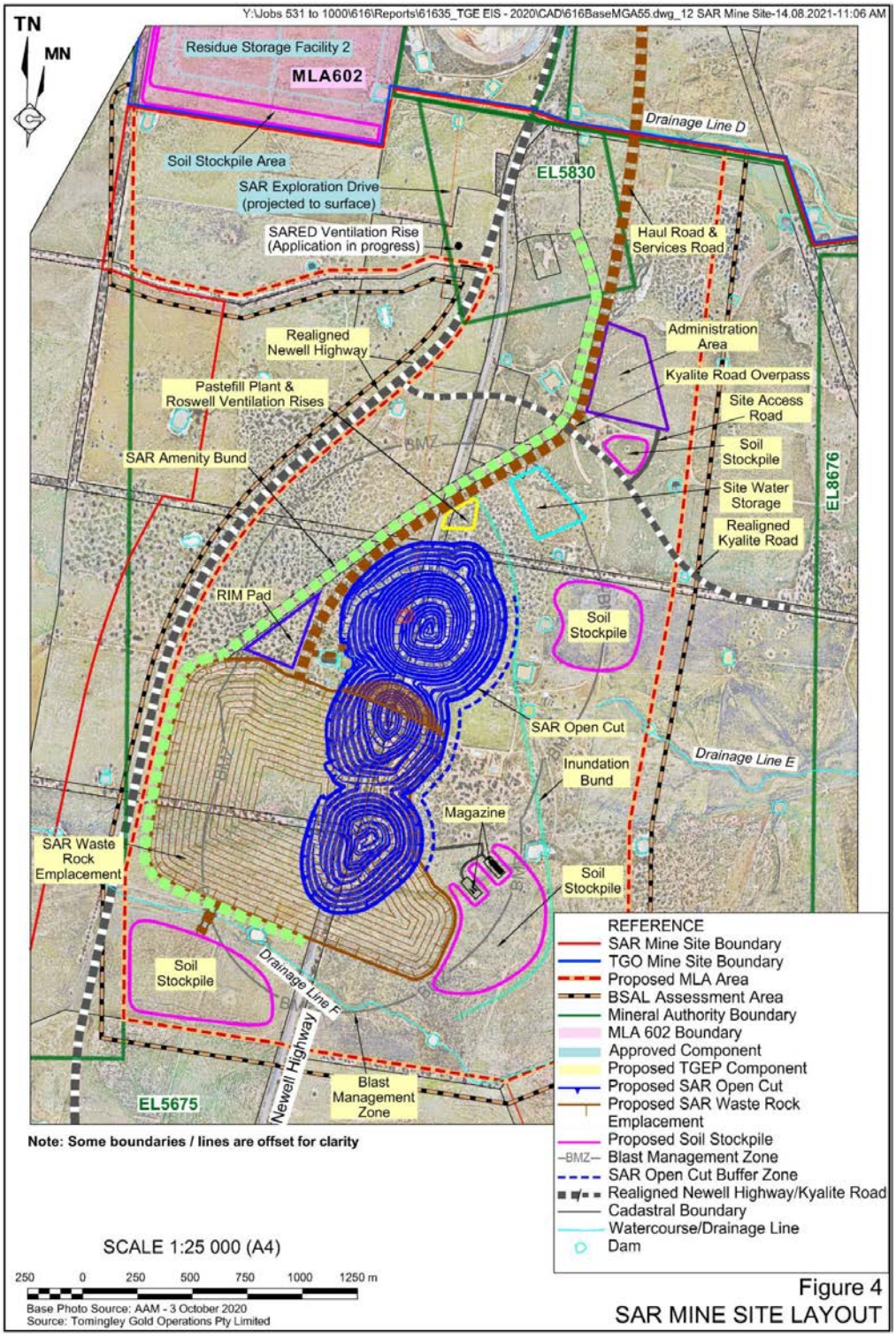

Figure 3: Proposed mine extension layout (*source: Gateway Report*)

11. Current approved mining operations at the existing Tomingley Gold Mine are located to the north of the proposed mine extension and comprise four open-cut pits, with underground workings under three of those open cuts (Wyoming 1, Caloma 1, and Caloma 2).

12. The Project seeks to extend the existing open cut and underground mining operations southward to target the San Antonio and Roswell deposits (**SAR**), and includes the following:

    - extend the mine life by seven years (from 2025 to 2032)
    - increase production from 1.5 million tonnes per annum (**Mtpa**) to 1.75 Mtpa, including minor modifications to the processing plant to increase the maximum processing rate
    - expand and upgrade existing surface infrastructure, including the realignment of a section of the Newell Highway and Kyalite Road and associated intersections with Back Tomingley West Road, McNivens Lane, and Kyalite Road overpass
    - construct two waste rock emplacements
    - construct the SAR Amenity Bund, Haul Road and Services Road between the SAR Open Cut and the Caloma 2 Open Cut
    - increase capacity for Residue Storage Facility 2, from Stage 2 to Stage 9, with a maximum elevation of 286m AHD
    - associated surface infrastructure, including construction of the administration area (offices, workshops, diesel store, equipment parking, vehicle washdown bay), internal site roads, hardstands, explosives magazines and water storages.

