

CADIA

HOLDINGS

PTY LIMITED

TRADING AS
CADIA VALLEY OPERATIONS

ABN 95 062 648 006

9 September 2019

Mr Mike Young
Energy and Resources
Department of Planning, Industry and Environment
GPO BOX 39
SYDNEY NSW 2001

**Cadia Valley Operations
Cadia Hill Tailings Completion – Modification Report**

Dear Mike,

The Cadia Valley Operations (CVO) is located approximately 25 kilometres (km) south-west of Orange, in the Central Tablelands of New South Wales (NSW) (Figure 1).

Cadia Holdings Pty Limited (CHPL) is the owner and operator of the CVO, and is a wholly owned subsidiary of Newcrest Mining Limited.

Project Approval (PA 06_0295) for the Cadia East Project was granted by the NSW Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 6 January 2010.

PA 06_0295 includes all components of the CVO including the Cadia East underground mine, the Cadia Hill open pit mine, the Ridgeway underground mine, the concentrate dewatering facilities in Blayney, and a wide range of ancillary and supporting infrastructure. These integrated operations are herein referred to as the CVO.

PA 06_0295 has been modified on a number of occasions, with the Determination of Modification 12 most recently occurring in 24 September 2018.

Background

As you are aware, on Friday 9 March 2018, CHPL identified a limited breakthrough of tailings material at the embankment of the Northern Tailings Storage Facility (NTSF).

The slumping of the embankment was fully contained within the Southern Tailings Storage Facility (STSF), which is located immediately downstream. No external environmental impacts arose from the incident (i.e. all tailings and rock material in the slump area were wholly contained within the STSF).

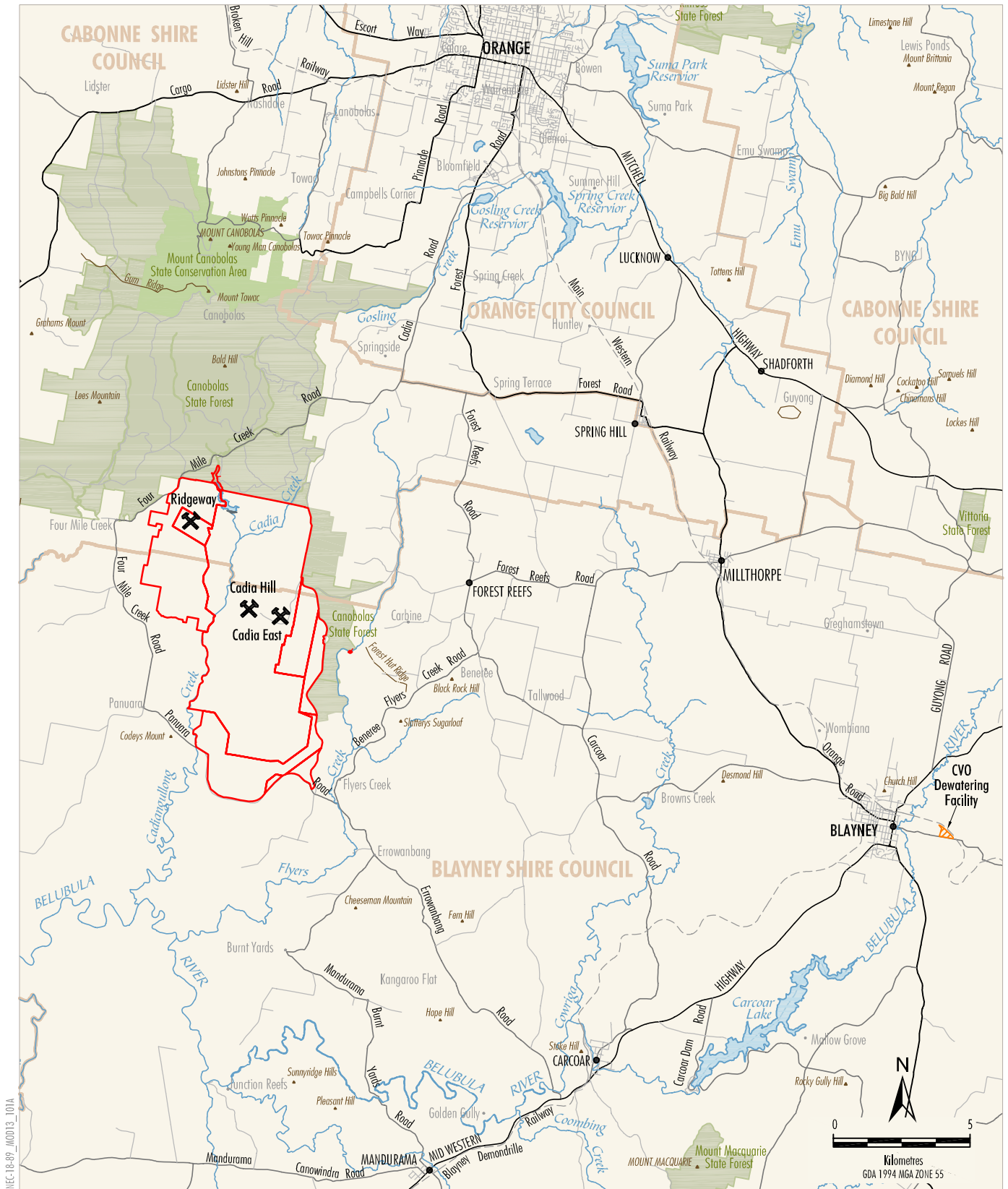
Subsequently, CHPL was granted approval on 20 April 2018 (through Cadia Valley Operations Modification 11 – Cadia Hill Tailings [Modification 11]) to deposit CVO tailings in the completed Cadia Hill open pit (i.e. in-pit deposition) up to a final consolidated elevation of 420 metres (m) Australian Height Datum (AHD). Deposition into the Cadia Hill open pit commenced on 5 May 2018.

On 24 September 2018, approval of the Cadia Hill Tailings Continuation Modification (Modification 12) was granted to increase the consolidated tailings level to 560 mAHD. Modifications 11 and 12 provide capacity for approximately four years of tailings deposition into the Cadia Hill open pit (for that facility) at permitted CVO annual ore processing rates.

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- LEGEND**
- Mining Lease/Mining Lease Application Boundary
 - Local Government Area
 - Road
 - Railway
 - NSW State Forest
 - NPWS Reserve

Source: Department of Lands NSW (2006);
Department of Industry (2017)



CADIA VALLEY OPERATIONS
Regional Location

Figure 1

CHPL is currently investigating the factors that led to the limited breakthrough of tailings material at the embankment of the NTSF, including exploring engineering solutions to repair the embankment. A report on the NTSF embankment failure by the Independent Technical Review Board is now available on the Newcrest Mining Limited website¹ and CHPL is implementing the recommendations contained in the report. In parallel, CHPL has identified the opportunity to deposit additional tailings within the completed Cadia Hill open pit (Figure 2).

¹ URL <http://www.newcrest.com.au/investors/market-releases>. Accessed 1 May 2019.

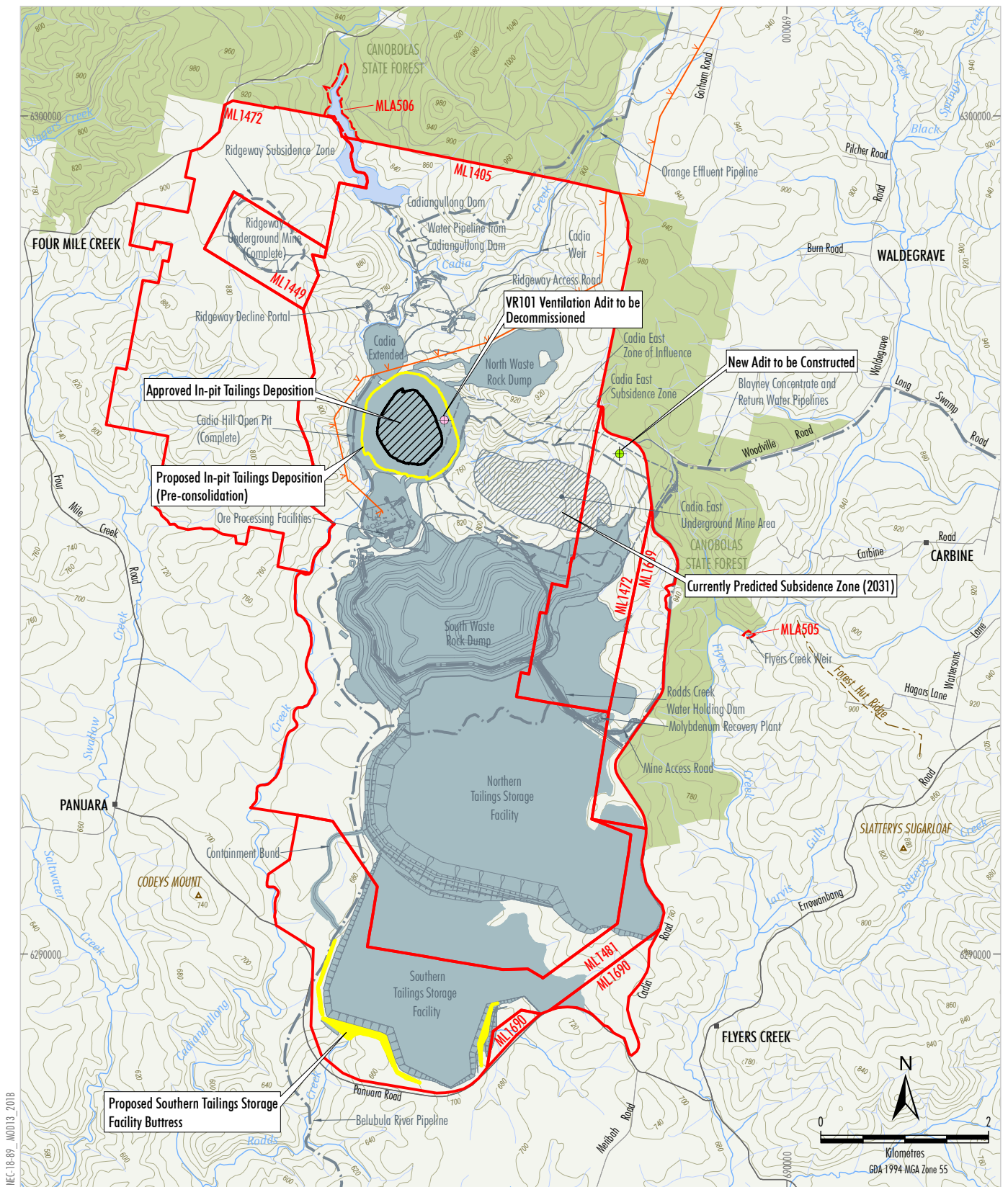


Figure 2

1 OVERVIEW OF THE MODIFICATION

The main activities associated with the Cadia Hill Tailings Completion Modification, or Modification 13 (the Modification), include:

