



Cadia East Gold/Copper Project Modification 14

Increased Processing Rate, Infrastructure Upgrades and Tailings Dam Repair/ Buttressing

State Significant Development Modification Assessment (MP06_0295 MOD 14)

December 2021



Published by the NSW Department of Planning, Industry and Environment

dpie.nsw.gov.au

Title: Cadia East Gold/Copper Project Modification 14

Subtitle: Increased Processing Rate, Infrastructure Upgrades and Tailings Dam Repair/ Buttressing

Cover image: Cadia East Gold/Copper Project – Southern Tailings Storage Facility (Source: Department of Planning, Industry and Environment May 2021)

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Executive Summary

Background

Cadia Holding Pty Limited (Cadia), operates the Cadia Valley Operations (CVO) mining complex located within the Cabonne and Blayney local government areas about 25 kilometres southwest of Orange. The CVO mining complex (the project) operates under a project approval (PA 06_0295), which has been modified 13 times and allows Cadia to extract approximately 562 million tonnes (Mt) of ore at a processing rate of 32 Mt per annum (Mtpa) until 30 June 2031. It also allows for tailings to be deposited into the Northern Tailings Storage Facility (NTSF) and Southern Tailings Storage Facility (STSF).

In March 2018, a breakthrough of the NTSF embankment into the STSF occurred resulting in Cadia being unable to operate both the NTSF and the STSF, leading to the drying out of tailings materials and increased dust events and air quality impacts to the surrounding community.

Scope of modification

The modification has four main components, involving increasing the project's processing rate to 35 Mtpa, tailings facilities construction works (including repair of the NTSF embankment and changes to the construction of the NTSF and STSF embankments to a combination of centreline and downstream), additional overburden pre-conditioning works above the Cadia East orebody and construction and operation of a Sodium Hydrosulphide (NaHS) Solutioning Plant.

Statutory context

On 6 January 2010, the project was approved under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) by the then Minister for Planning and later transitioned to State significant development. Cadia submitted a modification application under section 4.55(2) of the EP&A Act to the Department of Planning, Industry and Environment (the Department) on 10 December 2020.

The Department considers that the proposed modification is within the scope of section 4.55(2) of the EP&A Act as the application is substantially the same development as last modified under section 75W of the EP&A Act, and would not significantly increase the environmental impacts of the project as approved.

Engagement

The Department exhibited the modification application and accompanying documents from 21 January 2021 until 19 February 2021, receiving a total of 29 formal community submissions (28 from the general public and one from a special interest group). The Department also received advice from 11 government agencies and submissions from Blayney Shire, Cabonne Shire, and Orange City Councils and considered additional community representations received after the exhibition period.

Key issues raised in public submissions included concerns for allowing an increase in production rate resulting in incremental increases in air quality impacts, impacts on downstream water quality and increased water use in an already constrained water market.

Assessment

The Department considered the key assessment issues for the proposal relate to the tailings storage facilities upgrade works (including construction methods and safety), air quality, water resources, biodiversity and road traffic noise. A summary of the Department's consideration of the key assessment issues is outlined below.

Tailings facilities construction

The repair works to the NTSF would allow for continued deposition of tailings into the storage facility, whilst the conversion of the embankments to downstream/centreline construction would result in increased geotechnical stability and safety of the facilities. Although the embankment design would be different to the approved project, the proposed final landform design, including surface water management, is consistent with project's rehabilitation objectives. The Department has recommended that all future lifts to the NTSF and STSF be completed using either downstream or centreline methods.

Importantly, these works are essential for undertaking approved mining operations at Cadia as there is insufficient tailings capacity in the Cadia Hill open cut pit and operations would cease without the required tailings storage capacity.

Air quality and greenhouse gas

Construction works required for the NTSF and STSF as well as the increased processing rate would result in an increase in total suspended particles by 22%, with most of this increase (approximately 75%) associated with the tailings facility construction activities.

However, the incremental increase in dust emissions from the project (including existing activities along with the modification) would comply with ambient air quality criteria at surrounding residences. While cumulative impacts, which include background dust levels, would exceed the 24-hour criteria for PM₁₀ and PM_{2.5}, the modelling predicts that the project would not cause additional exceedances at residences above that caused by background dust levels. The proposal is also predicted to comply with other relevant air quality criteria, including odour from hydrogen sulphide emissions associated with the NaSH plant.

The proposal would increase the project's approved greenhouse gas emissions by approximately 2% (Scope 1 and Scope 2) with total site emissions equating to 0.9% of NSW's total annual greenhouse gas emission inventories (based on State and Territory Greenhouse Gas Inventories 2017). The Department has included a requirement to prepare and implement an Air Quality and Greenhouse Gas Management Plan, including implementing measures to minimise greenhouse gas emissions.

The Environment Protection Authority (EPA) and the Department consider that Cadia adequately assessed potential air quality impacts of the proposal and that subject to recommended conditions, including an independent air quality audit, inclusion of stricter air quality impact criteria and implementation of an Air Quality and Greenhouse Gas Management Plan, air quality impacts can be appropriately mitigated. The Department also considers that the NTSF repair works would facilitate the most effective, long term mitigation of existing dust impacts by allowing resumption of wet tailings deposition into the tailings facilities.

Water

The proposal would result in an additional 10% (approximately) demand in water which can be supplied by Cadia's existing water management systems to an average reliability of 98.1%. Noting concerns raised in community submissions about water supply, the Department's recommended conditions include requiring that Cadia has sufficient water supply for all stages of the project and adjusting the scale of operations to match available water supply. The Department has also recommended that Cadia include measures to accurately monitor its actual water take against predicted take. The Department has also recommended water management performance measures related to the operation of the tailings facilities following recommendations from the EPA and requirements for dam safety in accordance with the national ANCOLD guidelines.

Biodiversity

Clearing of around 23.3 hectares of endangered Box-Gum Woodland and associated habitat for threatened species is required to construct the proposed downstream/centerline embankment, requiring offsetting of 555 ecosystem credits and 1,488 species credits. Cadia has identified measures it would implement to mitigate impacts during clearing and would offset biodiversity impacts through a combination of establishment of land-based stewardship sites and contribution to the Biodiversity Trust Fund. The Department has recommended that a standalone Biodiversity Management Plan be prepared and implemented incorporating the proposed mitigation measures.

Noise

The proposal is predicted to comply with the existing operational noise criteria; however, the Department has recommended that a contemporary Noise Management Plan be prepared and implemented to replace the existing noise monitoring plan requirement. Additional light and heavy vehicle movements associated with the increased workforce and construction would result in a maximum increase in road traffic noise impacts to receivers of 2 dB, a level which is unlikely to be perceptible. The existing project conditions provide adequate mitigation to any residential receiver that may be impacted. The Department has also recommended inclusion of traffic noise management measures in the revised Noise Management Plan.

Other issues

The Department's assessment also considered other potential impacts of the project, including hazards, Aboriginal heritage, traffic, historic heritage, visual impacts, subsidence and community consultation. The Department considers that incremental impacts as a result of the proposal could be suitably managed and mitigated to an acceptable level, subject to the existing and recommended conditions.

Evaluation

The Department has undertaken a comprehensive assessment of the merits of the modification application and supporting information in accordance with the relevant requirements of the EP&A Act, including the relevant 'matters for consideration', considering all information provided by Cadia, government agencies, the public and special interest groups. The Department acknowledges that the proposal, including the increased processing rate and the construction works for the NTSF and the STSF, would result in additional environmental impacts compared to the approved project. The Department has carefully considered the residual impacts of the proposal in consultation with key government agencies, and consider that these residual impacts can be effectively managed, mitigated and/or offset through the incorporation of contemporary conditions, including updated operating, reporting and auditing requirements.

The Department notes that without the repair to the NTSF and proposed changes to embankment design then the mine would be relying on only one tailings storage facility (the Cadia Hill open cut), which would eventually reach capacity prior to the end of the mine's life. It is also recognised that declining ore grades are a significant driver to the proposed increased processing rate.

The modification would allow Cadia to continue delivering its social and economic benefits to the community for the course of the project life. The modification through the increase in production rate from 32 to 35 Mtpa would provide an incremental \$46 million net present value of total net production benefits to the NSW economy and support up to 35 additional full-time equivalent operational jobs.