      Note: The Gateway Panel notes the description of the Application was not specific in terms of the surface infrastructure and underground workings. The Gateway Panel encourages the Applicant to clarify the description of the development in the EIS, but notes the description of a Project cannot be conditioned on the Gateway Certificate because it is not something that relates directly to the relevant criteria under clause 17H(4) of the Mining SEPP.

13. The Gateway Report identifies that sections of the proposed MLAA include land classified as BSAL in accordance with the *Strategic Regional Land Use Policy – Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land (Interim BSAL Protocol).*

14. Section 1.1 of the Gateway Report confirms that written notification of the Gateway Application was provided to Crown Lands, Narromine Shire Council, the road authority for each of the road reserves, and Transport for NSW, in accordance with Clause 17F(3)(a) of the Mining SEPP.

4 CONSULTATION

15. Pursuant to clause 17G of the Mining SEPP, this Gateway Application was referred to the Commonwealth Independent Expert Scientific Committee (**IESC**) and the NSW Minister for Water, Property and Housing (**MWPH**). The Gateway Panel received the following advice on the proposal:

    - advice from the IESC (received 22 October 2021)
    - advice from the MWPH (received 1 November 2021).

16. A virtual site inspection was conducted by the Gateway Panel on 7 October 2021 to assist in understanding the physical characteristics of the Site and surrounding land. The site inspection was conducted virtually due to COVID-19 pandemic restrictions preventing one from being conducted physically. Site inspection notes were made available on the Independent Planning Commission's website (the Gateway Panel is a subcommittee of the Independent Planning Commission).

17. The Gateway process is an independent, upfront scientific assessment of the impact of new State significant mining and coal seam gas proposals on strategic agricultural land and its associated water resources. The process does not involve public consultation. The Project is also the subject of a State significant development application that is subject to public consultation in accordance with the *Environmental Planning and Assessment Act 1979*.

5 MATERIAL

18. In considering the Gateway Application, the Gateway Panel reviewed the following documents (**Material**):

- Gateway Application Form, provided to the Gateway Panel on 16 August 2021
- Tomingley Gold Extension Project - Gateway Certificate Application Supporting Documentation (**Gateway Report**) prepared by R.W. Corkery & Co Pty Ltd, dated August 2021
- Landholder Notification prepared by Alkane Resources Ltd, dated 19 July 2021
- Agricultural Impact Statement (**AIS**) prepared by Tomingley Gold Operations Pty Ltd, dated August 2021
- BSAL Assessment prepared by Sustainable Soils Management Pty Ltd, dated August 2021
- Draft Tomingley Gold Extension Project Groundwater Assessment (**Groundwater Assessment**), prepared by Jacobs Group Australia Pty Ltd, dated July 2021
- Hydrology and Hydraulics Technical Report prepared by Jacobs Group Australia Pty Ltd, dated 24 September 2021
- Surface Water – EIS Technical Report prepared by Jacobs Group Australia Pty Ltd, dated 24 September 2021
- IESC Advice dated 9 October 2021
- MWPH advice received 1 November 2021 (incomplete scan of MWPH's advice provided in error)
- MWPH advice received 11 November 2021 (complete version provided, including previously missing pages).

6 STRATEGIC AGRICULTURAL LAND VERIFICATION

6.1 Biophysical Strategic Agricultural Land verification

19. The Gateway Report confirms that sections of the Mining Lease Area (MLA) include land classified as BSAL in accordance with the *Strategic Regional Land Use Policy – Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land (***BSAL Protocol***)*.

20. The Applicant provided an Agricultural Impact Statement (**AIS**), which included a Land and Soil Capability Assessment, and a Biophysical Strategic Land Assessment to map the

soils information, identify access to a reliable water supply, and undertake a risk assessment.

21. The Applicant has identified five Soil Mapping Units (**SMU**) within the Site, as detailed in Section 4 of the Gateway Report: Chromosol SMU; Andesite Chromosol SMU; Sodosol SMU; Gilgai SMU; and Disturbed SMU. Two of these SMUs are classified as BSAL - the Chromosol and Andesite Chromosol.