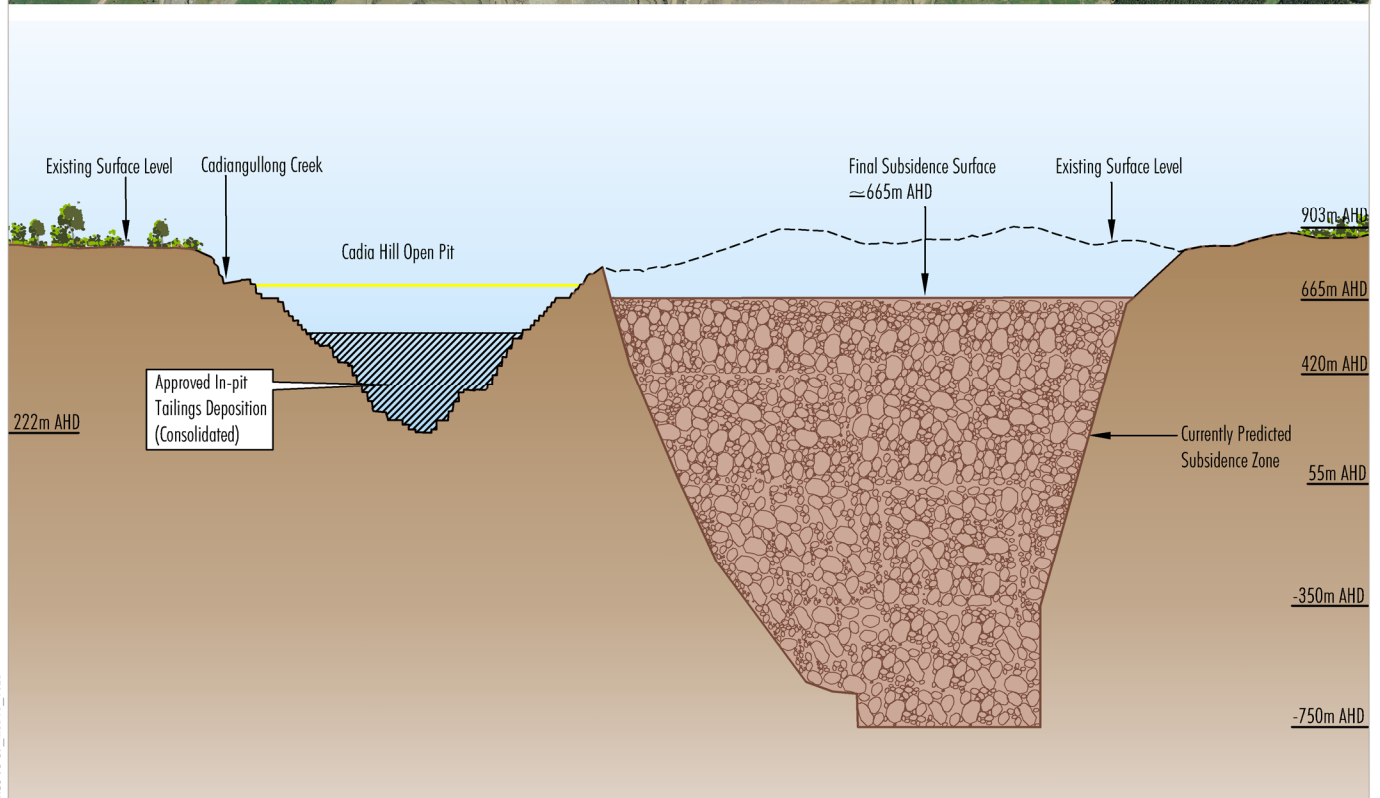
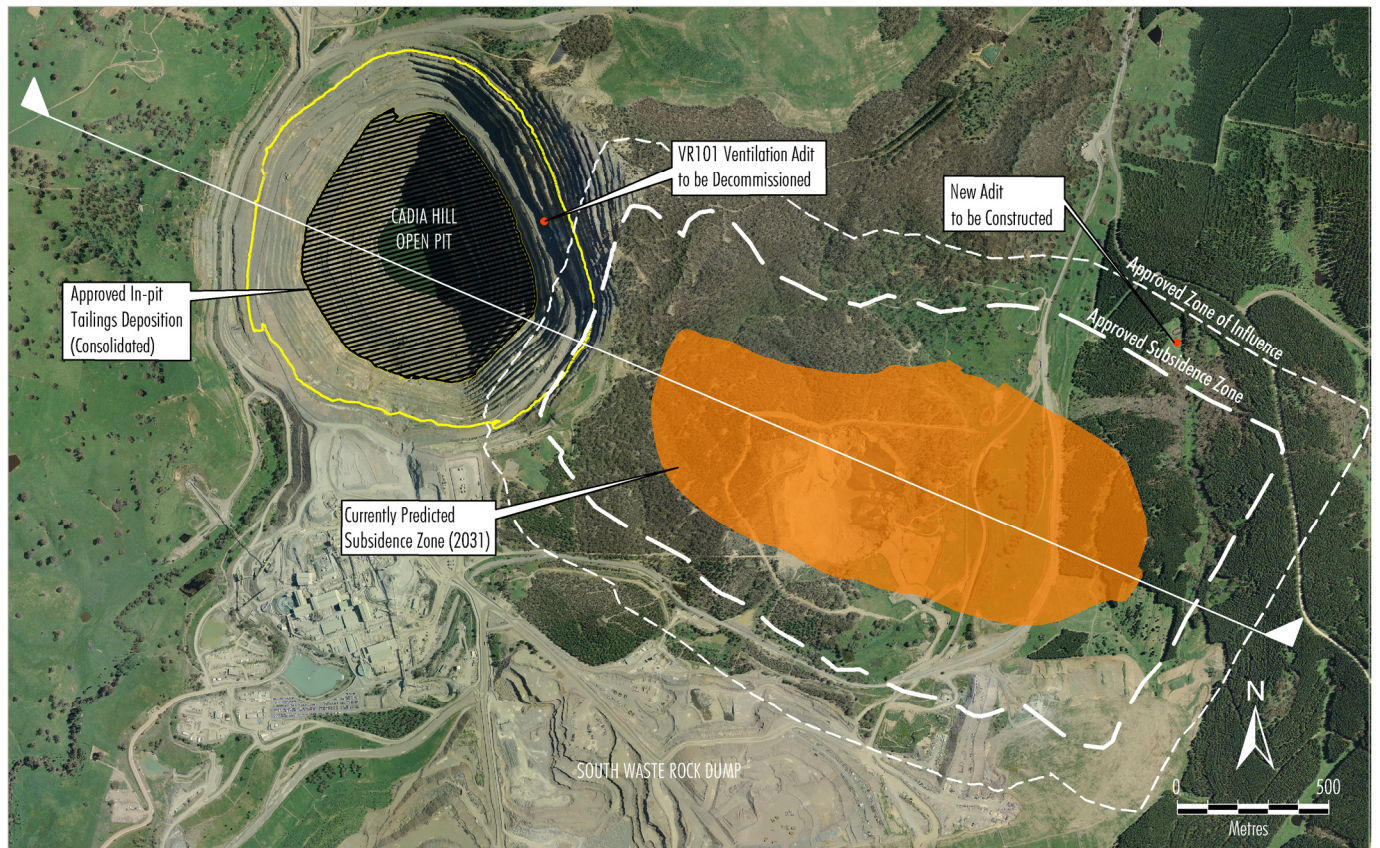
- increasing the tailings level from 560 mAHD (consolidated tailings level) to 713 mAHD (pre-consolidation tailings level);
- an additional 177 million tonnes (Mt) of capacity, equivalent to approximately seven years of additional deposition to this storage facility;
- decommissioning and closure of the existing ventilation adit VR101, located in the Cadia Hill open pit, which would be inundated by tailings;
- installation of a new ventilation adit within the currently approved disturbance footprint of Cadia East (outside of the Cadia Hill open pit);
- construction of additional buttressing of the STSF embankment; and
- a pit lake (i.e. a “wet cover”) as the final landform of the Cadia Hill open pit, consistent with the approved final landform.

Following further engineering studies, additional downstream buttressing is proposed for the STSF. The buttress is proposed in anticipation of future approved lifts of the STSF (up to its approved height of 702 m Australian Height Datum [AHD]). This design is based on the latest understanding of the foundation and tailings conditions incorporating the findings of the ITRB report on the NTSF embankment slump, however studies are ongoing. Should ongoing studies indicate that further downstream buttressing is required (i.e. in addition to that proposed for the Modification), CHPL would review and evaluate the need for further approvals at that time.

Key elements of the Modification are shown on Figures 2 and 3.

To evaluate the potential environmental implications of the proposed changes to tailings, water management, relocation of the ventilation adit on-site and construction of the STSF buttressing outside the extent of the approved CVO disturbance footprint, the following specialist environmental reviews have been completed (Appendices A to F, respectively):

- Groundwater Assessment – Australasian Groundwater and Environmental Consultants (AGE).
- Surface Water Assessment – Hydro-Engineering Consultants (HEC).
- Expert Opinion – Dr Noel Merrick (HydroAlgorithmics).
- Noise Assessment – Wilkinson Murray.
- Aboriginal Cultural Heritage Assessment (ACHA) – Landscape Natural and Cultural Heritage Management (Landscape).
- Biodiversity Development Assessment Report (BDAR) – Flora Search and Biodiversity Monitoring Services.