On balance, the Department believes that the project is in the public interest and should be approved subject to the strict recommended conditions.

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1 Introduction

Cadia Holding Pty Limited (Cadia), a wholly owned subsidiary of Newcrest Mining Limited, operates the Cadia Valley Operations (CVO) mining complex, located within the Cabonne and Blayney local government areas about 25 kilometres (km) southwest of Orange (see **Figure 1**).

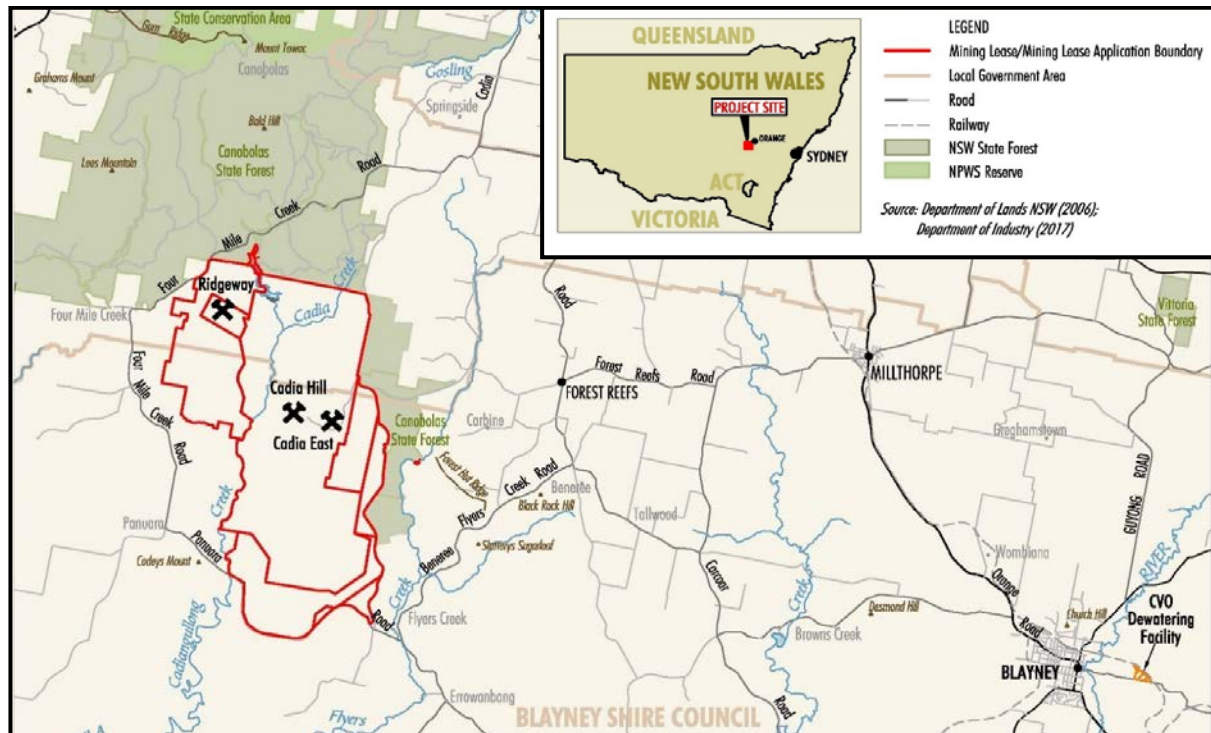


Figure 1 | Regional context (Source: Modification Report (MOD 14) – Cadia East Gold/Copper Project)

The CVO mining complex (the project) operates under project approval (PA 06_0295) granted by the then Minister for Planning on 6 January 2010, and includes the active Cadia East underground mine (commenced production in January 2013), the Cadia Hill open cut mine (placed in care and maintenance in 2012) and the Ridgeway underground mine (placed in care and maintenance in 2016).

The project approval has been modified 13 times and allows Cadia to extract approximately 562 million tonnes (Mt) of ore from the CVO mining complex (including 456 Mt from the Cadia East underground mine), at a processing rate of 32 million tonnes per annum (Mtpa), and produce a tailings waste stream of approximately 30 Mtpa.

The project approval also allows for tailings deposition into the Northern Tailings Storage Facility (NTSF) and the Southern Tailings Storage Facility (STSF) through staged upstream embankment lifts up to approved final heights of 779 metres Australian Height Datum (mAHD) (Stage 22), and 702 mAHD (Stage 11), respectively. Tailings deposition is also permitted into the Cadia Hill open cut pit up to its full capacity of 713 mAHD.

The project is a major employer in the region which employs an ongoing peak operational workforce of approximately 910 employees/contractors.

In March 2018, a breakthrough of the NTSF embankment into the STSF occurred resulting in Cadia being unable to operate both the NTSF and the STSF, leading to the drying out of tailings materials and increased dust events and air quality impacts to the surrounding community

2 Proposed modification

The modification application has four main components, involving:

1. **Processing rate increase** - from 32 Mtpa to 35 Mtpa, including associated infrastructure upgrades;
2. **Tailings facilities construction works** including,
 - a. repair of the NTSF embankment;
 - b. changes to the construction of the NTSF and STSF embankments to centreline and/or downstream lifts from the approved upstream design, including additional buttressing;
3. Construction and operation of a sodium hydrosulphide (**NaHS**) **Solutioning Plant**; and
4. **Overburden pre-conditioning** above the Cadia East orebody.

The proposal would be located entirely within the existing project area; however, additional disturbance would be required to facilitate the centreline and/or downstream lift construction works for the NTSF and STSF (see **Figure 2**).

Following repair of the NTSF, Cadia intends to continue depositing tailings up to the maximum approved deposition heights. No additional raises to the final height of the tailings storage facilities are proposed as part of the modification.

The proposal would increase the project's operational workforce by 35 full-time equivalent personnel on average over the remaining life of the project. Construction personnel required for the upgrades would be within the project's peak construction workforce.

A summary of the proposal's key components is provided in the following sub-sections. Full details of the proposal are available in the Modification Report (see **Appendix A1**), Submissions Report (**Appendix A3**) and additional information provided by Cadia (**Appendix A5**).