22. The Gateway Panel finds the Applicant's methodology for the verification of BSAL within the Project boundary area is generally in accordance with the BSAL Protocol and is acceptable for a Gateway Application; however, the Gateway Panel notes the BSAL Assessment provided by the Applicant (Appendix 4 of the Gateway Report) indicates all BSAL units with an area less than 20 ha were considered to be non-BSAL units and were therefore excluded from the analysis. The Gateway Panel is of the view that, under the BSAL Protocol, the minimum area for BSAL is 20 ha in areas covered by the Upper Hunter or New England Strategic Regional Land Use Plans only. Given this Site is outside of those areas, the 20 ha minimum size does not apply and should therefore be included in the BSAL assessment. For the purpose of this Gateway Certificate assessment, the Gateway Panel find that the submitted BSAL verification is sufficient for this early stage of assessment, but all areas of BSAL should be covered in the EIS to ensure informed decision making. A condition has been imposed on the Gateway Certificate recommending this.

23. Notwithstanding the findings in paragraph 22, the Gateway Panel is of the opinion that, while any area of BSAL land that is less than 20 ha is technically BSAL, it is not of a sufficient size to support commercially material agricultural use and therefore the impact of the Project on the productivity of that BSAL is unlikely to be significant.

6.2 BSAL potentially affected by the Project

24. The Applicant identifies 357 ha of BSAL within the Mining Lease Area (**MLA**).

25. At page 45, the Gateway Report confirms the Project will result in the following impacts:

- disturb 207 ha of BSAL;
- permanently remove approximately 130 ha of land from agricultural production;
- temporarily remove approximately 136 ha of land from agricultural production with that land returned to native vegetation with targeted grazing;
- temporarily remove approximately 209 ha of land from agricultural production with that land returned to pasture/cropping use;
- continued use of approximately 1,342 ha for agricultural purposes.

26. In the context of the Gateway Panel's findings set out at paragraph 22, the EIS should confirm that the BSAL assessment considers areas less than 20 ha as well as those greater than 20 ha.

6.3 Critical Industry Cluster Land (CIC)

27. There is no critical industry cluster land within or proximal to the Site, with respect to clause 17H(4)(b) and the definition of CIC in the Mining SEPP.

7 GATEWAY PANEL ASSESSMENT OF IMPACTS ON BSAL

28. The Gateway Panel has considered the Project's impact on BSAL, duration of impact and proposed avoidance or mitigation measures in accordance with clause 17H(4)(a) and (5)

of the Mining SEPP. The Gateway Panel's findings with respect to the potential impacts of the Project on BSAL are summarised in Table 1.

Table 1: Summary of Gateway Panel determination of impacts on BSAL

Mining SEPP clause 17H(4)(a) Relevant Criteria	**Determined impact**
(i) any impacts on the land through surface area disturbance and subsidence,	Significant – conditions included on Gateway Certificate
(ii) any impacts on soil fertility, effective rooting depth or soil drainage,	Significant – conditions included on Gateway Certificate
(iii) increases in land surface micro relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH,	Significant – conditions included on Gateway Certificate
(iv) any impacts on highly productive groundwater (within the meaning of the aquifer interference policy,	Unlikely to be significant, subject to the Gateway Certificate conditions
(v) any fragmentation of agricultural land uses,	Not Significant
(vi) any reduction in the area of biophysical strategic agricultural land.	Locally significant in terms of this land, but not regionally significant in the broader scale of agricultural uses

7.1 Significance of the Project's potential impacts on BSAL

7.1.1 *Clause 17H(4)(a)(i) Impacts on the land through surface area disturbance and subsidence*

29. As indicated in Table 7 and Figure 10 of the Gateway Report, the Applicant has identified approximately 207 ha of the total 357 ha of BSAL soils would be disturbed as a result of the Project (plus multiple undefined areas of BSAL less than 20 ha). This land would be directly impacted by the Project.

30. The Applicant advises at Section 6.2 of the Gateway Report that there would be no subsidence associated with the underground mining operations, and as a result no BSAL land would be subject to subsidence-related impacts. The Gateway Panel agrees that the likelihood of subsidence impacts is low.

31. However, subsidence of waste rock emplacements and back-filled mine pits is likely. Given that the stability of the waste rock emplacements relies on their resistance to erosion, the potential for subsidence to influence water flows, potentially causing water to concentrate in defined flow paths, could considerably reduce the overall stability of the landform. Therefore, in order to satisfy this criteria, the Gateway Panel has imposed conditions on the Gateway Certificate recommending the Applicant include a management plan in the EIS detailing the long-term monitoring and actions to mitigate any subsidence impacts on the waste rock dumps. The Gateway Panel has also imposed a condition

recommending the Applicant establish a baseline to determine if any subsidence occurs over the life of the project.

7.1.2 *Clause 17H(4)(a)(ii) Impacts on soil fertility, effective rooting depth or soil drainage*

32. The Applicant advises at Section 6.3 of the Gateway Report that soils within the proposed area of disturbance would be stripped and stockpiled for use in rehabilitation operations, which would seek to re-establish suitable soil properties, including fertility, effective rooting depth and drainage, salinity, slope, surface rockiness and soil pH to maximise the success of rehabilitation operations.