LEGEND

— Proposed Modification In-pit Tailings Deposition (Pre-consolidated)

Source: CHPL (2008; 2018); After AGE (2018)



CADIA VALLEY OPERATIONS

Conceptual Long Section of the
Cadia Hill Open Pit and the Cadia East
Subsidence Zone

Figure 3

There would be no material alteration to the approved impacts of the CVO on the following aspects:

- air quality;
- road network; and
- population, employment and community infrastructure demand.

Table 1 provides a comparative summary of the proposed modified operations against the currently approved CVO.

Table 1
Snapshot of Proposed Changes to Currently Approved
Cadia East Project

Project Development Component	Currently Approved ²	Cadia Hill Tailings Completion Modification
Mining Methods	Cadia Hill - conventional open pit mining methods. Ridgeway - underground sub-level and block caving with development of associated surface subsidence zone. Cadia East - underground panel caving with development of associated surface subsidence zone.	No change.
Life of Mine Cadia East Ore Production	Approximately 456 Mt.	No change.
Life of Mine CVO Ore Production	Approximately 562 Mt.	No change.
Waste Rock Management	Deposition in the North and South Waste Rock Dumps and mined-out void of the Cadia Extended open pit. Cadia East waste rock to be deposited in the South Waste Rock Dump.	No change.
Life of Mine	Mining up until approximately 2030. Project Approval to 2031.	No change.
Tailings Management	Use of the NTSF and STSF and raising of these storages via upstream embankment lifts. 100 Mt of tailings disposal in Cadia Hill open pit. Cumulative tailings disposal volume of 497 Mt from 2013.	Deposition of tailings in the Cadia Hill open pit to its full capacity, to a (pre-consolidation) level of approximately 713 mAHd. This would provide an additional 177 Mt of capacity in the Cadia Hill open pit. Cumulative tailings disposal volume unchanged. Installation of additional buttressing of the STSF.
Ventilation Adit	The mining complex includes several ventilation adits/shafts for ventilation of underground mining areas. Ventilation adit VR101 is located within the Cadia Hill open pit and is used as an intake for underground mine ventilation.	Decommissioning and closure of existing adit VR101, which would be inundated by tailings in the Cadia Hill open pit as a result of the Modification. Installation of a ventilation adit within the current approved disturbance footprint, to replace adit VR101.

² PA 06_0295 for the Cadia East Project, as modified by section 75W Modifications numbered 1 to 10 and section 4.55(1A) Modification numbers 11 and 12.

Table 1 (Continued)
Snapshot of Proposed Changes to Currently Approved
Cadia East Project

Project Development Component	Currently Approved	Cadia Hill Tailings Completion Modification
Ore Processing	On-site processing of up to 32 million tonnes per annum (Mtpa) of gold and copper ore.	No change.
Concentrate Transport and Dewatering	Gold/copper concentrate is transported from the ore processing facilities via a concentrate pipeline to the Blayney Dewatering Facility. Construction of CVO Dewatering Facility to the east of Blayney and eventual decommissioning of the existing Blayney Dewatering Facility. Installation of a new concentrate pipeline from the CVO to the CVO Dewatering Facility. Transport of dewatered mineral concentrate by rail to the eastern seaboard.	No change.
Water Supply and Management	Water supply sourced from the Cadiangullong Dam, Flyers Creek Weir, Cadia Creek Weir, Orange Sewage Treatment Plant treated effluent, Blayney Sewage Treatment Plant treated effluent, on-site groundwater bores, Belubula River, Cadia Extended open pit and site runoff. Development of additional pipeline/pumping systems and raising of the Rodds Creek Water Holding Dam. Contingent transfer of supernatant tailings water from STSF and NTSF to Cadia Hill open pit for water management. Internal tailings return water pipeline and pumping systems from Cadia Hill open pit.	No change.
Operational Employment	An average of 880 employees up to a maximum of approximately 1,300 employees.	No change.
Final Landforms	Includes South Waste Rock Dump, North Waste Rock Dump, NTSF, STSF, Cadia East Subsidence Zone, Ridgeway Subsidence Zone, Cadia Hill open pit, Cadia Extended open pit, Cadiangullong Dam, Rodds Creek Holding Dam and other water management infrastructure. The final landform of Cadia Hill pit would be a pit lake (i.e. a wet cover). Cadia East underground mine subsidence zone and Cadia Hill open pit to intersect in the long-term and combine to form an integrated post-mining landform with a single final void waterbody.	No change. No change. No intersection between the Cadia East underground mine subsidence zone and Cadia Hill open pit in the long-term and, therefore, two separate final void waterbodies (smaller in extent compared with the approved subsidence zone). ³

1.1 ASSESSMENT PATHWAY

Environmental Planning and Assessment Act, 1979

CVO was gazetted as an SSD for the purposes of future modifications on 13 April 2018. Following review of the potential environmental impacts of the Modification, approval for the Modification is therefore sought to PA 06_0295 under section 4.55(1A) of the EP&A Act.

³ This change is forecast by updated geotechnical (subsidence) modelling and is not a consequence of the Modification.

Section 4.55(1A) of the EP&A Act relevantly provides:

(1A) Modifications involving minimal environmental impact, and

A consent authority may, on application being made by the applicant or any other person entitled to act on a consent granted by the consent authority and subject to and in accordance with the regulations, modify the consent if:

- (a) it is satisfied that the proposed modification is of minimal environmental impact, and*
- (b) it is satisfied that the development to which the consent as modified relates is substantially the same development as the development for which the consent was originally granted and before that consent as originally granted was modified (if at all), and*
- (c) it has notified the application in accordance with:*
 - (i) the regulations, if the regulations so require, or*
 - (ii) a development control plan, if the consent authority is a council that has made a development control plan that requires the notification or advertising of applications for modification of a development consent, and*
- (d) it has considered any submissions made concerning the proposed modification within any period prescribed by the regulations or provided by the development control plan, as the case may be.*

...

Clause 3BA of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* relevantly provides:

3BA Winding-up of transitional Part 3A modification provisions on cut-off date of 1 March 2018 and other provisions relating to modifications

...

- (6) In the application of section 4.55 (1A) or (2) or 4.56 (1) of the Act to the following development, the consent authority need only be satisfied that the development to which the consent as modified relates is substantially the same development as the development authorised by the consent (as last modified under section 75W):*
 - (a) development that was previously a transitional Part 3A project and whose approval was modified under section 75W,*

...

The consent authority is, therefore, required to satisfy itself that any consent as modified (i.e. Modifications 11 to 13) would result in the Cadia East Project remaining substantially the same development as was last modified under section 75W (i.e. Modification 10), inclusive of consideration of the changes arising from the previously approved modifications.

A comparative analysis is provided in Attachment B that outlines the key elements of the approved Cadia East Project (including Modifications 1 to 10) as a basis for comparison against Modification 13 (in addition to Modifications 11 and 12), including the key environmental assessment outcomes. Consideration of the key comparatives detailed in the draft guideline *Modifying an Approved Project* (NSW Government, 2017) when considering whether the Modification could be considered to be “substantially the same” is provided in Table 2.

Table 2
Summary Evaluation for “Substantially the Same” Test

Key Comparatives	Cadia East Project (including section 75W Modifications 1-10)*	Modification 13 (including section 4.55 Modifications 11-12)
Development size, scale and footprint	Very large gold/copper mining complex incorporating three individual gold/copper mines.	No material change.
Intensity including rates of production	32 Mtpa.	No change.
Primary, secondary and ancillary use	Secondary use of completed Cadia Hill open pit for supernatant tailings water storage.	Storage of tailings solids in Cadia Hill open pit.
Project life and hours of operation	Project Approval to 2031. Operating hours are 24 hours per day, seven days per week.	No change.
Extent, duration and severity of impacts	As described in previous environmental assessments and as authorised by PA 06_0295.	No material change.

* Refer to Attachment B.

Attachment B demonstrates that Modifications 11 to 13 have not materially altered the essence of the CVO, nor have the approved environmental impacts of the operations been materially altered.

The proposed construction of buttressing of the STSF is the only component of the Modification located outside of the approved CVO disturbance footprint. This would require clearing of 0.31 hectares (ha) of Box-Gum Woodland, which does not meet the Commonwealth criteria for protection under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Department of the Environment and Heritage, 2006). The BDAR for the Modification concludes that the cumulative impacts of the Modification on native vegetation loss and reduction of fauna habitat are small, and negligible in the regional context (see Section 3.3.2). It is therefore considered that the Modification would result in no material change to the extent, duration and severity of approved impacts.

The CVO has demonstrably remained a very large gold/copper mining complex that incorporates the following key elements approved under PA 06_0295 (as modified) (Figures 1 and 2 and Tables 1 and 3):

- three individual gold/copper mines;
- major ore handling and processing facilities;
- mineral concentrate transfer, dewatering, storage and transportation facilities;
- extensive water supply and water management systems;
- major waste rock dumps and tailings storages that comprise very extensive mine landforms in the Cadia Valley; and
- a wide range of supporting infrastructure and facilities.

This would also clearly continue to be the case if the Modification was approved (Table 2) and, therefore, the consent authority can be satisfied that the CVO incorporating the Modification would remain “substantially the same”.

Furthermore, this Modification Report includes a Statement of Environmental Effects in accordance with Clause 115(1)(e)(ii) of the *Environmental Planning and Assessment Regulation 2000*. The assessments contained herein conclude that the Modification is of “minimal environmental impact”.

Environment Protection and Biodiversity Conservation Act, 1999 (Cth)

Given the location and nature of the proposed modification (i.e. installation of a new ventilation adit within the currently approved disturbance footprint of Cadia East, minor additional land disturbance associated with construction of the proposed STSF buttressing and continued beneficial use of a completed open pit for tailings deposition), CHPL is satisfied that the Modification would not have a significant impact on any relevant Matter of National Environmental Significance under the EPBC Act.

1.2 CONSULTATION FOR THE MODIFICATION

Consultation and engagement with the community and other stakeholders is a key focus at the CVO. Consultation undertaken for the Modification is described below.