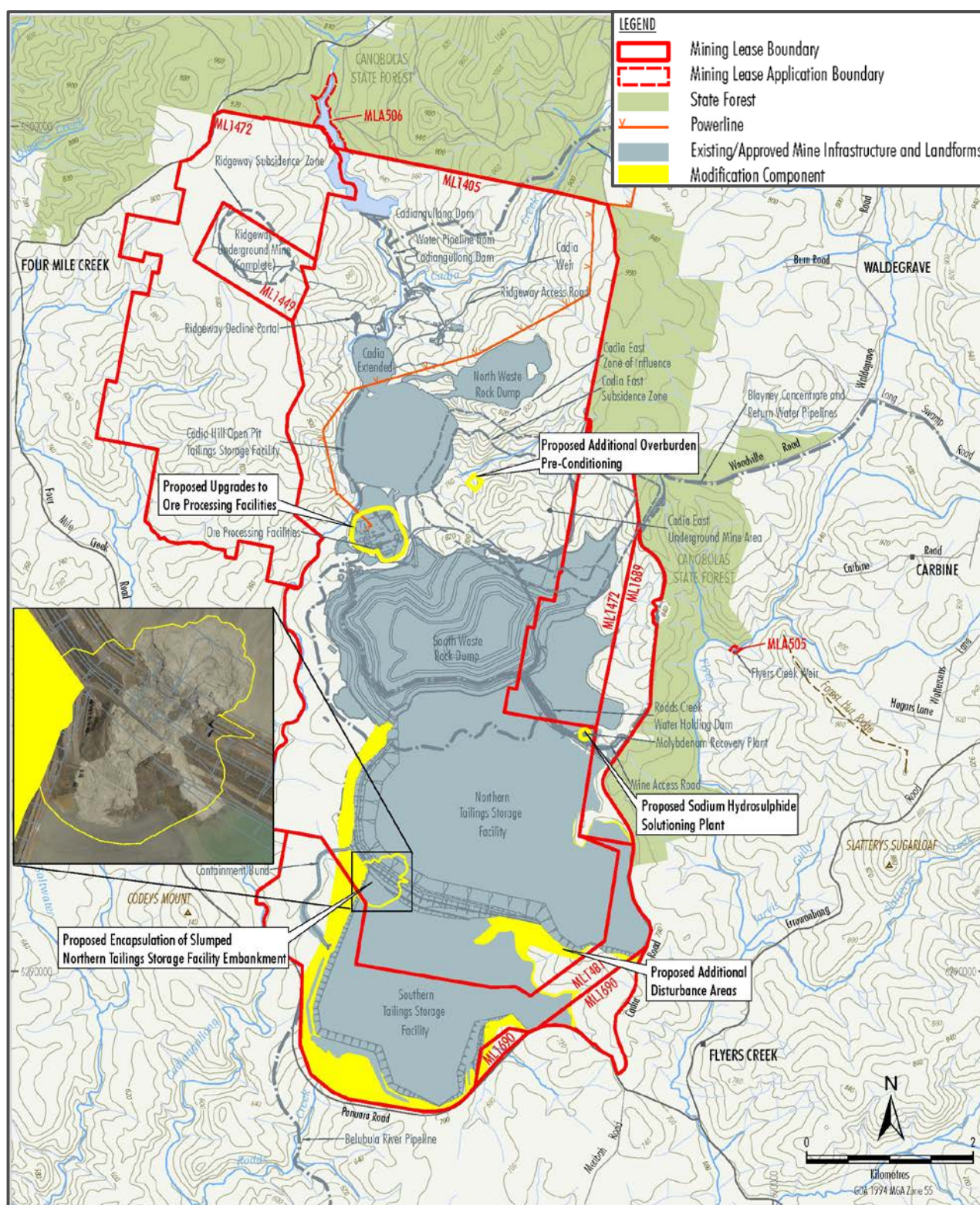
2.1 Increased processing rate and infrastructure upgrades

The proposed increase in annual processing rate requires replacement of the Concentrator 1 SAG Mill motor, with works contained within the existing footprint of the Concentrator 1 housing (see **Figure 3**). This upgrade is in addition to infrastructure upgrade works approved as part of Modification 6 in 2015, which Cadia has been progressively implementing to achieve its approved annual ore processing rate of 32 Mtpa (see **Figure 3**).

The total ore processing from the Cadia East underground mine, over the life of the mine, would increase by approximately 69 Mt, from 456 Mt to 525 Mt (around 9.4%), which would also increase process consumables, including sodium hydrosulphide, water demand (approximately 7 megalitres (ML) per day), process reagents and heavy vehicle movements.

The proposed 35 Mtpa processing rate would also increase peak power demand to 179 megawatts (utilising the existing power supply infrastructure) and capacity of trains transporting mineral concentrate; however, no additional trains or trips would be required.

No changes to the water supply infrastructure, CVO Dewatering Facility infrastructure or concentrate and return water pipelines would be required to facilitate the processing rate increase.



2.2 Tailings storage facilities construction works

Following the slumping failure of the NTSF embankment, Cadia engaged an Independent Technical Review Board to undertake an investigation into the causes of the failure and to provide a review of mine construction methodologies and operations. The investigation report was published in 2019 (see **Appendix A5**).

Cadia has prepared the concept design based on the Independent Technical Review Board's findings and recommendations for the NTSF and STSF future approved lifts, including the NTSF repair works.

Materials for the tailings facility construction would be sourced from existing waste rock emplacement areas and borrow areas within the future NTSF and STSF inundation areas (for clay for low permeability zones), consistent with the approved project. Cadia estimates the tailings upgrade works including the NTSF repair works and the tailings embankment extensions would require 50 Mm³ of non-acid forming materials which can be sourced from the south waste rock dump (with up to 68 Mm³ available).

Construction methodology

There are three main methods used in design and management of tailings storage facilities including upstream, downstream and centreline. In summary, the key differences between the three methods are:

1. **Upstream:** Dams are built progressively upstream of the previous lift over emplaced tailings material.
2. **Centreline:** Dams are raised progressively on top of the centreline of the previous dam, with a low permeability zone through the centreline. Centreline lifts require more material than upstream lifts but are considered more stable.
3. **Downstream:** Dams are raised progressively downstream of the previous lift, with a low permeability zone on the upstream slope of the dam. Downstream dams require more material to build than upstream dams but are considered the most stable.

Both the NTSF and STSF have historically been constructed by upstream lifts, with Cadia now proposing to transition to a combination of downstream and/or centreline lift for improved safety and stability. **Figure 4** shows the conceptual design for the STSF, which is proposed to be constructed by downstream lift for the next stage (Stage 7), which would then transition to centreline lifts for the remaining approved stages of the facility (Stages 8 to 11).

As centreline and downstream lifts require a larger area than upstream lifts, the development footprints of the tailings storage facilities would both be extended within the approved project site to accommodate the new embankment to the approved heights of each facility, with some areas constrained by the existing project boundary and Panuara Road. In these areas, Cadia has advised that a modified centreline lift would be required, with a steeper embankment slope (see **Appendix A5**).

The embankment construction would require additional clearing of native vegetation, relocation of existing infrastructure (including internal haulage routes) and installation of new infrastructure, such as seepage collection ponds.

NTSF repair works

To repair the NTSF embankment breakthrough, Cadia proposes to encapsulate the slumped embankment area and tailings material in-situ with rock sourced from non-acid forming materials

located on site from the existing waste rock dumps (see **Figure 5**). The repair works would be contained within previously disturbed areas, with the works located in the STSF, or in the previously approved areas for future NTSF and STSF embankment lifts.

Initial design has been completed based on conservative assumptions regarding foundation conditions and allowing for potential liquefaction of the tailings and ensuring the perimeter embankment is designed to meet the required Factor of Safety (being the safety margin of slopes on dam embankments for static and seismic loading conditions).

The design has been undertaken in consultation with the principal investigator of the Independent Technical Review Board and the head of the school of Civil and Environmental Engineering of the University of NSW, with detailed engineering of the design currently continuing in accordance with the 2019 ANCOLD *Guidelines on Tailings Dams* (ANCOLD Guidelines).

The STSF is currently classified as having a 'High B consequence' if it were to fail due to the potential environmental impact and potential catastrophic severity from damage and loss. However, the NTSF is currently categorised as 'Significant'. Cadia has advised the Department this classification is currently under review and is likely to be recategorised to 'High B consequence'. If this reclassification were to occur, then Cadia would need to submit a further modification as additional disturbance would likely be required to accommodate any revised embankment and foundation design.

Tailings material that requires excavation from the slumped area would be removed and deposited into the existing NTSF or STSF. Further information provided to the Department (see **Appendix A5**) describes that given the consistency of the materials in this area, these tailings would need to be dredged, including the tailings located in the northern boundary of the STSF.

Construction of the NTSF repair is expected to take up to two and a half years. Following restoration works, Cadia proposes to continue depositing tailings into the NTSF to its approved height of 779 mAHD, through the combination of downstream and centreline lifts.

2.3 NaHS Solutioning Plant

Cadia also proposes to construct and operate a NaHS Solutioning Plant to enable on-site production of NaHS concentrate and supply it to the Molybdenum Recovery Plant, which would remove the requirement to transport bulk liquid NaHS to the project site by heavy vehicle. The plant would be located adjacent to the approved Molybdenum Recovery Plant within the approved disturbance area (see **Figure 2**).

The NaHS Solutioning Plant would produce NaHS concentrate by dissolving NaHS flake with raw water in an agitated mixing tank. The solutioning process would produce hydrogen sulphide gas which would be managed through an extraction system and sodium hydroxide scrubber.

An additional two operational jobs would be required to operate the NaHS Solutioning Plant for up to five days per week (included in the 35 additional full-time equivalent jobs required for the proposal).