33. The Gateway Panel advises the treatment of sodic soil with gypsum in the process of soil stripping and replacement will ultimately improve soil drainage and increase soil fertility. Nevertheless, care in soil handling will be necessary to minimise the risk of compaction limiting rooting depth in the reconstructed soil profile.

34. The Gateway Panel also notes remediation of soil constraints on LSC Class 6 gilgai affected land will improve soil drainage and increase soil fertility improving 56 ha of this land to LSC Class 4, improving the productivity of this land as an offset to the BSAL impacts.

35. In order to satisfy these criteria, the Gateway Panel has imposed conditions on the Gateway Certificate requiring the Applicant to include a management plan in the EIS detailing how the soil handling process will be managed to improve soil drainage and increase soil fertility, improving the productivity of LSC Class 6 land to LSC Class 4, and to rehabilitate disturbed land to LSC Class 4 to offset land that is directly impacted by the mining process.

7.1.3 *Clause 17H(4)(a)(iii) Impacts on land surface micro-relief, soil salinity, rock outcrop, slope and surface rockiness or significant changes to soil pH*

36. The Gateway Panel notes adverse changes to soil salinity or pH are unlikely. However, the waste rock emplacements will result in slopes that are sufficiently steep that they constrain land use to LSC Class 6 and represent an erosion risk that will need to be managed.

37. The EIS should consider what constraints to future land management (for example, limits on grazing pressure) will be needed to ensure that the waste rock emplacements remain vegetated and hence erosion resistant through time.

38. The Gateway Panel notes the IESC's comments that the Applicant has not provided information regarding strategies and measures to avoid, mitigate or reduce potential impacts associated with the residue storage facilities (**RSF**), including risks from potential embankment failure, seepage-induced instability, acid generation and mobilisation of toxic metals, internal and external erosion, poor foundation conditions and overtopping.

39. In consideration of the above, the Gateway Panel has imposed conditions on the Gateway Certificate requiring the Applicant to include a management plan in the EIS that addresses post-mine land use and future land management, including strategies and measures to ensure waste rock emplacements are not susceptible to erosion, and to avoid, mitigate or reduce potential impacts associated with the RSF.

7.1.4 *Clause 17H(4)(a)(iv) Impacts on highly productive groundwater*

40. At Section 2.3, the Draft Groundwater Assessment identifies, in the context of the NSW *Aquifer Interference Policy* (**AIP**), that the Project is situated in the 'porous and fractured rock water sources' sub-category of the 'less productive groundwater sources' category. The Applicant describes the groundwater environment surrounding the MLAA at Section 3 of the Gateway Report, and describes three broad groundwater systems within the area, as follows:

    - Perched aquifer, which can form in isolated areas associated with larger creeks where the shallow alluvial sediments may be locally saturated if they are underlain by a low-permeability unit. Perched systems are reportedly not located close to the MLA and in any case would have no significant interaction with the (separate) regional fractured rock groundwater system;
    - Cainzoic transported alluvium groundwater system, comprising a relatively thick layer of generally low permeability fluvial sediments that is unsaturated in the vicinity of the MLA and does not locally represent an aquifer;
    - Fractured rock groundwater system, featuring locally in the vicinity of the MLA. The permeability in this system is generally very low, but there is potential for enhanced permeability in certain areas. The Applicant identifies that the perched aquifer is hydrologically separated from the deeper, fractured rock system.

41. The Applicant advises there are no registered production bores within the fractured rock system within 7.5 km of the centre of the SAR mine site. As a result, the Applicant argues groundwater is not a significant water source for agricultural uses in the area.

42. The Applicant has undertaken a preliminary groundwater assessment, which indicates the following (from Section 6.4 of the Groundwater Report):

    - Groundwater drawdown at the end of mining and 200 years after mining is not expected to encroach on any existing registered groundwater bores within the fractured rock system.
    - Given the perched aquifer and the fractured rock system are not hydrologically connected, there would be no impacts on bores within the perched aquifer due to mining-induced drawdown in the regional fractured rock system.
    - There would be no impacts on Groundwater Dependent Ecosystems (**GDE**) and no reduction in groundwater-related baseflow in surrounding watercourses.
    - The Applicant would obtain groundwater allocations if required for groundwater inflows to the Project – the quantum of those inflows is yet to be determined, but additional entitlements within the Lachlan Fold Belt MBD Fractured Rock Groundwater Source are available.
    - All groundwater inflows into the Project will be used for mining-related purposes and not discharged to natural drainage.
    - The Project would not adversely impact groundwater quality during mining.
    - The two post-mining voids would form long term pit lakes. Evaporation would result in decreased water quality within the lakes over time, but the Gateway Report makes conflicting statements about whether the voids would each be a 'perpetual sink' or whether 'some migration and throughflow could occur' and that it is 'unlikely to migrate a significant distance from the voids';
    - The Project would not exceed the minimum impact criteria for fractured rock aquifers identified by the AIP.