It is anticipated that the consultation undertaken to date would be ongoing with all key stakeholders during the continued deposition of tailings into the Cadia Hill open pit.

1.2.1 Cadia Residents Meeting

CHPL held a Cadia District Residents Meeting on 21 March 2019, where attendees were briefed on the Modification. The meeting included a briefing from AGE Hydrogeologist, Mr James Tomlin. Questions from the residents in attendance included queries regarding the overall groundwater regime and groundwater system and the context of the Cadia Hill open pit. At the meeting, Mr Tomlin explained the Cadia Hill open pit is within very hard rock of low permeability and that CHPL would seal fractures within the pit wall between 694 mAHD and 713 mAHD to prevent any outward migration of tailings water during operations (consistent with AGE [March 2019]). CVO General Manager Mr Peter Sharpe explained that deposition would not continue between 694 mAHD and 713 mAHD unless CHPL was confident of the proposed mitigation measures. Following the briefing, no further concerns were raised from the residents in attendance.

An update to the change in the scope of works to include buttressing was provided through the Community Consultative Committee in May and August 2019. Further updates will also be provided in the August community newsletter.

1.2.2 Local Councils

CHPL provided separate briefings on the Modification to Orange City Council, Cabonne Council and Blayney Shire Council on 26 March 2019, 27 March 2019 and 1 April 2019, respectively. Letters of support provided by the three local Councils in response to CHPL consultation on the Modification are provided in Attachment A.

An update to the scope of the Modification (to incorporate the construction of buttressing of the STSF) was sent to Cabonne Council, Orange City Council and Blayney Shire Council on 24 June 2019.

1.2.3 Environmentally Concerned Citizens of Orange

CHPL briefed a meeting of the Environmentally Concerned Citizens of Orange on 27 March 2019. Subsequently, a follow-up briefing occurred in July 2019 regarding the buttressing. No objections or concerns were raised regarding the proposed Modification.

1.2.4 Orange Local Aboriginal Land Council

Refer to Section 3.4.

1.2.5 NSW Government Agencies

NSW Government agencies that were separately consulted include:

- Resources Regulator (29 March 2019);
- Environment Protection Authority (EPA) (25 March 2019);
- Department of Industry – Lands and Water (DoI – L&W) (25 March 2019); and
- Office of Environment and Heritage (OEH) (26 March 2019) (now the Biodiversity and Conservation Division of the Department of Planning, Industry and Environment [DPIE]).

Key comments from these regulators included:

- ensuring that adequate monitoring will be in place to understand potential “source” areas in the Cadia Hill open pit and verify that the pit remains a sink (see Section 3.1.3);
- the Water Management Plan be updated to include new trigger levels for bores in the Cadia Hill open pit, and cross referenced against a Trigger Action Response Plan, to appropriately manage the Cadia Hill open pit as a sink (see Section 3.1.3); and
- suggested including commitments in the Modification Report regarding fauna monitoring and mitigation measures to be implemented prior to decommissioning of ventilation adit VR101 (see Section 3.3.4).

An update to the scope of the Modification (to incorporate the construction of buttressing) was sent to the Division of Resources and Geosciences, Resources Regulator, OEH (now the Biodiversity and Conservation Division of the DPIE), DoI – L&W and EPA on 24 June 2019.

In addition, the NSW Dam Safety Committee was also briefed.

2 MODIFICATION REPORT CONTENT

The DPIE has recently launched a new State Significant Development (SSD) website⁴, which contains requirements for Modification Reports. Accordingly, this Modification Report includes:

- a short description of the approved SSD project and the reasons why the Modification is required (Background and Section 1);
- a description of the proposed Modification (Section 1);
- an explanation of the relevant strategic and statutory context (Section 1.1);
- a description of the findings of any community engagement (Section 1.2);
- an assessment of the relevant impacts of the Modification (Section 3); and
- an evaluation of the merits of the Modification (Section 1.1).

⁴ URL <https://www.planningportal.nsw.gov.au/major-projects/assessment/state-significant-development/modifications>. Accessed 16 April 2019.

3 ENVIRONMENTAL REVIEW

3.1 GROUNDWATER ASSESSMENT

3.1.1 Existing Environment

Mining in the Cadia Hill open pit ceased in 2012. The Cadia Hill open pit is hosted in competent Ordovician volcanic rocks and has been subject to long-term monitoring of groundwater impact propagation, and also geotechnical evaluation with respect to pore pressures in the pit walls (i.e. for pit safety/stability purposes).

AGE (2019) (Appendix 2) concluded the following with respect to the very low inherent permeability of the Cadia Hill open pit host rock into which the tailings would be deposited under the Modification:

The most recent update to the groundwater model adopted a hydraulic conductivity for the Ordovician rock mass of between 5×10^{-12} to 6×10^{-11} m/sec to achieve calibration with estimated and observed groundwater inflows to the mining areas.

In the Cadia East Environmental Assessment (EA) (CHPL, 2009), it was identified that the Cadia East underground mine subsidence zone would eventually intersect the Cadia Hill open pit, and the open cut and underground voids would then combine to form an integrated post-mining landform, with a single final void waterbody.

Due to ongoing recalibration of geotechnical models, geotechnical assessments now indicate that the previous assessment was conservative and the Cadia East subsidence zone is not expected to extend to the Cadia Hill open pit. As stated by AGE (2019) (Appendix 2):

This means that instead of a single pit lake forming across the two mining areas, the two pits will remain separated. HEC (2019) updated the water balance model to reflect the changes in the Cadia Hill pit and predicted the water level will rise some 30 m higher than if it was connected with the Cadia East subsidence zone. The modelling indicates the water level will stabilise and fluctuate between 687 mAHD and 699 mAHD, averaging about 694 mAHD...

It is noted that calibration of geotechnical models will continue to be ongoing, and any changes to the predicted subsidence zone will be reported in subsequent environmental assessments.

3.1.2 Potential Impacts

The groundwater assessment conducted by AGE (March 2019) (Appendix A) considered the potential groundwater implications of the proposed deposition of approximately 177 Mt of additional tailings in the Cadia Hill open pit and made the following conclusions:

CHPL plans to seek a further approval to increase the tailings emplacement within Cadia Hill open pit beyond the MOD12 level of 560 mAHD to a final emplacement level of approximately 713 mAHD.

...

The sections show that during operations, the water level within Cadia Hill Pit will rise above the base of Cadiangullong Creek, indicating the potential for transport of pit water into the creek in the short-term during operations.

...

The modelling indicated that outward seepage from Cadia Hill Pit to the south-west would occur, but the volumes would be very low between 2.9×10^{-8} and 4.2×10^{-6} m/day. This is due to the very low permeability of the surrounding rocks and low hydraulic head differential between the maximum pit water level and adjacent groundwater level south-west of the pit. The total predicted volume of seepage from the entire section of the pit at the end of the simulation (i.e. 150 years) was predicted to be 0.072 m³/yr (72 L/yr).

...

Therefore, whilst tailings slurry will initially be deposited to 713 mAHD, it will slowly settle to 563 mAHD in the middle of the Cadia Hill Pit. This means that within about six to seven years the level of the tailings will fall below 700 mAHD and a lake will form over the settling tailings.

...

This figure indicates that, post-closure, as the pit water level falls and equilibrates, the potential for direct seepage to Cadiangullong Creek will reduce to zero. A post-mining groundwater elevation between 700 mAHD and 710 mAHD in the vicinity of Cadiangullong Creek, indicates there will be an inward hydraulic gradient established south-west of the pit wall resulting in the pit forming a 'sink' long-term.

With respect to potential impacts on groundwater quality, AGE (2019) (Appendix A) also concluded:

Previous studies also identified that the water quality of the combined Cadia Hill and Cadia East final void will be affected by the long term evapo-concentration of salts and also acidic drainage of potentially acid forming Ordovician host rock affecting pH and dissolved metal concentrations. The continued addition of the tailings solids to the Cadia Hill open pit would not affect the long term water quality of the recovered groundwater table or final void, as the void water quality would continue to be an outcome of evapo-concentration of salts and the geochemistry of the host rock, both of which would be unchanged by the Modification.

This groundwater quality conclusion would be largely unchanged by the revised single final void waterbody (i.e. no interaction with the Cadia East underground mine subsidence zone) identified during the calibration of the site-specific geotechnical model. Based on the above, it can be concluded from a groundwater perspective that there would be minimal environmental impact arising from continued tailings deposition in the Cadia Hill open pit, in consideration of the implementation of the proposed preventative and contingency measures described above.

The above groundwater review conclusions from AGE are supported by the expert opinion of Dr Noel Merrick (Hydro Algorithmics, 2019) (Appendix C), who concluded:

Based on the documents cited, the reviewer holds the following opinions:

- *Laboratory testing for hydraulic conductivity indicates that the Cadia Hill pit rock matrix has a very low permeability and, therefore, groundwater flow would occur largely via defects such as fractures and joints.*
- *In the short-term during operations, the evidence for ongoing behaviour of most sections of the Cadia Hill pit as a groundwater sink is compelling. However, modelling indicates the potential for the pit to form a temporary source in the south-western section of the pit, between 694 mAHD and 713 mAHD.*
- *The proposed identification, location and sealing of fractures within the pit wall between 694 mAHD and 713 mAHD is a credible method to prevent outward migration of tailings water that could transmit water outside of the pit shell.*
- *Long term (post-closure), the evidence for the Cadia Hill pit to form a sink in all areas is compelling.*
- *The barrier/conduit status of intersected faults is irrelevant while the pit remains a groundwater sink (with hydraulic gradients towards the pit).*

- *The proposed additional tailings deposition would not alter the findings of my previous expert opinion with the implementation of proposed preventative and contingency measures (Document #3).*

3.1.3 Mitigation and Management Measures

The groundwater assessment conducted by AGE (March 2019) described the following mitigation measures with respect to the proposed additional tailings deposition in the Cadia Hill open pit:

Additionally, to reduce the potential impact of the south-west section of the Cadia Hill open pit forming a temporary 'source' during operations, CHPL would:

- *conduct trials to assist in determining and testing the optimal treatment strategy prior to inundation of tailings;*
- *locate faults and cracks in the south-west corner of the Cadia Hill pit, between 694 mAHD and 713 mAHD, and treat these using, for example, a grout/polyurethane sealant (injected under pressure into fractured networks); and*
- *implement contingency measures should unforeseen impacts occur (e.g. cease pumping of tailings and supernatant into the pit and commence pumping out of the pit).*

In addition, additional groundwater monitoring bores would be installed in the south-west corner of the Cadia Hill open pit (outside of the pit shell) and along Cadiangullong Creek to measure groundwater levels and water quality.