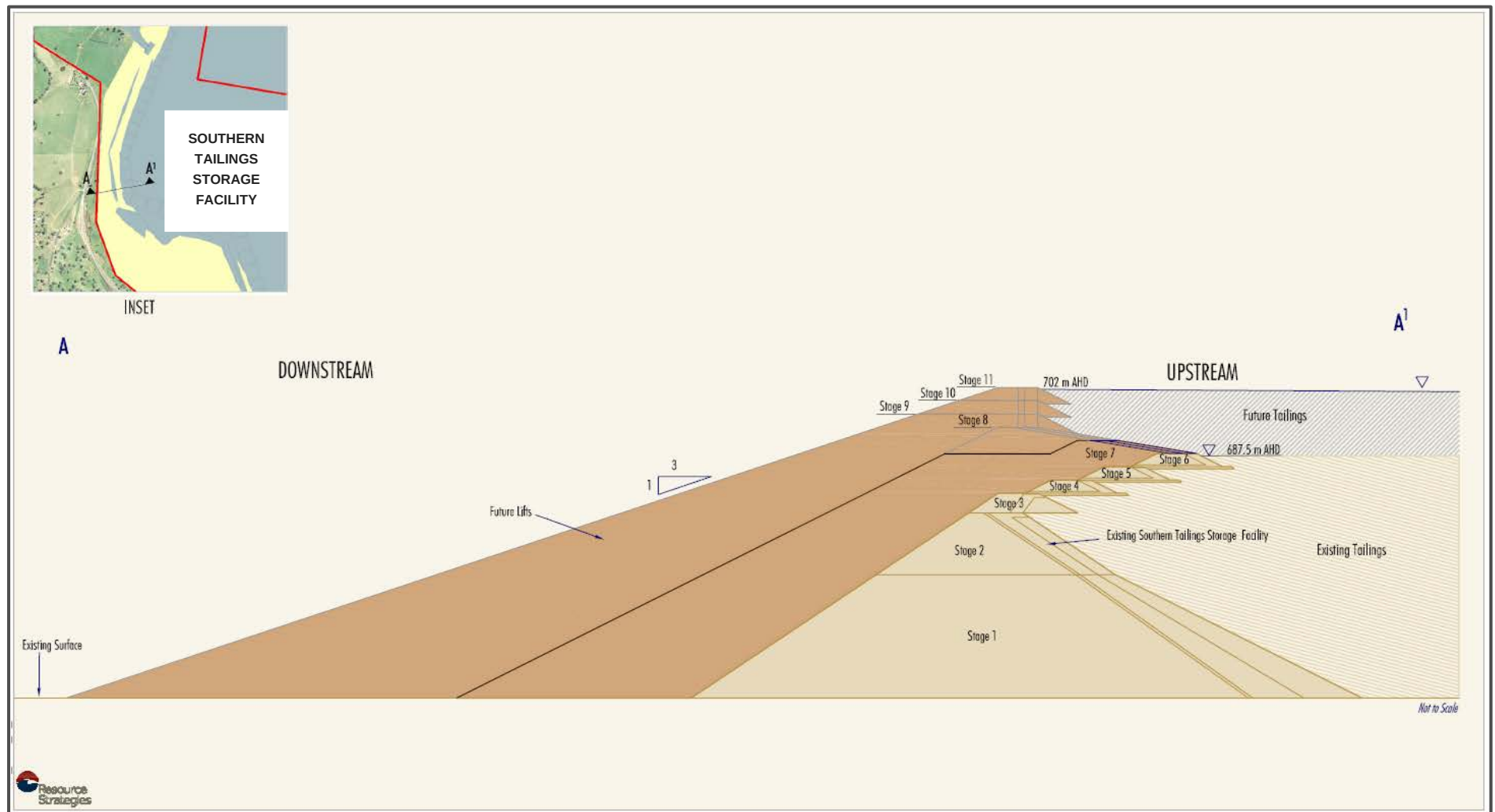


Figure 4 | Downstream lift (Stage 7) and centreline lift (Stages 8-11) construction methodology (Source: Modification Report (MOD 14) – Cadia East Gold/Copper Project)

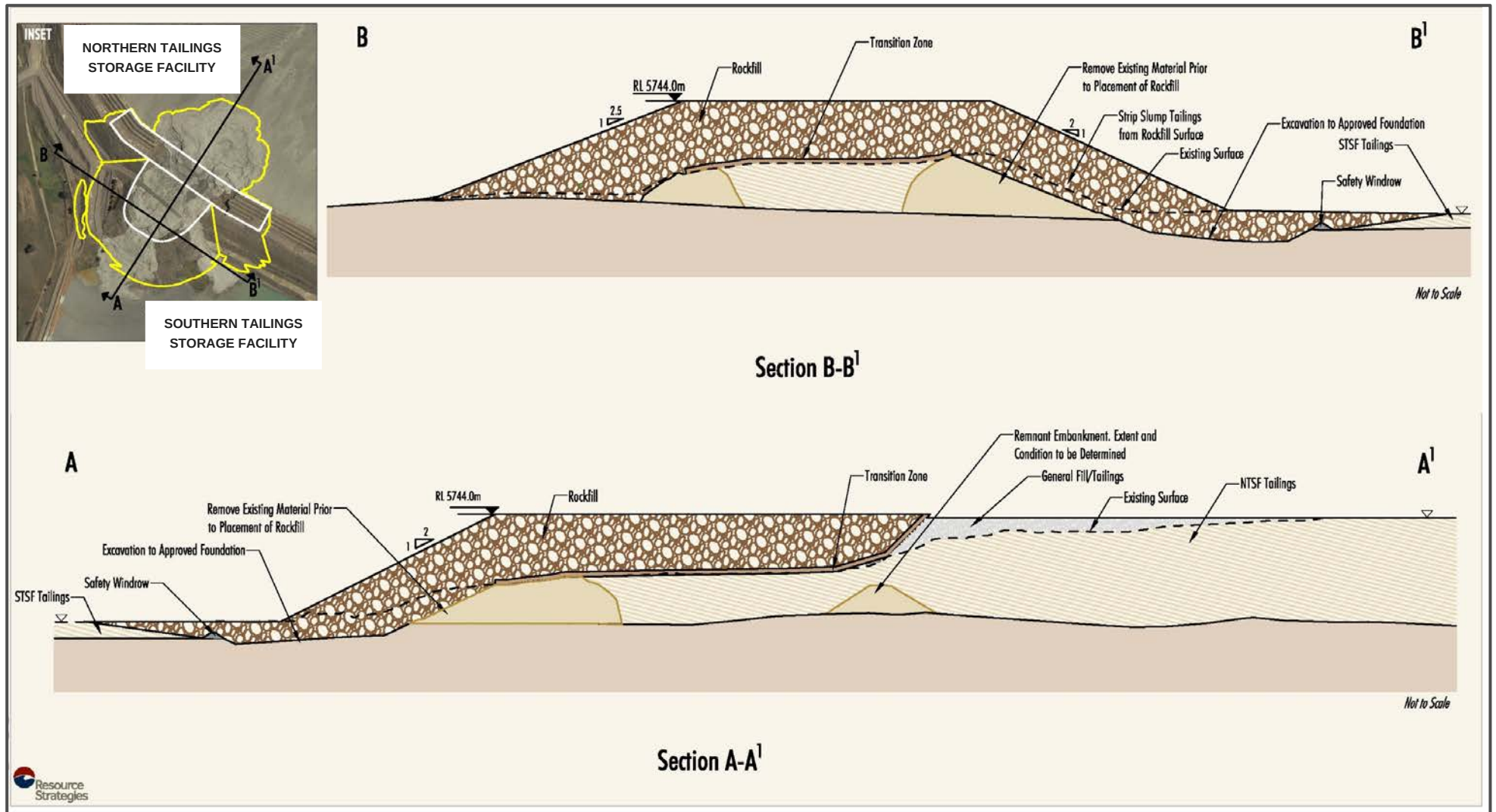


Figure 5 | Proposed NTSF repair (Source: Modification Report (MOD 14) – Cadia East Gold/Copper Project)

2.4 Overburden pre-conditioning works

The underground mining method at Cadia involves controlled caving of the rock mass by undercutting a block of ore. As part of this process, Cadia has approval to pre-condition the ore body by hydraulic fracturing or blasting from the underground workings.