43. Further to the above impacts, the IESC advice identifies short- and long-term legacy effects arising from the contamination of surface water and groundwater near the RSF, which is likely in the short-term to contain saline and moderately alkaline water with elevated concentrations of substances such as ammonia, arsenic, copper, cyanide and nickel. In the long-term, the tailings stored in the RSF may become acid generating, depending on the balance of acid generating material and acid neutralising capacity of the tailings. No information is provided on this in the Gateway Certificate material provided to the Panel, but the imposed Gateway Certificate conditions recommend this be addressed fully in the EIS.

44. The IESC also comments that there will be changes to groundwater availability and quality in the perched alluvial aquifers caused by mining activities and alterations of topographic relief (for example by the road realignment, but not necessarily or specifically associated with mining-related drawdown in the fractured rock system). The altered alluvial groundwater availability and surface water-groundwater interactions may impact on GDEs associated with these creeks, which may include threatened ecological communities and remnant riparian vegetation used transiently by species listed under the *Environment Protection and Biodiversity Conservation Act 1999 (***EPBC Act**) and the *Biodiversity Conservation Act 2016* (**BC Act**).

45. The IESC identified several areas in which additional work is recommended as part of the EIS. These areas are detailed in the IESC advice dated 9 October 2021, as summarised below:

- Further field data to establish the degree of hydraulic connection between the perched alluvial aquifers and surface creeks and the deeper regional fractured rock system, especially in the vicinity of mapped GDEs. Based on the extent of connectivity, further modelling may be necessary to understand the magnitude, extent, and duration of drawdown and associated impacts;
- The model uncertainty analysis should capture plausible ranges of the aquifer hydraulic parameters because drawdown may extend further than currently predicted;
- Geochemical characterisation of waste rock and tailings;
- Characterise the chemistry of the RSF and assess risks to wildlife;
- Further information regarding risk mitigation measures associated with the RSF;
- Collection of contemporary water quality data;
- Water balance assessment;
- Field assessment of groundwater use by terrestrial GDEs, such as riparian vegetation along Gundong and Bulldog Creeks;
- Additional data on the distribution and abundance of aquatic biota, terrestrial GDEs, and stygofauna (if present);
- Development of trigger action response plans to detect and mitigate potential impacts of the Project.

46. The Gateway Panel notes the further information identified by the IESC to be included in the EIS (paragraph 45). The Gateway Panel agrees that the EIS should include further data and analysis to improve the understanding of the connectivity between the perched groundwater in the alluvium, associated GDEs and the underlying fractured rock system. Depending on the outcome of these investigations, further groundwater modelling and/or uncertainty analysis may be necessary to understand the magnitude and extent of drawdown.

47. The Gateway Panel also agrees that further investigation is needed on the likelihood of changes to surface-groundwater interactions and potential impacts on ecologically important flow components.

48. The Gateway Panel notes the IESC has concerns about some of the assumptions and the range of scenarios applied in the groundwater modelling. As such, the groundwater model provided with the EIS will need to address issues that would increase confidence in the groundwater impact assessment, associated modelling and underlying assumptions.

49. The IESC is of the view that the uncertainty analysis is conducted on a poorly calibrated groundwater model and that the model may not be fit for purpose to adequately assess the risks to water resources in the area and predict long-term impacts on groundwater levels, flow and quality. However, the Gateway Panel notes that the IESC Explanatory Note on Uncertainty Analysis (Middlemis and Peeters, 2018) does not necessarily require a well calibrated model in this context where the Project demonstrates basic compliance with the AIP Level 1 minimal impact considerations for Less Productive Fractured Groundwater Sources. Nonetheless, the EIS should provide improved justification of the modelling methods and performance, and further uncertainty analysis may be required, consistent with IESC guidance, to quantify the effect of uncertainties on the Project and AIP objectives.

50. In terms of the final voids, the Gateway Panel agrees with the IESC's view that the Applicant has not adequately modelled the final void water quality or the behaviour and associated influences that both the backfilled and final open voids may have on the surrounding groundwater system. The EIS would also benefit from more extensive use of the proxy information from the nearby Peak Hill final void.

51. The Applicant has also not proposed strategies to avoid, mitigate or reduce potential impacts to water-dependent ecosystems, such as GDEs, partly because the Gateway report has provided inadequate detail on the distribution and character of GDEs and the effect of uncertainties on the predicted distribution of drawdown impacts.