Groundwater monitoring at the CVO during the in-pit deposition of tailings at the Cadia Hill open pit would continue to be undertaken in accordance with CHPL's existing Water Management Plan.

The current groundwater monitoring programme is extensive (Figure 4). In accordance with commitments for Modification 11, CHPL revised the number of groundwater bores proximal to the Cadia Hill open pit, to verify the ongoing hydraulic gradient towards the areas of historical and current mining. CHPL completed the installation of additional groundwater monitoring bores (MB91-95) (Figure 4) in 2018, to monitor the impact of tailings deposition in the Cadia Hill open pit.

Consistent with the findings of AGE (2019), additional monitoring would be installed adjacent to the south-western corner of the Cadia Hill open pit. These monitoring improvements would be documented in the next revision to the CVO Water Management Plan.

3.2 SURFACE WATER ASSESSMENT

3.2.1 Potential Impacts

The surface water assessment conducted by HEC (2019) (Appendix B) considered the potential final void water balance implications of the proposed deposition of an additional 177 Mt of tailings in the Cadia Hill open pit and concluded the following:

Modelling predicts that the final void water levels would take more than 150 years to reach equilibrium. In the long term, the water level is not predicted to rise to closer than within 21 m of the 721 mAHD spill level. No spills were forecast to occur.

At the CVO, tailings are produced from the grinding of mineralised gold and copper ore in the processing plant, where the target minerals are separated from the tailings via flotation before the concentrated minerals are dewatered for export. The remaining tailings that are currently deposited into the Cadia Hill open pit are typically low in sulphur and are non-acid forming as the sulphide mineralisation is largely extracted in processing and, therefore, reports to the concentrate product.

Water quality sampling in the Cadia Hill open pit since the deposition of tailings commenced is typically in the electrical conductivity (salinity) range of approximately 2,000 to 2,500 microsiemens per centimetre and is described by AGE (2019) as slightly alkaline and brackish. This range is significantly less saline than long-term water quality predicted for the approved final void.

Based on the above, it can be concluded from a surface water perspective that there would be minimal surface water impacts from the proposed continued tailings deposition into the Cadia Hill open pit. The post-mining final void water quality would remain unchanged.

The previous surface water assessment (HEC, 2018) predicted that the final equilibrium water level in the Cadia Hill open pit (approximately 665 mAHD) would be some 56 mAHD below the spill level. The revised modelling predicts the final equilibrium water level would be some 20 m below the spill level.

Existing Site Water Balance

A Site Water Balance was completed for the Cadia East EA (CHPL, 2009) for the approved water management system.

The approved water management system comprises of a number of plant units, mobile equipment, dams, natural systems (i.e. the Belubula River) and groundwater bores. The system supplies water to the CVO, including the ore processing facilities, underground mining operations and for haul road watering.

The initial estimated site water balance inventory was 6,804 megalitres in December 2008 and the site water balance was simulated for the remaining 22 years of the mine's life (i.e. to the end of 2030) based on this starting point. The results of the simulation indicated the water management system would perform within its design requirements for all conditions represented in the rainfall data (CHPL, 2009).

The site water balance was revised for Modification 6. The revised site water balance, conducted by Gilbert and Associates (2015), predicted that water supply to the CVO would continue to perform to a very high level of reliability. The following summary of modelling results was provided (Gilbert and Associates, 2015):

Modelling indicates there would be relatively little change to the performance of the water supply system as a result of the Modification. The Modification would not affect the performance of the existing water management system in any significant way.

Methodology for Revised Site Water Balance

The site water balance was revised for the Modification to assess the effect of the deposition of an additional 177 Mt of tailings into the Cadia Hill open pit.

The water balance model forecasts the CVO water balance over the period from November 2018 to mid-2031. The model simulates 118 “realizations” derived using the climatic record from 1895 to 2013, to generate water balance statistics for the performance of the water management system. The climate record includes historical climatic events (i.e. high, low and median rainfall periods) to provide a wide range of possible conditions experienced at the CVO.

The model was linked to the output of the Belubula River Integrated Quantity and Quality Model to simulate the water available for extraction in accordance with the *Water Sharing Plan for the Belubula Regulated Water Source*.

Modelling Results

With respect to the process plant supply reliability, HEC (2019) (Appendix B) concluded:

The model forecast indicates that 70% of climatic realizations are predicted to experience some (non-negligible) shortfall volume during the simulation period. The average volumetric reliability (averaged over all 118 climatic realizations) is 96.4%, while the lowest in any of the 118 climatic realizations is 85.4%.

3.2.2 Mitigation and Management Measures

Tailings deposition into the Cadia Hill open pit commenced in May 2018. CHPL manages water that accumulates in the Cadia Hill open pit (from tailings supernatant water and rainfall runoff) by recovering (pumping) this water to the water management system for re-use in ore processing. CHPL will progressively construct tailings delivery and return water pipelines that traverse down to a lower elevation within the Cadia Hill open pit. This will increase the control of the beach profile and subsequently provide greater water extraction potential.

Pumping rates would approximately match the tailings deposition rate and anticipated rainfall runoff. Reclaim from the Cadia Hill open pit would be given the same use priority as the other operational tailings storages.

CHPL will continue to undertake the following additional monitoring during deposition into the Cadia Hill open pit, as recommended by HEC (2018) as part of the Final Void Water Balance for Modification 12:

- weekly survey of pond water level;
- daily volumes of water reclaim; and
- daily water volumes and tailings tonnages of tailings deposited.

Measures to manage the predicted water supply shortfalls are described by HEC (2019) (Appendix B):

The operational water balance model would continue to be used by CHPL to provide on-going forecasts of water supply reliability for the CVO. Such forecasts will allow CHPL to plan for contingency measures as required, including acquisition of additional WALs/temporary transfers or implementation of water use reduction measures.

3.3 BIODIVERSITY ASSESSMENT

A BDAR has been prepared by FloraSearch (2019) in accordance with the requirements of the *NSW Biodiversity Offsets Policy for Major Projects* and underlying Biodiversity Assessment Method (BAM) (OEH, 2017) and is presented in Appendix F. The BDAR for the Modification considered the impact of construction of the proposed buttressing on native vegetation and threatened biodiversity. The BDAR is supported by targeted fauna surveys and fauna habitat assessment conducted by Biodiversity Monitoring Services (BMS) (2019) (Appendix 2 of the BDAR).

A description of the existing environment relating to the biodiversity values within the proposed buttress extent is provided in Section 3.3.1. Section 3.3.2 describes the potential impacts of construction of the buttress, and Section 3.3.3 outlines mitigation measures, management, monitoring and the biodiversity offset strategy. Section 3.3.4 considers potential impacts on bat habitat relating to the proposed closure and decommissioning of a ventilation adit located in the Cadia Hill open pit.

3.3.1 Existing Environment

The Modification is located in a highly cleared agricultural region. The 1.5 km buffer zone around the proposed buttressing encompasses 1,788.8 ha, of which 195.6 ha (10.9 percent [%]) is remnant native woodland, with most having been thinned historically (FloraSearch, 2019) (Appendix F).

The proposed buttressing is located within the (FloraSearch, 2019) (Appendix F):

- NSW South Western Slopes Bioregion and Inland Slopes Sub-region of the Interim Biogeographic Regionalisation for Australia (IBRA);
- The Mandurama Slopes, Canobolas Sheet Basalts and Canobolas Slopes Mitchell Landscapes; and
- Blayney Shire Local Government Area (LGA).

Surveys for the Modification

Flora and fauna surveys were undertaken within the proposed buttress extent (the “development footprint” – Figure 5), in addition to the areas immediately adjacent (the “study area” – Figure 5).

Vegetation surveys in the study area were undertaken by FloraSearch over two days (26 June 2017 and 12 June 2019) to identify the Plant Community Types (PCTs), and target potentially occurring threatened flora species and ecological communities. Searches of relevant State and Commonwealth databases and a literature review were also conducted to determine which threatened biodiversity has potential to occur on the study area (FloraSearch, 2019) (Appendix F).

Fauna surveys and habitat assessments of the entire study area were undertaken by BMS between 13 to 15 February 2019 and 4 and 7 June 2019. Survey techniques included habitat assessment, nest tree survey, call playback, spotlighting and bird surveys (BMS, 2019).



HEC-18-89_M0013_205A

LEGEND

- Mining Lease Boundary
- Proposed Southern Tailings Storage Facility Buttress (Development Footprint)
- Study Area

Existing Vegetation Communities

- 2 Box Gum Woodland
- 3 Exotic Grassland
- 6 Disturbed Ground
- 7 Plantings

Source: CHPI (2018)
Orthophoto CVO - Flown November 2016



CADIA VALLEY OPERATIONS
Flora and Fauna Study Area
and Existing Vegetation Communities

Figure 5

Vegetation Communities

Vegetation communities were mapped within the proposed buttress extent based on PCTs. The native trees within the remnant Woodland indicate that the most likely original PCT in the study area is PCT 266 – *White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion*. This community is commonly known as Box-Gum Woodland. The Box-Gum Woodland comprises two small patches totalling 0.31 ha. The remainder of the study area includes exotic-dominated grassland (3.9 ha) and disturbed land (9.3 ha), which lack vegetation cover. These areas did not conform to a native PCT (FloraSearch, 2019) (Appendix F).

Threatened Flora Species and Populations

No threatened flora species or populations listed under the *Biodiversity Conservation Act, 2016* (BC Act) or the EPBC Act were identified in the study area by the survey (FloraSearch, 2019) (Appendix F).