Cadia now proposes additional pre-conditioning of competent overburden above the Cadia East orebody which differs from the project approval as it would occur from the surface rather than from the underground mining area. No other changes in the hydrofracturing method compared to the approved project is proposed. The additional pre-conditioning would include up to 29 drill holes via directional drilling (see **Figure 6**) within the approved subsidence caving zone.

The Department notes that above ground pre-conditioning has previously been approved in 2014 (Modification 4) and in 2017 (Modification 9) and it is proposed to extend this area using the same methodology.



Figure 6 | Location of pre-conditioning works (Source: Modification Report (MOD 14) – Cadia East Gold/Copper Project)

3 Strategic context

This section describes the relevant strategic context and the need for the proposed modifications, including the NTSF repair and associated construction works, and the increase to the project's approved processing rate to 35 Mpta. The Department's detailed assessment of the proposal is provided in **section 6** of this report.

3.1 NTSF embankment failure

On 9 March 2018, part of the embankment of the NTSF failed due to the movement of an unidentified low-density foundation layer located in the southern area of the NTSF resulting in a limited breakthrough of tailings into the STSF. Since 2018, Cadia has been unable to deposit tailings into the NTSF and STSF after being issued a prohibition notice by the Resources Regulator under section 195 of the *Work Health and Safety Act 2011*.

Although the tailings material was fully contained within the STSF, repair of the NTSF embankment has been unable to commence due to ongoing investigations and design of the repair in consultation with the Independent Technical Review Board and relevant regulatory approvals. Cadia has established temporary and suitable contingency measures to manage ongoing residual risks, including the construction of a containment bund and increased real-time radar monitoring of the dam wall.

With tailings deposition now ceased for more than 3 years, the facilities' surfaces have become drier and more susceptible to dust generation. Prolonged drought in regional NSW and the catastrophic bushfires experienced over the 2020 summer also contributed to increased dust events and air quality impacts experienced by the surrounding community.

Although the Department recognises that Cadia has sought to minimise impacts and prevent dust lift-off from the facilities through applications of various polymer dust suppressant products and hydro mulch containing grass seed and fertiliser, no temporary mitigation option will be as effective as repairing the NTSF embankment and allowing tailings deposition to recommence.

3.2 Future optimisation works

Key findings of the 2019 Independent Technical Review Board report are summarised below:

- attributed the loss of containment of tailings from the NTSF to a combination of a previously unidentified low-density foundation layer (known as 'Forests Reef Volcanics Type A') in the southern boundary of the NTSF and high imposed loading on the foundation material leading to movement, which triggered liquefaction of part of the tailings behind the embankment; and
- recommended review of the design, construction and operation of the tailings facilities, maintain ongoing monitoring of the embankment foundation to ensure future lifts to the NTSF or STSF are safe, maintain geotechnical stability and are constructed with long-term stability.

It is noted that operation of the tailings storage facilities to their final approved heights could be achieved through the proposed repair and construction works, which were based on Cadia's concept design at the time of submitting this modification application, prepared in accordance with the ANCOLD Guidelines and in consultation with Dams Safety NSW and the Resources Regulator.

As Cadia's design has progressed throughout the assessment of the modification, Cadia has identified that additional land disturbance may be required as a result of review of the consequence category for the NTSF (as outlined in **section 2.2**), further drilling investigation indicating that a larger foundation width may be required, and optimisation of the modified centreline lift design in areas constrained by Panuara Road. Cadia would seek a further modification pending the outcomes of these additional investigations.

The Department considers that Cadia can commence the works for transitioning from upstream design as part of this proposal should this modification be approved. This is important as the proposed downstream or centreline construction methods would result in greater geotechnical stability than the current upstream lifts, and facilitate recommencement of tailings deposition and in turn, mitigation of dust resuspension from the currently dried tailings surfaces.

3.3 Increased processing rate

The project represents one of Australia's largest gold mining operations, delivering critical and substantial economic benefit to regional NSW and more broadly, the NSW economy.

Cadia's market release dated 19 August 2021, predicted varying ore production rates indicating a declining profile, with an average produced gold grade of 0.7 grams/tonnes (g/t) for the 2022-2024 financial year to 0.5 g/t at the end of the project life in the 2030-2031 financial year. Similarly, copper grades would also be on a declining trajectory with average copper grade predicted to be 0.4% for 2022-2024 financial year, reducing to 0.3% at the end of the project life.

The Department and the Department of Regional NSW - Mining, Exploration & Geoscience consider that the proposed increase to project's processing rate from 32 Mtpa to 35 Mtpa would facilitate continuation of the project's significant social and economic benefits to the State and region, as it would:

- result in an efficient use of mineral resources, and improved resource recovery and achieve recovery rates of about 80% for gold and about 85% for copper over the life of the project;
- provide an appropriate return to the State through about \$39 million in total additional royalties and approximately an additional \$1.3 billion in total revenue (2021 dollars); and
- generate support for regional development, financial resilience, and investment in the community and the economy, including through creation of an additional 35 full-time jobs for regional workers to the current peak operational workforce of 910 employees/contractors.

4 Statutory context

4.1 Scope of modification

On 6 January 2010, the project was approved under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) by the then Minister for Planning.

Under clause 6 of Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017* (EP&A Regulation), the project was transitioned to State significant development by order, which took effect by publication in the NSW Government Gazette on 13 April 2018.

A modification application under section 4.55(2) of the EP&A Act was submitted to the Department of Planning, Industry and Environment (the Department) on 10 December 2020.

The Department has reviewed the modification and considers that the application is substantially the same development as last modified under section 75W of Part 3A of the EP&A Act (Modification 10, approved April 2018), would not significantly increase the environmental impacts of the project, and would not change the approved mining and transport methods, extent of Cadia East underground mine footprint, or surface infrastructure.

Consequently, the Department considers that the proposed modification is within the scope of section 4.55(2) of the EP&A Act.

4.2 Consent authority

The Minister for Planning and Public Spaces (the Minister) is the consent authority for the modification application. However, under the Minister's delegation of 26 April 2021, the Executive Director, Energy, Resources and Industry, may determine the application. This is because the local Councils (Blayney Shire and Cabonne Shire Councils) did not object to the proposal, Cadia has not made any reportable

political donations and the Department received more than 15 but less than 50 objections to the proposal during the exhibition period.

4.3 Mandatory matters for consideration

In accordance with section 4.15(1) and section 4.55(3) of the EP&A Act, the following must be considered in granting the modification application as relevant to the application:

- environmental planning instruments or proposed instruments;
- any planning agreement;
- EP&A Regulation;
- likely impacts of the modification application, including environmental impacts on both the natural and built environments, and social and economic impacts;
- suitability of the site;
- any submissions;
- the public interest; and
- the reasons for granting approval for the original application.

The Department has considered the relevance of these considerations for the modification application below.

Environmental planning instruments or proposed instruments

A number of environmental planning instruments apply to the modification, including:

- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP);
- *State Environmental Planning Policy No 55—Remediation of Land* (SEPP No 55 – Remediation of Land);
- *Cabonne Local Environmental Plan 2012*; and
- *Blayney Local Environmental Plan 2012*.

The Department has considered the proposed modification against the relevant provisions of these instruments, including Cadia's consideration of the relevant instruments in its Modification Report. The Department considers that the proposed modification can be carried out in a manner that is generally consistent with the aims, objectives and provisions of these instruments.

EP&A Regulation

There are no additional considerations relevant to the modification application in the EP&A Regulation.

Likely impacts of the modification application

The likely impacts of the modification are considered in **section 6** of this report.

Suitability of the site

The modification would not change the approved mine site boundaries. The Department considers that this modification application would not result in significant changes that would alter the conclusions made as part of the original assessment and subsequent modifications under Part 3A.

Submissions

In accordance with clause 10 of Schedule 1 of the EP&A Act, modification applications to State significant developments under section 4.55(2) must be publicly exhibited for a minimum of 14 days. The Department originally exhibited for a 14-day period; however, it was identified that some submitters to the original environmental assessment were not notified of the exhibition period. As such, the Department extended the exhibition period for another 16 days. The Department publicly exhibited the modification application and notified and sought comment from Cabonne Council, Blayney Shire Council, Orange City Council and relevant agencies. The Department also made the application available on its website, as discussed further in **section 5** of this report.