52. In terms of the MWPH advice received, which was informed by a technical assessment undertaken by the Department of Planning, Industry and Environment – Water (**DPIE Water**) and the Natural Resources Access Regulator (**NRAR**), the Gateway Panel notes the conclusion that the Project is unlikely to create more than minimal impacts, in terms of the AIP. DPIE Water indicated support for the IESC advice, and also provided specific recommendations for additional work and/or detail to be provided as part of the EIS, as summarised below:

    - expand the monitoring network and gather additional data including on water quality and GDEs.
    - conduct analysis and modelling to confirm the hydraulic disconnect between the shallow alluvium associated with waterways, the unsaturated Cenozoic alluvium and the fractured rock groundwater system; and the distribution and character of related GDEs.
    - improve key elements of the groundwater modelling, including the conceptual model, the hydraulic connectivity between groundwater and surface systems and their parameterisation, and the predictions of impacts on groundwater and surface water systems and GDES.
    - quantify the incremental and cumulative impacts of the approved project and extension, including post-mining impact predictions until quasi-steady state equilibrium is demonstrated.
    - provide improved detail on the monitoring network and data analysis, the groundwater modelling design, execution and uncertainty analysis, and the Preliminary

Groundwater Management Plan, to support decision making on impact assessment, water licensing and entitlement, consistent with best practice guidance.

53. DPIE Water notes that regional-scale studies indicate disconnects between the shallow alluvial aquifer that is found within current waterway channels, the unsaturated Cenozoic alluvium and the fractured rock groundwater system, but, as detailed in paragraph 52, recommends the EIS confirms this disconnect locally through additional data gathering, analysis and improved conceptual modelling. DPIE Water note improved modelling would address potential risks of impacts to the shallow groundwater system and confirm the level of impact to surface water features to enable informed decision making.

54. The MWPH advice includes an assessment under the AIP, which indicates the groundwater system comprises Less Productive aquifers. The Gateway Panel agrees with this assessment. The AIP assessment also concludes the modelled 2m drawdown contour does not encroach on any existing registered groundwater bores, except for a cluster of monitoring bores for the mine. In terms of water quality, the AIP assessment included in the MWPH advice notes the final void water chemistry will degrade over time. While the poor-quality water is unlikely to migrate a significant distance from the voids due to the low hydraulic conductivity of the rock mass, some migration and throughflow could potentially occur.

55. In the context of the above, the Gateway Panel recognises that the groundwater modelling work completed to date is adequate for this early stage of assessment of water impacts under the AIP, but finds that further work is necessary to inform the EIS and confirm and justify the preliminary findings, including further investigation, analysis and sampling with respect to GDEs and further analysis of the water balance and water quality of the post-mining voids.

56. With respect to the GDEs, the Gateway Panel notes that the Applicant has relied on mapping from the regional scale GDE Atlas to show that there are no 'high priority' GDEs close to the Site, but has not attempted any sampling (for stygofauna, for example) to confirm this low potential. While the Gateway Panel notes the depth to the water table, high salinity and low permeability in the fractured rock system are attributes that suggest a low probability for terrestrial GDEs or stygofauna, further work is necessary to confirm this and assist with the assessment of the SSD application.

57. In terms of the post-mining voids, the Gateway Panel is of the view that further analysis and justification should be undertaken to confirm what type of post-mining lakes will form within the two residual final voids, what the final water quality will be for any final void lake and whether the final void lake water is likely to migrate away from the voids, potentially affecting the regional fractured rock water quality.

58. In the context of the Material and the advice received by the IESC and MWPH, the Gateway Panel concludes that, while the Applicant's preliminary groundwater assessment makes a number of assertions (as set out in paragraph 42), they are not always justified and would need to be investigated further in the EIS, including the information outlined in paragraphs 52, 53, 55, 56 and 57. This is reflected in the Gateway Certificate conditions requiring the Applicant to undertake further work as part of the EIS.

7.1.5 *Clause 17H(4)(a)(v) Fragmentation of agricultural land uses*

59. As described in the Gateway Report, the Site is predominantly used for cropping and intermittent grazing. The underground component of the mine is not likely to result in any significant fragmentation of agricultural land uses. However, the open cuts and surface infrastructure components will result in direct impacts on agricultural land uses.

60. Section 6.5 of the Gateway Report identifies the following impacts on agricultural land:

- Permanent removal of approximately 130 ha of land from agricultural production.
- Temporary removal of approximately 136 ha of land from agricultural production with that land returned to native vegetation with targeted grazing.
- Temporary removal of approximately 209 ha of land from agricultural production with that land returned to returned to pasture/cropping use.
- Continued use of approximately 1,342 ha for agricultural purposes.
- Realignment of the Newell Highway and minor realignment of other local roads, including Kyalite Road.