The BAM (OEH, 2017) requires the use of an online program (the BAM Credit Calculator) to assess biodiversity impacts and determine the biodiversity offset requirements for those impacts. Of six candidate threatened flora species identified by the BAM Credit Calculator (all species credit species) two are considered to potentially inhabit the study area. These include the *Swainsona recta* (Small Purple-pea) and *Swainsona sericea* (Silky Swainson-pea). As survey timing was outside of that recommended for these species, they have been assumed to be present in the BAM Credit Calculator. However, given the poor condition of vegetation on the study area, in practice it is considered unlikely that either of these two flora species are present (FloraSearch, 2019) (Appendix F).

Threatened Ecological Communities

PCT 266 in an appropriate condition can represent part of the listed Box-Gum Woodland threatened ecological community (TEC) listed under the BC Act and the EPBC Act as (FloraSearch, 2019) (Appendix F):

- BC Act: *White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community*; and
- EPBC Act: *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland Critically Endangered Ecological Community* (EPBC Act).

However, the two small patches of remnant Box-Gum Woodland do not meet the Commonwealth criteria for protection under the EPBC Act (Department of the Environment and Heritage, 2006). The ground cover is highly degraded and lacks the required diversity of 12 non-grass native species, including one important species, per 0.1 ha (FloraSearch, 2019) (Appendix F).

Fauna Habitat

The study area is located predominantly on previously disturbed land and exotic-dominated grasslands. Fauna habitat is generally of low quality and lacking in sufficient features, such as flowing rocky streams, caves and connected shrubby vegetation areas. However, habitat constraints for some species were present, including paddock or hollow-bearing trees and *Eucalyptus albens* (White Box trees). The 0.31 ha of remnant Box-Gum Woodland contains mature hollow-bearing live and dead White Box trees, with habitat features suitable for some threatened fauna species (BMS, 2019) (Appendix F).

Threatened Fauna Species and Populations

The Squirrel Glider (*Petaurus norfolcensis*) and the Little Lorikeet (*Glossopsitta pusilla*) (both listed as vulnerable under the BC Act) were the only threatened fauna species positively identified within the study area.

The Squirrel Glider is listed as a species credit species (i.e. species that cannot be reliably predicted by PCTs) and the Little Lorikeet is listed as an ecosystem credit species (i.e. species predicted to be present based on the PCTs present on the study area).

Fauna survey timing was outside the recommended timing for some Species Credit Species, whose ability to utilise the study area cannot, therefore, be ruled out. These Species Credit Species have been assumed present in the Credit Calculator for the purposes of the assessment, including:

- Pink-tailed Legless Lizard (*Aprasia parapulchella*);
- Little Eagle (*Hieraaetus morphnoides*); and
- Superb Parrot (*Polytelis swainsonii*).

3.3.2 Potential Impacts

Native Vegetation Clearance

The following vegetation clearance would be required:

- loss of 0.31 ha of Box-Gum Woodland Endangered Ecological Community (EEC) (PCT 266) (requires offset); and
- loss of 3.9 ha of exotic-dominated grassland (does not require offset).

Cumulative Impacts

The cumulative impacts of the Modification on native vegetation loss and reduction of fauna habitat are concluded to be small, and negligible in the regional context. 79 % of the Mandurama Slopes Mitchell Landscape is estimated to have been cleared historically (98,184 ha). The Modification would add 0.31 ha to this loss. No losses would occur on the other two Mitchell Landscapes on the study area; Canobolas Slopes and Canobolas Sheet Basalts (Appendix F).

Indirect Impacts

Potential indirect impacts from the Modification on vegetation (and other terrestrial biodiversity) have been assessed in Appendix F. A number of existing measures (Section 3.3.3) to avoid and minimise indirect impacts on biodiversity would be continued for the Modification (e.g. weed and pest management).

Ecosystem Credit Species

The biodiversity credit report output from the Credit Calculator indicates that the total area of Box-Gum Woodland (0.31 ha) to be removed from the development footprint is valued at eight credits.

Species Credit Species

The total species credits for two threatened flora species and four threatened fauna species is 46 (Table 3).

Table 3
Biodiversity Credits Summary

Threatened Species	Conservation Status ¹		Clearance Area within Biodiversity Assessment Development Footprint	Number of Species Credits
	BC Act	EPBC Act		
Small Purple-pea	Endangered	Endangered	2.00	8
Silky Swainson-pea	Vulnerable	-	2.00	8
Pink-tailed Legless Lizard	Vulnerable	Vulnerable	2.00	8
Little Eagle	Vulnerable	-	1.50	6
Superb Parrot	Vulnerable	Vulnerable	2.00	8
Squirrel Glider	Vulnerable	-	2.00	8
Total				46

¹ Threatened species status under the BC Act and/or EPBC Act (current as at June 2019).

3.3.3 Avoidance, Mitigation and Management Measures

Existing measures to avoid, mitigate and manage impacts on biodiversity, as outlined in the CVO Land and Biodiversity Management Plan, would continue to be implemented including:

- native vegetation immediately adjoining proposed clearance areas is clearly marked to avoid accidental damage during vegetation clearance activities;
- vegetation removal in accordance with the CVO Vegetation Clearance Protocol;
- weed control measures; and
- animal pest control measures (including destruction of the pest and/or removal of harbour/habitat where possible).

The existing CVO Rehabilitation Strategy would be updated to incorporate the development footprint.

Biodiversity Offset

CHPL would make a payment to the NSW Biodiversity Conservation Fund, administered by the NSW Biodiversity Conservation Trust, instead of retiring credits for all of the biodiversity credit requirements. The total cost of the payment has been determined by the BAM Credit Calculator as \$86,308.64. The payment summary report from the BAM Credit Calculator is provided in Appendix F.

3.3.4 Ventilation Adit VR101

An adit (VR101) is located in the Cadia Hill open pit (at 600 mAHD) and is used for ventilation of the underground mine workings. VR101 is proposed to be decommissioned and closed as a component of the Modification.

VR101 was inspected by BMS in October 2018 to conduct a bat habitat assessment (as a separate assessment to the BDAR). The entire length of VR101 was driven in a vehicle, stopping at seven side passages. The deployed anabat recording identified no call sequences; however, some bat scats were identified in one of the seven side passages. CHPL would conduct additional seasonal surveys prior to closing of VR101 to determine the extent of bat habitat and use on-site. If threatened bats are identified, fauna management strategies would be developed in accordance with the Threatened Species Management Protocol contained within the Cadia Land and Biodiversity Management Plan. These management measures would be undertaken in consultation with the Biodiversity and Conservation Division.

3.4 ABORIGINAL CULTURAL HERITAGE ASSESSMENT

An ACHA was prepared for the Modification by Landskape (2019) (Dr Matt Cupper) and is presented in Appendix E. The ACHA considered the impact of construction of the proposed buttressing on Aboriginal cultural heritage places, objects and values.

The ACHA for the Modification was undertaken in consideration of the following codes, guidelines and regulations (Landskape, 2019) (Appendix E):

- *Aboriginal cultural heritage consultation requirements for proponents 2010 (Part 6 National Parks and Wildlife Act, 1974) (Consultation Guidelines) (NSW Department of Environment, Climate Change and Water [DECCW], 2010a).*
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010b).*
- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW (OEH, 2011).*
- *(Draft) Part 3A EP&A Act Guidelines for Aboriginal Cultural Impact Assessment and Community Consultation (NSW Department of Environment and Conservation [DEC], 2005).*
- *The Australia International Council on Monuments and Sites (ICOMOS) The Burra Charter: The Australian ICOMOS Charter for Places of Cultural Significance (Australia ICOMOS, 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).*
- *NSW Minerals Industry Due Diligence Code of Practice for the Protection of Aboriginal Objects (NSW Minerals Council, 2010).*

Surveys for the Modification

Surveys were undertaken on 6 July 2017 by Dr Matt Cupper, with the assistance of registered Aboriginal stakeholder representative from Orange Local Aboriginal Land Council (OLALC), Heritage Officer Greg Ingram. The entire extent of the of the proposed buttressing (the “development footprint” shown in Figure 5) was inspected with a pedestrian survey, whereby team members walked abreast across the area in a series of transects. Transects were equally distributed across the survey area and were approximately 10 m apart. The ground surface was examined for archaeological traces such as stone artefacts, hearths, hearthstones, shells and mounds (Landskape, 2019) (Appendix E).

3.4.1 Potential Impacts

The assessment found that sediments in the proposed buttress extent are extensively disturbed by past earthworks, including land clearing and existing embankment construction. No Aboriginal cultural heritage places, objects or values were found and the potential for uncovering any previously unidentified cultural heritage is negligible to low. Based on these findings, Landskape (2019) concludes that construction of the proposed buttressing is unlikely to harm Aboriginal cultural heritage places or objects (Landskape, 2019) (Appendix E).

The ACHA was provided to the OLALC for review and comment in June 2019. Following feedback from the OLALC, the background description of the ACHA was augmented with additional detail regarding historical Aboriginal land use of the area.

3.4.2 Mitigation and Management Measures

The mitigation and management measures outlined in the existing CVO Aboriginal Cultural Heritage Management Plan (ACHMP) would continue to be implemented for the Modification.

3.5 NOISE ASSESSMENT

The noise assessment conducted by Wilkinson Murray (2019) (Appendix D) for the Modification considered the impact of the installation of a new ventilation adit to relocate ventilation adit VR101, which would be inundated by tailings. The relocated ventilation adit would be installed within the currently approved disturbance footprint and outside of the Cadia Hill open pit.

Modelling predicted that noise levels at the nearest and potentially most exposed receivers with the Modification in place, during construction and operations, would result in an increase of 0 to 2 decibels when compared with the existing/approved noise levels.