Public Interest

The consideration of the public interest is provided in **section 7** of this report.

The reasons for granting the consent for the original application

In determining the original application, the Minister for Planning concluded that the benefits of the project outweighed the impacts and imposed a range of strict conditions to appropriately manage the impacts. The Department has considered the proposed modification against the reasons for determining the project and is satisfied that the proposed modification does not affect the decision that was previously made.

4.4 Objects of the EP&A Act

The consent authority must also consider the objects of the EP&A Act during the decision-making process. The Department has assessed the proposed modification against the current objects of the EP&A Act. The objects of most relevance to the decision on whether or not to approve the proposed modification are found in section 1.3 of the EP&A Act. They are:

- Object 1.3(a): *to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources;*
- Object 1.3(b): *to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment;*
- Object 1.3(c): *to promote the orderly and economic use and development of land;*
- Object 1.3(e): *to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats;*
- Object 1.3(f): *to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage);*
- Object 1.3(i): *to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State; and*
- Object 1.3(j): *to provide increased opportunity for community participation in environmental planning and assessment.*

The Department is satisfied that the proposed modification encourages the proper management and development of resources (Object 1.3(a)) and the promotion of the orderly and economic use of land (Object 1.3(c)). The proposal would optimise resource recovery and continuation of mining operations under the project approval (06_0295), while utilising the mine's established infrastructure and workforce.

The Department has carefully considered the environmental impacts of the proposed modification, including potential impacts on the natural, cultural and built environments (Object 1.3(e) and (f)). The

key findings of the Department's assessment are summarised in **section 6**. The Department made the modification application available on its website and consulted with Councils (Object 1.3(i) and (j)). The outcomes of the consultation process are outlined in **section 5**.

The Department has considered the principles of ecologically sustainable development (ESD, Object 1.3(b)) in its assessment of the proposed modification. The Department considers that the proposed modification may be carried out in a manner that is consistent with the principles of ESD, as defined in section 6(2) of the *Protection of the Environment Administration Act 1991*.

4.5 Impacts on biodiversity values

Under the relevant provisions of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*, the Department and its Biodiversity, Conservation and Science Directorate (BCS) require that the modification application must include a Biodiversity Development Assessment Report (BDAR), as the proposed modification would disturb additional land compared to the approved project. The Department's assessment of biodiversity impacts is described in **section 6.5**.

5 Engagement

5.1 Department's engagement

The Department's consultation process included public exhibition of the modification application and accompanying documents from 21 January 2021 until 19 February 2021 (a total of 30 days), and:

- notifying the landowners adjacent to the project site, original submitters and Councils (Blayney Shire, Cabonne Shire and Orange City Councils) of the exhibition and submission process;
- publishing advertisement of the exhibition in the Blayney Chronicle, Orange Central Western Daily, Bathurst Western Advocate, Bathurst Western Times and Orange Midstate Observer;
- arranging for exhibition of hard copies of the proposal in local Council offices;
- making all the information on the proposal publicly available on the Department's website; and
- ongoing consultation with government agencies on the assessment of key issues and the community throughout the proposal's assessment.

On 25 May 2021, the Department visited the CVO mining site and locations of the proposed modification areas, including the NTSF, STSF, additional disturbance areas and Cadia's mitigation management for dust impacts from the tailings dams. The Department has also met (teleconference due to COVID restrictions) with the recently formed community group, the Cadia District Protection Group (CDPG) on 25 August 2021 and 16 November 2021, raising issues mainly relating to Cadia's social license, as well as air quality and water impacts from Cadia's existing and proposed operations.

5.2 Submissions

The Department received a total of 29 formal community submissions during exhibition of the proposal, including 28 from the general public and one from a special interest group (the Orange Regional Water Security Association). Four of the community submissions were form letters. The Department also received advice from 11 government agencies and submissions from Blayney Shire and Cabonne Shire, and Orange City Councils (see **Table 1**).

All the relevant documents are available on the Department's website, including formal submissions and agency advice, Cadia's Submissions Report, responding to matters raised during exhibition, and additional agency advice on Cadia's Submissions Report (see **Appendices A2 to A5**).

Table 1 Summary of submissions and agency advice

Group	Submissions/ Advice	Support	Object	Comment
General Public	28	0	26	2
Special Interest Groups	1	0	1	0
Government Agencies	14	2	0	12
Total	43	2	27	14

The Department's assessment has also considered community representations received after the exhibition period, including two from individuals, one from the Belubula Headwaters Protection Group, and multiple representations from the CDPG.

5.3 Key Issues – Community

Of the 28 community submissions, the key issues raised related to both Cadia's existing and proposed activities, as summarised in **Table 2** below.

Table 2 Summary of community key issues

Issue	Description
Issues related to the Modification	• Air quality and associated health impacts to humans and livestock (deposited dust and potential contaminates in the total suspended particles including silica) • Greenhouse gas emissions • Safety concerns over any additional raises of the NTSF and any future tailings storage facilities • Water quality impacts on private bores, the Belubula River, the Cadiangullong Creek and dependent threatened species • Construction noise • Odour • Night light and visual • Biodiversity • Heritage impacts • Rehabilitation – TSF final landforms and closure planning including details of surface water run-off and drainage slopes, seepage management, topsoil and containment of leachate and potential impacts to the Belubula River.
Issues raised related to existing operations and general concerns	• Dust events from the NTSF and STSF since the 2018 NTSF slump breakthrough • Particulate matter emissions from the existing underground operations of diesel fueled equipment from existing ventilation shafts • Existing conditions on particulate matter monitoring • Water quality • Demand/supply and associated health impacts • Noise impacts • Traffic impacts • Visual/night light • Operation of Cadia's Community Consultative Committee (CCC) • Cadia's social license • Number of modifications to the project • Cadia's future operations and intention to construct a new TSF.

Where relevant to the modification application, the Department's consideration of these matters is provided in **sections 6 and 7** of this report.

The Department notes that issues were raised about the number of modifications to the project approval, and Cadia's future operations beyond the approved project, including construction and operation of additional tailings storage facility. This assessment considered the proposed modification activities, and any future expansions would be subject to additional planning approvals separately to this modification application, and therefore is not considered further in this assessment.

As outlined earlier, the Department was recently advised by Cadia that it is likely to lodge an additional modification to the project to account for any change to the classification from Significant to High B Consequence, which would require additional buttressing of the embankment and disturbance outside the approved project footprint.

5.4 Key issues – Government agencies

The **Resources Regulator** requested further information about the mine rehabilitation, including rehabilitation objectives, the concept design for the final landform of the tailings storage facilities and surface water infrastructure or capping materials. Cadia provided additional information through the assessment and the Resources Regulator confirmed that it was satisfied that the additional information provided adequately addressed the Resources Regulator's key issues (see **Appendix A4**). The Department's consideration of rehabilitation, final landform and the design of the NTSF and STSF is discussed in **section 6.1** of this report.

The **Water Group** within the Department (DPIE Water) and the **Natural Resources Access Regulator** (NRAR) did not raise concerns but requested that the project's water management plan be updated to reflect the changed disturbance areas, water management infrastructure and transfer requirements and that Cadia commits to reporting on water take at the project site each year. The Department's assessment of likely impacts of the proposal on water resources is discussed in **section 6.4**.

The **Biodiversity, Conservation and Science Directorate** (BCS) within the Department requested an updated BDAR to include further justification of land categorisation methods, assessment of indirect impacts, appropriate mitigation measures and an assessment of serious or irreversible impacts in accordance with the Biodiversity Assessment Method. Following provision of an updated BDAR (see **Appendix A5**), BCS advised its residual issues have been addressed and recommended updates to the existing rehabilitation and final landform related conditions (see **Appendix A4**). The Department's consideration of biodiversity impacts of the proposal is discussed in **section 6.5**.

The **Environment Protection Authority** (EPA) requested further information about impacts on air quality primarily from the NaHS Solutioning Plant and cumulative background concentrations, power supply and impacts to water supply and quality. The EPA were satisfied with Cadia's response in its Submissions Report and recommended conditions for the NaHS Solutioning Plant, reviewing and revising the project's Air Quality Monitoring Program and water and traffic noise management measures.