61. The Applicant indicates these impacts would not result in the fragmentation of BSAL land because:
    - The project is not expected to result in a decrease in the production and efficiency of agriculture on land that would not be directly impacted by the Project. All directly impacted areas are located on Applicant-owned land;
    - The proposed road realignments would relocate existing barriers to moving stock and agricultural machinery. The Applicant will prepare a plan for coordinated agricultural operations on both sides of realigned roads and will improve access and safety within this road network.
62. The Gateway Panel is satisfied the Project will not unreasonably fragment agricultural uses because post-mining the overall land capability and stock carrying capacity will be increased as a result of land improvement and better management practices (from 6888 Dry Sheep Equivalent in 2021 to 10562 Dry Sheep Equivalent post-mining in 2035). Therefore, the Gateway Panel has not imposed any conditions relating to criteria 17H(4)(a)(v).

7.1.6 *Clause 17H(4)(a)(vi) Reduction in the area of BSAL*

63. As identified above, the Project would result in a reduction of approximately 207 ha of BSAL (plus multiple undefined areas of BSAL less than 20 ha).
64. The Gateway Panel supports in principle the mitigation measures to offset this loss.
65. The Gateway Panel finds that while the area of disturbed BSAL land is a size which is capable of significant and material agricultural use, land productivity is limited by low average rainfall and high rainfall variability, and lack of access to irrigation water. Over the 22-year period 1999-2020 only four years had in-crop rainfall exceeding 200 mm for the winter crop. Therefore, the impact of the project on the productivity of the BSAL land is minimal and acceptable. As such, the Gateway Panel has not imposed any conditions relating to criteria 17H(4)(a)(vi).

7.1.7 *Clause 17H(5)(a) Duration of Impact*

66. The proposed Project will extend the mine life to December 2032, with land rehabilitation and improvement scheduled to continue till 2035.
67. The duration of post-mining impacts will extend indefinitely, notably in terms of drawdown around the final void lake and its water quality degradation. The long-term drawdown is expected to be much less than the impacts during mining because the final void lake is only approximately 20m lower than the pre-mining water table. There is potential for some migration and throughflow of poor-quality water from the final void lake, although this is unlikely to migrate a significant distance due to the low hydraulic conductivity of the rock mass and the hydraulic gradients towards the final void lake. The Gateway Panel is of the

view that further analysis and justification should be undertaken to confirm what type of post-mining lakes will form within the two residual final voids, the final void lake quasi-equilibrium water balance and associated water quality, whether water is likely to migrate away from the voids (potentially affecting the regional fractured rock water quality), and the timeframes involved in those processes. As such, the Gateway Panel has imposed conditions relating to criteria 17H(4)(a)(iv).

68. Similarly, the Gateway Panel views other enduring impacts of mining to include the loss of productive land, and the need to manage grazing pressure on the waste rock emplacements to ensure ground cover and hence surface stability is maintained. The Gateway Panel has imposed conditions under criteria 17H(4)(a)(i) for these impacts to be addressed in the EIS.

7.1.8 *Clause 17H(5)(b) Proposed Avoidance, Mitigation, Offset or Rehabilitation Measures*

69. As outlined in section 5.1 of the Gateway Report, the Applicant proposes in-pit placement of waste rock to minimise the area of land disturbance and locate Project-related infrastructure in areas of non-BSAL to avoid the disturbance of BSAL *"to the maximum extent practicable*" (page 37 of the Gateway Report).

70. However, the Applicant notes there are factors that influence mine design and the placement of infrastructure that make avoidance of BSAL challenging. The Applicant notes the NSW government requires extraction to be optimised and therefore the location and size of the open cut pits are subject to the location of the mineral deposits. Other factors such as the larger surface area required for the SAR Waste Rock Emplacement or established native vegetation (the clearing of which would require prohibitive biodiversity offsetting costs) make locating mine components on non-BSAL land difficult.

71. In terms of mitigation measures, the Applicant proposes management measures to ensure only the approved areas are disturbed and stripping, stockpiling and respreading soil to maximise the likelihood of success in the proposed rehabilitation operations.

72. In order to offset the loss of approximately 207 ha of BSAL, the Applicant indicates the following rehabilitation measures, as discussed in Section 6.6 of the Gateway Report:

- Enhancement of approximately 50 ha of Land and Soil Classification (**LSC**) Class 6 land to achieve LSC Class 4 status;
- Rehabilitation of approximately 209 ha of disturbed land following the completion of mining activities to achieve LSC Class 4 status;
- Backfilling of Caloma 1 and Caloma 2 LSC Class 8 open cuts to create 42 ha of LSC Class 6 land.
- Progressively improving the carrying capacity of the Applicant-owned land to increase the stock capacity per hectare following the completion of the Project, which would increase the gross agricultural margin of that land.