Wilkinson Murray (2019) (Appendix D) concluded the following with respect to construction and operational noise impacts associated with the Modification:

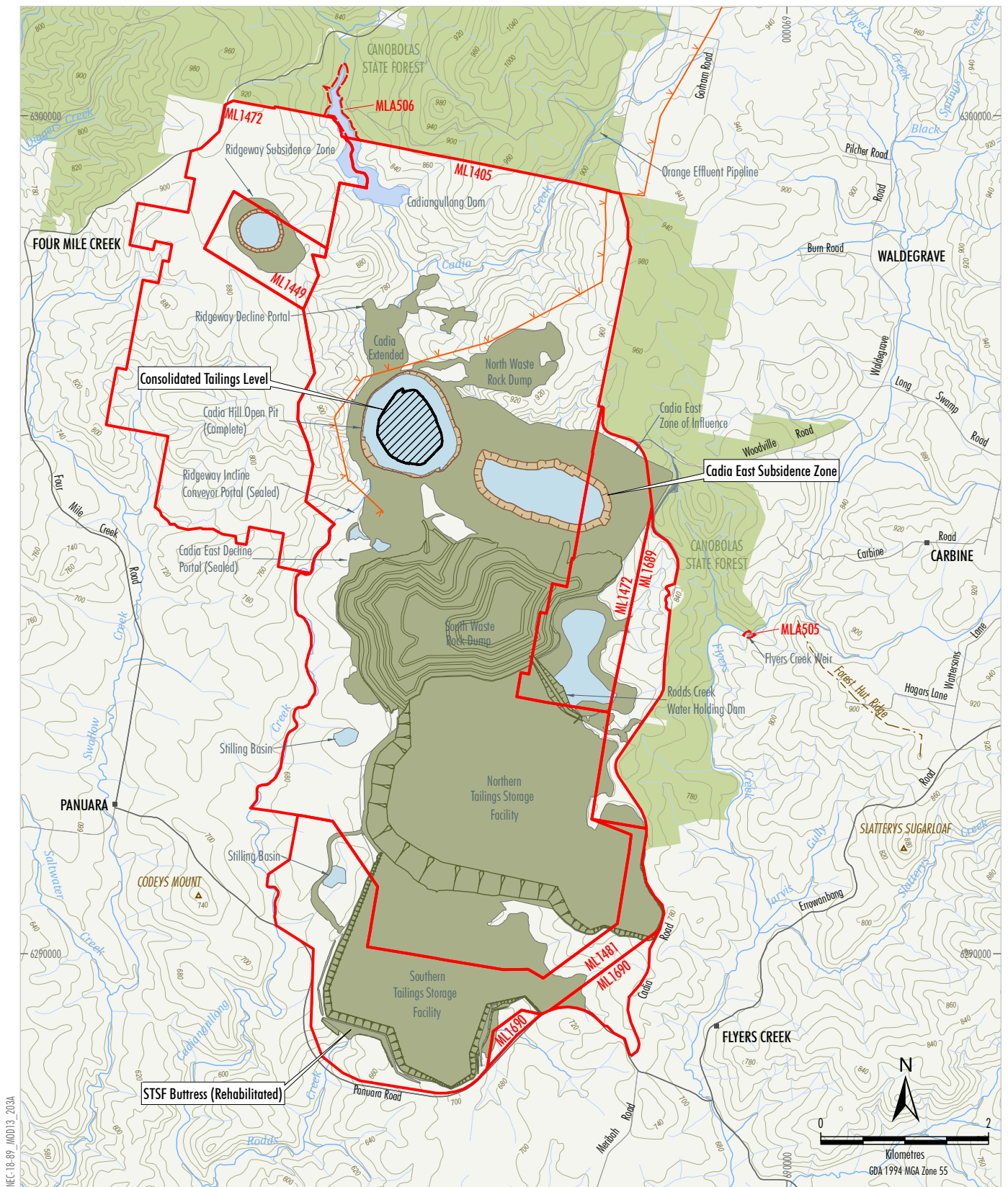
Noise predictions indicate that operational and construction noise levels associated with the proposed Modification comply with the impact assessment criteria at all identified receivers. As such, the proposed Modification is not expected to impact on the acoustic amenity of receivers in the vicinity of Cadia.

Based on the above, it can be concluded from a noise perspective that there would be negligible impact on the acoustic amenity of receivers in the vicinity of CVO from the installation of the proposed ventilation adit.

3.6 OTHER ASPECTS

Final Landform

As described in Section 3.1.1, updated geotechnical modelling indicates that the Cadia East subsidence zone is not expected to extend to the Cadia Hill open pit (i.e. would be smaller in extent compared with the approved subsidence zone). Therefore, two separate final void waterbodies would form. The updated water balance model (HEC, 2019) predicted the long-term water level in the Cadia Hill void would average approximately 694 mAHD. In the long-term, the water level modelled for the Modification is not predicted to rise to closer than within 21 m of the 721 mAHD spill level (Figures 3 and 6).



- LEGEND
- Mining Lease Boundary
 - Mining Lease Application Boundary
 - State Forest
 - Powerline
 - Revegetated/Rehabilitated Area
 - Waterbody



CADIA VALLEY OPERATIONS
Post Mining Landforms

Source: Land and Property Information (2017);
NSW Planning & Environment Resource & Energy (2017);
CHPL (2018)

Figure 6

It can therefore be concluded that the Modification would result in no material change to the approved final landform for the CVO, and hence is of minimal environmental impact. Safety management measures at the pit lake, subsidence zone and zone of influence would be unchanged by the Modification (i.e. exclusion by safety bunding/fencing). A native woodland screen would be planted around the fence of the subsidence zone to provide a visual barrier and delineation of the zone to assist in future land use planning. Where possible, the native woodland screen would be used as a link in the vegetation corridor programme.

Hazard and Risk

The Cadia Hill open pit is a 500 m deep mine void, located in hard rock and upstream of the existing approved ore processing facilities, STSF and NTSF.

The existing tailings and water return pipelines and associated pumps and electrical reticulation would continue to be utilised in support of the Modification.

The proposed additional deposition of tailings in the Cadia Hill open pit, therefore, would not result in any adverse change to the likelihood or consequences of a hazardous event at the CVO.

Visual

There would be no change to the height of the existing STSF buttress as a result of the additional buttressing proposed in the Modification. Therefore, no visual impacts are anticipated for the Modification. Rehabilitation of the buttressing would be incorporated into the existing rehabilitation strategy for the tailings storage facilities.

Other Environmental Considerations

Consideration of other potential environmental impacts arising from the Modification is provided below:

- **Land Resources and Downstream Water Quality** - no implications as continued tailings deposition is wholly within an approved open pit and no credible solute seepage pathway to the exterior environment exists, with the implementation of proposed preventative and contingency measures.
- **Workforce Demand and Accommodation** - no material change to the CVO workforce would be required.

Cadia East Underground Mine Safety

CHPL has developed and refined a site-specific calibrated geotechnical model for the Cadia East underground mine. The calibrated model indicates the subsidence zone would be smaller than was previously predicted and approved for the Cadia East Project.

Based on the proposed Modification consolidated tailings deposition level of 713 mAHD, calibrated subsidence modelling and the very low permeability host rock, CHPL does not have any underground mine safety concerns with the storage of additional tailings and tailings supernatant water in the Cadia Hill open pit. No safety issues have been identified from the deposition of tailings to date.

Notwithstanding, CHPL would continue to implement its operational safety management systems, including ongoing monitoring and risk assessments.

4 CONCLUSION

The Modification does not propose any increase to the approved rates of mining, ore processing or tailings emplacement at the CVO. Nor would it alter the project operational workforce.

The Cadia East Project would remain substantially the same as the Project as approved by the last modification under section 75W (i.e. Modification 10), inclusive of the proposed Modification and the previously approved Section 4.55 modifications (i.e. Modifications 11 and 12).

In order to assess the potential environmental impacts of the proposed Modification, a number of environmental reviews were completed. These reviews and the other assessments detailed in this report have concluded that the Modification would have minimal environmental impact.

CHPL consulted with local stakeholders during development of the Modification application, including a residents meeting, which provided attendees with an opportunity to engage in discussion regarding potential groundwater impacts associated with the Modification and any other concerns that the residents may have regarding the Modification. Additionally, CHPL separately briefed the Environmentally Concerned Citizens of Orange, Blayney Shire Council, Cabonne Council, Orange City Council, the Resources Regulator, OEH (now the Biodiversity and Conservation Division of the DPIE), DoI – L&W and the EPA on the Modification. Letters of support provided by the three local councils in response to CHPL consultation on the Modification are provided in Attachment A.

The CVO environmental management and monitoring measures currently being applied by CHPL would continue to be applied to minimise potential impacts on existing environmental values. The following additional measures described in this application would also be applied:

- preventative and contingency measures relating to the potential temporary migration of tailings water out of the south-west section of the pit (in the short-term); and
- monitoring and management (if required) measures prior to decommissioning of ventilation adit VR101, to reduce the potential impact to bat habitat.

Please do not hesitate to contact me on (02) 6366 6326 if you would like to discuss.

Yours sincerely



Jane Chung
Approvals and Community Superintendent
Cadia Valley Operations

5 REFERENCES

- Australasian Groundwater and Environmental Consultants Pty Limited (2019) *Cadia Hill Tailings Completion – Groundwater Assessment*.
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Wilkinson Murray Pty Ltd (2019) *Cadia Hill Tailings Completion Modification – Modification 13 Noise Review*.

ATTACHMENT A
CORRESPONDENCE FROM LOCAL COUNCILS



Phone: (02) 6392 3247

Fax: (02) 6392 3260

Contact: H Nicholls

THE GENERAL MANAGER

POST OFFICE BOX 17

MOLONG 2866

Website: www.cabonne.nsw.gov.au

Email: council@cabonne.nsw.gov.au

Our Ref:

Doc ID: 1006620

ABN: 41992 919 200

9 April 2019

Jane Chung
Approvals and Community Superintendent
Cadia Valley Operations
Newcrest Mining Limited
1460 Cadia Road
ORANGE NSW 2800

Dear Madam,

**CADIA VALLEY OPERATIONS – MOD 13
CADIA HILL TAILING COMPLETION**

Thank you for meeting with Council staff on 27 March 2019 to brief Council on the proposal to modify the planning approval to enable additional deposition of tailings into the Cadia Hill Pit.

Based upon the information provided, council has no objection to the proposed modification subject to adequate environmental controls being implemented to ensure that there will be no adverse environmental impact to groundwater or water quality.

Should you have any further enquiries please contact the undersigned at council's Environmental Services Department on 6392 3247 during business hours.