The EPA also proposed the Department apply a condition requiring Cadia to secure a reliable power supply, including back-up power for environmental monitoring equipment; however, the Department considers this is already included in the existing conditions (condition 12(a), requiring Cadia to ensure all plant and equipment is maintained in a proper and efficient condition). The EPA also confirmed that a variation to the project's environment protection licence (EPL) (EPL 5590) under the *Protection of*

the *Environment Operations Act 1997* (POEO Act) would be required, if the proposal is approved. The Department's consideration of these issues is discussed in **section 6**.

The **Forestry Corporation of NSW** identified that an 'Approved Zone of Influence' extends into an area of State forest tenure and requested more details on potential impacts to State forests. Cadia's Submissions Report clarified that this matter was considered in the original environmental assessment and that the proposal would not change the level of approved impact to this area. The Forestry Corporation of NSW reviewed Cadia's response and provided no additional advice.

The **Mining, Exploration & Geoscience** (MEG) within the Department of Regional NSW determined that the proposal would be entirely within Cadia's existing mine leases and represent an efficient development and utilisation and recovery of minerals resources, consistent with the objects of the *Mining Act 1992*. MEG also noted that any new biodiversity offset areas should be established in consultation with MEG and any holders of mining or exploration licences to minimise risk of sterilisation of resources.

The **Department of Primary Industries – Agriculture, Crown Lands and Dams Safety NSW** within the Department, local councils (**Cabonne Shire** and **Blayney Shire Councils**) and the neighbouring **Orange City Council** reviewed the proposal and did not raise concerns. Crown Lands requested that Cadia enters into a section 265 Compensation Agreement under the *Mining Act 1992*; however, the Department considers that this obligation is outside of the scope of assessment for the proposal under the EP&A Act.

6 Assessment

The Department has assessed the modification application and supporting information in accordance with the relevant requirements of the EP&A Act, including the matters for consideration, as set out in section 4.15(1) of the EP&A Act. A list of the key documents that informed the Department's assessment is provided in **Appendix A**.

The Department considers the key assessment issues for the proposal relate to tailings storage facilities construction works (including construction methodology and safety), and potential impacts of the proposal on air quality, water resources, biodiversity and noise, as discussed further below. The Department has considered a range of other issues relevant to the proposed modification in **section 6.6**.

6.1 Tailings facilities construction

The Department considers that there are two key issues regarding the proposed tailings storage facility construction works. The first is that the repair of the NTSF embankment would be the most effective long-term measure to reducing air quality impacts and dust emissions, which has been impacting the community since the breakthrough in 2018. The second is that the transition of the facilities to centreline and downstream construction is required to increase the geotechnical stability and safety of the NTSF and STSF.

The most common concern raised in community submissions was the prevalence of existing air quality impacts from the dry tailings facilities and strong opposition to any additional lifts to the tailings storage facilities following repair of the NTSF due to perceived safety concerns. The Department also received

representations from the community throughout the assessment about the final landform and rehabilitation of the tailings facilities.

NTSF repair

Cadia and the Department both consulted with the Resources Regulator and Dams Safety NSW throughout the assessment. The Department, Resources Regulator and Dams Safety NSW are satisfied that the NTSF repair has been appropriately designed and would comply with relevant legislation including:

- *Dams Safety Act 2015*;
- *Dams Safety Regulation 2019*;
- *Work Health and Safety (Mines and Petroleum Sites) Act 2013*;
- *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*; and
- *Work Health and Safety (Mines and Petroleum Sites) Amendment Regulation 2019*.

The Department considers that the repair of the NTSF must occur in order for tailings to continue to be redeposited into the facility. Tailings deposition in the NTSF in turn would significantly reduce air quality impacts on the surrounding community and allow for ongoing operations of the mine through permitting storage in both the NTSF and the STSF, prior to the Cadia Hill open cut pit tailings storage facility reaching capacity.

Centreline and downstream lifts

The proposed change from upstream lift to a predominantly centreline lift allows for the design to maintain a suitable Factor of Safety for operating conditions, long-term stability of the tailings storage facilities and the ability to accommodate an earthquake of 1:10,000 annual exceedance probability, which exceeds the ANCOLD requirements for a High B consequence category and reduces risk of liquefaction.

The design change requires additional embankment material which, under the conceptual design proposed for the modification, would be sourced from the existing NAF waste rock stockpiles, with adequate material present for lifts up the end of the project approval (30 June 2031).

Rehabilitation and final landform

Changes to the embankment of the NTSF and STSF would not significantly change the project's final landform and rehabilitation strategy, with the rehabilitation objectives for the proposal being consistent with those in the project's latest approved Rehabilitation Strategy (Revision 3, dated 12 June 2020). Consistent rehabilitation objectives for the NTSF and STSF and the south waste rock dump include:

- the closure criteria and final land use for the tailings facilities and the south waste rock dump to be "Woodland Conservation" (subject to occasional short-term and periodic strategic grazing for management purposes and biodiversity outcomes);
- for the tailings facilities: repair the NTSF embankment, respread native topsoil immediately in revegetation areas, undertake rehabilitation trials, install erosion control structures, construct wetlands to assist clean water drainage from the area and increase habitat and ecological function, retain existing sediment ponds until water quality is acceptable and undertake rehabilitation of

woodland and native grassland communities including creation of additional habitat targeting threatened and declining woodland species; and

Details of the conceptual final landform for the NTSF and STSF including the embankment changes are provided in **Figure 7**. The Department notes that the conceptual final landform depicts the final landform associated with the proposal. As outlined above, subject to final detailed design, the final landform may be further revised if the classification of the NTSF is changed from 'Significant' to 'High B' consequence classification.

Figure 7 | Conceptual final landform, subject to detailed design (Source: Response to Request for Information Dated 30 June 2021 (MOD 14) – Cadia East Gold/Copper Project)

Recommended conditions

The Department recommends the following changes to the relevant rehabilitation and water management conditions in the project approval:

- construction of future lifts to the NTSF and STSF must be undertaken using centreline or downstream lifts only;
- consistent with Dams Safety NSW requirements, the NTSF and STSF design is to be in accordance with the ANCOLD guidelines;
- Cadia must notify Dams Safety NSW prior to any modification of any dams that could impact the safety of the dam, in accordance with Clause 21 of the *Dams Safety Regulation 2019*;
- Rehabilitation Strategy conditions to be revised to include the conceptual final landform, life of mine rehabilitation in accordance with the mining schedule and managing socio-economic effects associated with mine closure, noting the Rehabilitation Strategy must be revised in consultation with relevant government agencies and the project's CCC;
- preparation of a Rehabilitation Management Plan in accordance with the requirements of the *Mining Act 1992*, detailing measures to achieve the objectives and rehabilitation described in the Rehabilitation Strategy; and
- requirements for mine water management performance measures, including nil off-site water discharge.

Summary

The Department, in consultation with Dams Safety NSW, the Resources Regulator and MEG, is satisfied with the information provided by Cadia regarding the proposed tailings facilities construction works. The Department considers that, subject to recommended conditions, the proposal would result in increased safety of the facility and allow ongoing operation of the NTSF and STSF to continue. This would result in an overall benefit to the environment by restoring the most effective and long-term mitigation for tailings storage facilities, which is for the surface of the facility to be inundated with wet tailings with high moisture content.

6.2 Air quality and greenhouse gas emissions

Management of dust emissions from the tailings dam since the embankment failure and cessation of wet tailings deposition into NTSF and STSF was a key concern raised in community submissions, with landowners around the site concerned that the increase in processing rate would exacerbate air impacts. Odour from hydrogen sulphide emissions from the NaHS Solutioning Plant on surrounding receivers, was also raised as a concern by members of the community.

These matters are the focus of the Department's consideration of air quality impacts.

Methodology

The proposal included an Air Quality Impact Assessment (AQIA) completed in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA 2017) (Approved Methods) and the *NSW Voluntary Land Acquisition and Mitigation Policy for State Significant Mining, Petroleum and Extractive Industry Developments* (VLAMP).