73. In summary, the Applicant contends the Project will not result in a significant reduction in agricultural productivity associated with the loss of BSAL land and the "*minor reduction would be very substantially outweighed by the benefits that would accrue to the agricultural and wider community as a result of the Project*" (page 46 of the Gateway Report).

74. The Gateway Panel finds the proposed avoidance, mitigation, offset and rehabilitation measures to be appropriate in this case because they are sufficient, in a land productivity sense, to fully offset the impact of the loss of land as a result of mining activities.

75. The strategies to be used to improve the productivity of LSC Class 6 land to LSC Class 4, and to rehabilitate disturbed land to LSC Class 4 will need to be detailed fully as part of the EIS development. The Panel imposes the condition that the practices to be used to improve land condition be detailed in the EIS.

8 CONCLUSION

76. The Gateway Panel has assessed the Gateway Application against the relevant criteria listed in the Mining SEPP and has had regard to the duration of potential impacts and any proposed avoidance, mitigation, offset or rehabilitation measures.

77. The Applicant's methodology for the verification of BSAL within the Project boundary area is generally in accordance with the BSAL Protocol and is acceptable for a Gateway Application. However, the Gateway Panel finds that the BSAL assessment to be included as part of the EIS should include areas of BSAL soils that are less than 20 ha in area in accordance with the BSAL Protocol.

78. The Gateway Panel finds that there is no CIC land in, or in proximity to the Application area.

79. The Gateway Panel notes the IESC's advice that concludes the impacts on water resources can be appropriately defined, managed, and mitigated through enhanced EIS documentation and development consent conditions.

80. The Gateway Panel also has had regard to the advice received from the MWPH, which notes the regional-scale studies indicate disconnect between the shallow alluvial aquifer that is found within current waterway channels, the unsaturated Cenozoic alluvium, and the fractured rock groundwater system. The MWPH advice indicates that the EIS should confirm this disconnect locally through additional data gathering, analysis and improved conceptual models to resolve the potential risk of impacts to the shallow groundwater system. The MWPH advice also indicates improvements to the numerical modelling are recommended to confirm the level of impact to surface water features and enable informed decision making.

81. The Gateway Panel finds that the proposed development meets the following relevant BSAL criteria from Clause 17H of the Mining SEPP:

- 17H(4)(a)(v): The Gateway Panel is satisfied the Project will not unreasonably fragment agricultural uses because post-mining the overall land capability and stock carrying capacity will be increased as a result of land improvement and better management practices. Therefore, the Gateway Panel has not imposed any conditions relating to criteria 17H(4)(a)(v).
- 17H(4)(a)(vi): The Gateway Panel finds that while the area of disturbed BSAL land is a size which is capable of significant and material agricultural use, land productivity is limited by low average rainfall and high rainfall variability, and lack of access to irrigation water. Therefore, the impact of the project on the productivity of the BSAL land is minimal and acceptable. As such, the Gateway Panel has not imposed any conditions relating to criteria 17H(4)(a)(vi)

82. The Gateway Panel finds that the proposed development does not meet the meet the following relevant BSAL criteria from Clause 17H of the Mining SEPP:

- 17H(4)(a)(i): The Gateway Panel considers overall that the likelihood of subsidence impacts is low, but further consideration should be given to the long-term monitoring and management of the geomorphic landform waste rock emplacements with respect to the potential for subsidence to influence water flows, potentially causing water to concentrate in defined flow paths and reducing the overall stability of the landform.

- 17H(4)(a)(ii): The Gateway Panel considers that the process of soil stripping and replacement should include gypsum treatment of sodic soil to improve soil drainage and increase soil fertility, and the EIS should include a plan that details how the soil handling process will be managed to achieve this.
- 17H(4)(a)(iii): The Gateway Panel considers that the geomorphic landform waste rock emplacement and residue storage facilities will result in slopes that are sufficiently steep that they constrain future land uses and represent an erosion risk that will need to be managed. Additionally, changes to the nature of the tailings produced from the new ore body need to be considered, and any environmental risks presented by the tailings addressed. The Gateway Panel has therefore imposed conditions(s) that recommend the EIS include a plan that addresses future land management, including strategies and measures to avoid, mitigate or reduce potential impacts associated with the residue storage facilities and geomorphic landform waste rock emplacements,
- 17H(4)(a)(iv): The Gateway Panel recognises that the groundwater modelling work completed to date is adequate for this early stage of assessment of water impacts under the Aquifer Interference Policy, but that further work is necessary to inform the EIS and confirm and justify the preliminary findings.

83. Based on its consideration of the Material, the Gateway Panel finds that the proposal does not meet the relevant criteria in clause 17(4)(a) of the Mining SEPP relating to soil management and water impacts and that a conditional Gateway Certificate should be issued.

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