Yours faithfully,

HJ Nicholls
DIRECTOR ENVIRONMENTAL SERVICES



Blayney Shire Council

Council Office 91 Adelaide Street, Blayney Postal Address PO Box 62, Blayney NSW 2799
Telephone (02) 6368 2104 Email council@blayney.nsw.gov.au
Web www.blayney.nsw.gov.au
ABN 47 619 651 511

2 May 2019

The General Manager
Cadia Valley Operations
1460 Cadia Road
ORANGE NSW 2800

Attention: Jane Chung
Via email: Jane.Chung@newcrest.com.au

Dear Jane

RE: Cadia Hill Tailings Completion Modification 13

Thank you for the presentation to our Councillor Workshop on Monday 1 April 2019. I wish to reiterate Council support of Newcrest Mining's Modification 13 – Cadia Hill Tailings Completion that will increase the tailings level to its full capacity which is approximately 713mAHD in the former pit.

Council understands the additional capacity provides approximately 7 years of additional deposition for this facility.

Our adjoining farmers rely on clean, uncontaminated ground and surface water for agricultural production, and Council supports the ongoing commitment by Cadia Valley Operations to undertake independent environmental impact assessments and water quality control and monitoring.

Should you require further information please contact me on Ph 6368 2104.

Yours faithfully

Rebecca Ryan
General Manager

D19/22947

11 April 2019

Mr Peter Sharpe
General Manager
Cadia Valley Operations
1460 Cadia Road
ORANGE NSW 2800

Dear Mr Sharpe

DEPOSIT OF TAILINGS INTO CADIA HILL PIT STAGE 3

Orange City Council is aware of the limited slump of the Northern Tailings Storage Facility (NTSF) embankment at Cadia Valley Operations (CVO) that occurred in March 2018 and of the current approved deposition of tailings in the Cadia Hill pit.

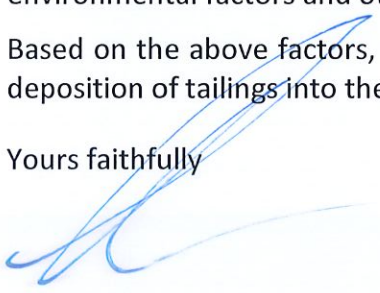
Council has been made aware of the proposal by CVO to deposit further tailings into the Cadia Hill pit to allow for recovery measures to be put in place at the NTSF.

Council recognises the importance of Cadia Valley Operations to the Orange economy and the valuable number of jobs it provides. Council understands the need for CVO to find alternatives to ensure the ongoing operation of the site.

It is understood that the NSW Government Department of Planning and Environment will be required to determine the impacts of this proposal including an appropriate assessment of environmental factors and other issues.

Based on the above factors, Orange City Council supports the application for the expended deposition of tailings into the Cadia Hill pit to maintain the stability of the Orange economy.

Yours faithfully



David Waddell
DIRECTOR DEVELOPMENT SERVICES

ATTACHMENT B

SUMMARY OF PREVIOUS CADIA EAST MODIFICATIONS

Summary Comparison Table - Cadia Valley Operations (CVO) Cadia East Project and Modifications 1 – 13¹

Approval or Modification	Mining Methods	Life of Mine Ore Production	Waste Rock Management	Life of Mine	Tailings Management	Ore Processing	Concentrate Dewatering and Transport	Water Supply and Management	Operational Employment	Other	Key Changes to Approved Cadia East Environmental Impacts
Cadia East Project (incorporating all previously approved Cadia Valley Operations [CVO])	Cadia Hill - conventional open pit mining methods. Ridgeway - underground sublevel and block caving and associated surface subsidence zone. Cadia East - underground panel caving and associated surface subsidence zone.	Cadia East - approx. 449.5 Mt. CVO - approx. 561 Mt.	Deposition in the North and South Waste Rock Dumps and mined-out void of the Cadia Extended open pit. Cadia East waste rock to be deposited in the South Waste Rock Dump.	Mining up until approx. 2030. Project Approval to 2031.	Use of the NTSF and STSF. Raising of these storages via upstream embankment lifts.	Processing of up to 27 Mtpa of gold and copper ore. Construction and operation of a Molybdenum Recovery Plant.	Transport of dewatered mineral concentrate by rail. Gold/copper concentrate transported from the ore processing facilities via a concentrate pipeline to the Blayney Dewatering Facility. Construction and operation of new CVO Dewatering Facility and concentrate pipeline.	Cadiangullong Dam, Flyers Creek Weir, Cadia Creek Weir, Rodds Creek Water Holding Dam, Orange Sewage Treatment Plant treated effluent, Blayney Sewage Treatment Plant treated effluent, on-site groundwater bores, Belubula River, site runoff and pipeline/pumping systems.	Average 880 to max approx. 1,300.	Not Applicable.	Not Applicable.
Modification 1 Cadia Hill Decline	Underground decline from Cadia Hill open pit, including bulk samples and ventilation.	0.02 Mt of additional ore.	Additional 0.8 Mt of waste rock.	No change.	No change.	No change.	No change.	No change.	No change.	Not Applicable.	No material environmental implications.
Modification 2 Blayney Dewatering Facility	No change.	No change.	No change.	No change.	No change.	No change.	Upgrade to dewatering facility capacity in Blayney and extending the life of the facility by two years.	No change.	No change.	Related to delay in establishment of CVO Dewatering Facility.	Addition of acoustic control elements which resulted in a decrease in local operational noise levels.
Modification 3 Cadia Road Pipeline Relocations	No change.	No change.	No change.	No change.	No change.	No change.	Realignment of concentrate and return water pipelines to follow existing Cadia Road rather than realigned route.	No change.	No change.	Option retained to relocate to originally approved alignment.	Minor reduction in approved land disturbance.
Modification 4 Pre-conditioning by Hydraulic Fracturing	Preconditioning of the Cadia East host rock from the surface using hydraulic fracturing.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	Not Applicable.	Negligible impacts on groundwater above those already approved. Noise impacts associated with drilling operations were temporary and limited.
Modification 5 Pre-conditioning by Blasting	Preconditioning of the Cadia East host rock from the surface using blasting techniques.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	Not Applicable.	Negligible impacts on groundwater above those already approved. Complied with existing blasting criteria. No additional noise impacts to those already assessed and approved.
Modification 6 Processing Rate Modification	No change.	Cadia East - approx. 456 Mt. CVO - approx. 562 Mt.	No change.	No change.	Minor upgrades to tailings infrastructure.	Processing of up to 32 Mtpa of gold and copper ore.	No change.	Contingent transfer of tailings water to Cadia Hill open pit for water management.	No change.	Upgrades to ore handling and processing facilities and associated increase in electricity demand. Other administrative updates.	Negligible noise emissions and no change to criteria. Negligible impacts on water supply.
Modification 7 Biodiversity Offset Modification	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	Modification of approved Biodiversity Offset Area.	No change.
Modification 8 Administrative Modification	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	Updating Project Approval schedule of lands.	No change.
Modification 9 Surface Pre-conditioning and On-Site Warehouse	Additional preconditioning of Cadia East host rock from the surface using hydraulic fracturing.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	No change.	Included on site warehouse.	Negligible impacts on groundwater above those already approved. Cumulative noise emissions compliant with noise limits.

¹ Details provided on the Department of Planning and Environment Major Projects website for the Cadia Valley Operations: <http://majorprojects.planning.nsw.gov.au/>

Summary Comparison Table - Cadia Valley Operations (CVO) Cadia East Project and Modifications 1 – 13¹ (Continued)

Approval or Modification	Mining Methods	Life of Mine Ore Production	Waste Rock Management	Life of Mine	Tailings Management	Ore Processing	Concentrate Dewatering and Transport	Water Supply and Management	Operational Employment	Other	Key Changes to Approved Cadia East Environmental Impacts
Modification 10 Molybdenum Plant Relocation	No change.	No change.	No change.	No change.	No change.	Relocation of the Molybdenum Recovery Plant including an upgrade in feed capacity from 460,000 tonnes per annum (tpa) to 500,000 tpa.	No change.	No change.	No change.	Increase in molybdenum product transported off-site. Relocation of the approved mine access road intersection.	No change.
Modification 11 Cadia Hill Tailings	No change.	No change.	No change.	No change.	Deposition of 30 Mt tailings into Cadia Hill open pit. Infrastructure established to support in-pit tailings deposition.	No change.	No change.	Pipeline installed to return Cadia Hill tailings water to water management system.	No change.	Minor infrastructure upgrade.	Negligible impacts on water resources above those already approved.
Modification 12 Cadia Hill Tailings Continuation Modification	No change.	No change.	No change.	No change.	70 Mt of additional tailings disposal in Cadia Hill open pit. Total life of mine tailings disposal volume unchanged.	No change.	No change.	No change.	No change.	Not applicable.	No change.
Modification 13 (proposed) Cadia Hill Tailings Completion Modification	No change.	No change.	No change.	No change.	Deposition of tailings in the Cadia Hill open pit to its full capacity to a (pre-consolidation) level of approximately 713 metres Australian Height Datum (m AHD). This would provide an additional 177 Mt of capacity in the Cadia Hill open pit. Total life of mine tailings disposal volume unchanged.	No change.	No change.	No change.	No change.	Decommissioning and closure of existing adit VR101, which would be inundated by tailings in the Cadia Hill open pit as a result of the modification. Installation of a ventilation adit outside of the current approved disturbance footprint to replace adit VR101. Construction of additional buttressing for the STSF embankment outside of the approved CVO disturbance footprint.	Negligible impacts on water resources with implementation of proposed preventative and contingency measures. Potential bat habitat within VR101, which is to be decommissioned and closed (monitoring and management measures are proposed to be implemented prior to decommissioning of the adit, to prevent potential impacts to bat habitat). The proposed ventilation adit is located within the approved CVO disturbance footprint. Impacts to biodiversity were therefore assessed and offset as part of the Cadia East Environmental Assessment. Complied with noise criteria. A Biodiversity Development Assessment Report completed for Modification 13 concluded that the cumulative impacts of construction of the STSF buttressing on biodiversity are small, and negligible in the regional context.

NTSF - Northern Tailings Storage Facility
STSF - Southern Tailings Storage Facility
Note - Modification 10 (i.e. development as was last modified under section 75W) is the basis for comparison against Modification 13 (in addition to Modifications 11 and 12).