The air quality modelling used an updated emissions inventory with a baseline 2017 scenario used as a representative year in the modelling. The air quality modelling considered the total emissions that were predicted in the original environmental assessment for the 'Year 17', which represents a time in mine operations most relevant to existing operations, as most mining has gone underground and construction is minimal. The 2017 calendar year was selected for modelling based on statistical analysis of 2015-2019 meteorological data, with 2017 found to be the most representative of meteorological conditions.

The AQIA modelled incremental and cumulative increases in particulate matter (PM₁₀ and PM_{2.5}, particles with diameters of less than 10 µm and 2.5 µm, respectively), total suspended particles (TSP) and dust deposition on surrounding receptors and privately owned residents from all sources, including the project's existing ventilation shafts and unmitigated tailings storage facilities. Modelling was also undertaken of hydrogen sulphide emissions from point source discharges from the NaHS Solutioning Plant.

The Department and the EPA are satisfied that the particulate matter and hydrogen sulphide modelling was undertaken in accordance with the relevant EPA guidelines. The EPA confirmed Cadia has addressed all previous comments raised.

Particulate matter

The proposal would result in an increase of annual TSP emissions from around 4,825 to 5,888 tonnes/year, an approximate 22% increase. The majority of the increased TSP emissions (75%) would be due to the construction activity associated with the repair/buttredding/construction of the tailings embankments. The remaining 25% is associated with the increase in production rate to 35 Mtpa increasing the amount of materials handling (such as waste material to emplacement areas, additional tailings and stockpile handling).

The Department notes that the tailings storage facilities, modelled as unmitigated sources, accounts for 2,816 of the predicted 5,888 tonnes/year of TSP emissions, which is approximately 48% of the mine sites total emissions.

Table 3 summarises the modelling predictions at surrounding privately owned residents.

Table 3 Predicted maximum incremental and cumulative impacts against the assessment criteria (exceedances are presented in bold)

Parameter	Averaging Period	Units	Approved Project's Criteria (PA 06_0295)	EPA Approved Methods Criteria	Maximum Incremental Impact	Maximum Cumulative Impact
TSP	Annual	µg/m ³	90	90	8.5	47.3
PM ₁₀	Annual	µg/m ³	30	25	5.2	16.0
	24-hour	µg/m ³	50	50	39.5	67.4
PM _{2.5}	Annual	µg/m ³	-	8	0.9	6.6
	24-hour	µg/m ³	-	25	6.7	34
Dust Deposition	Annual (Increment)	g/m ² /month	2	2	0.7	Not Applicable

Annual (Total)	g/m ² /month	4	4	Not Applicable	1.8
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No exceedances of the incremental (project alone) air quality criteria are predicted to occur. However, exceedance of the 24-hour criteria are predicted to occur based on a cumulative impact, including the project and background air quality excluding the project.

24-hour criteria

Exceedances of the PM_{2.5} and PM₁₀ cumulative 24-hour average criteria are predicted for up to 2 days a year at the most affected surrounding residential receivers ranging from 26.9 µg/m³ to 34 µg/m³ (compared to the criterion of 25 µg/m³) and 50.8 µg/m³ to 67.4 µg/m³ (compared to the criterion of 25 µg/m³) respectively.

However, these exceedances occurred due to high background concentrations (ranging from 26.9 µg/m³ to 33 µg/m³ for PM_{2.5}, and from 50.8 µg/m³ to 62.2 µg/m³ for PM₁₀) rather than from incremental increases from the proposal. As such, no additional daily exceedances of the short term 24-hour PM₁₀ and PM_{2.5} criterion are predicted to occur at the most impacted receiver (property 18) as depicted in **Figure 8** below, or at any other receiver.

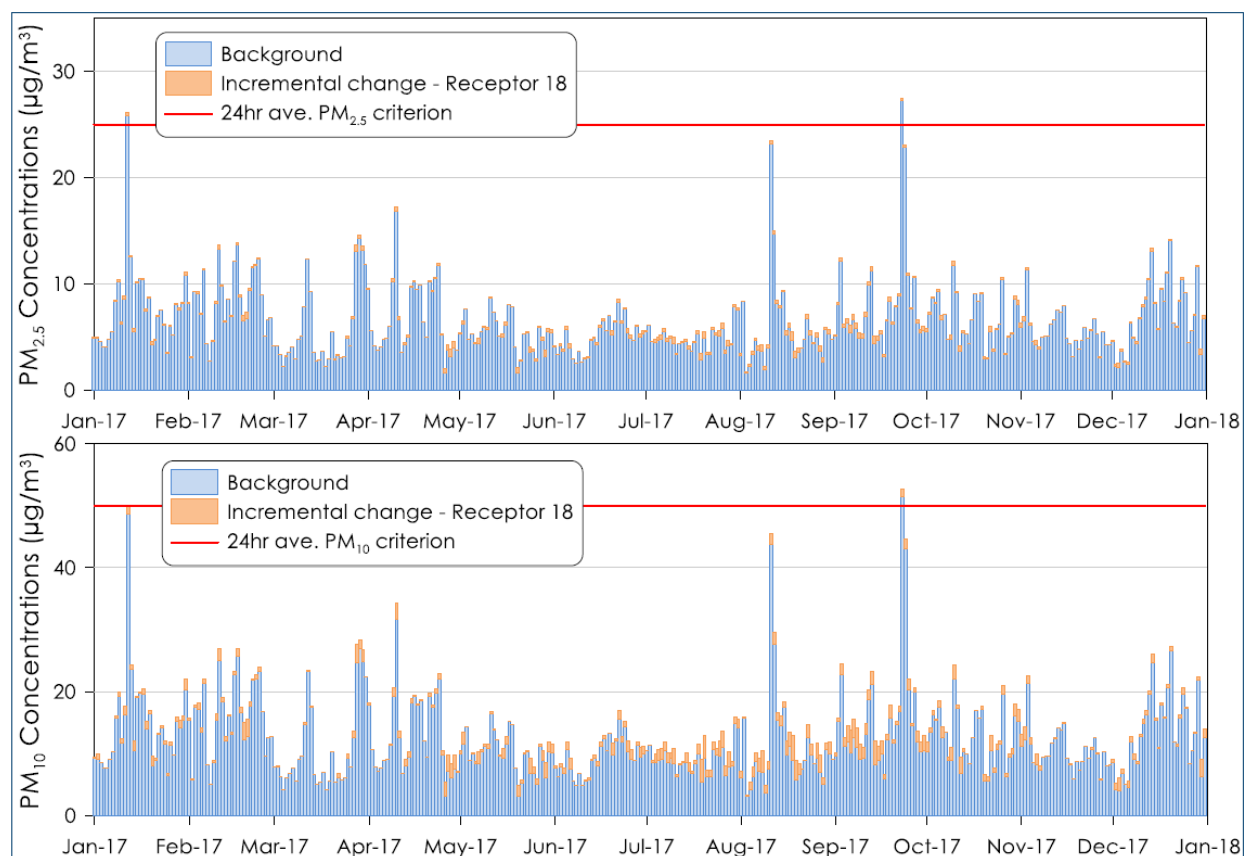


Figure 8 | Predicted cumulative 24 hr PM₁₀ and PM_{2.5} (Source: Air Quality Assessment Report (MOD 14) – Cadia East Gold/Copper Project)

Ventilation emissions

The CDPG raised concerns about dust from the existing ventilation shafts and whether the dust emissions used in the modelling was representative of actual operations. The ventilation emissions rate

modelled in the AQIA remains unchanged from the original project; with these emissions contributing around 3.5% of the total site emissions, under the proposed 35 Mtpa operating conditions (see **Appendix A5**).

The ventilation emission rate used during modelling (2.96 mg/m³) was considered appropriate as:

- underground dust concentration is maintained within safe working conditions in accordance with the *Work Health and Safety Act 2011* and *Work Health and Safety (Mines and Petroleum Sites) Act 2013*, with the air expelled being of similar air quality and therefore remains relatively constant irrespective of processing rate;
- a review of other similar projects ventilation emission rate indicates that the emission rate of 2.96 mg/m³ is above the average emission rate used in other air quality assessments (being 2.60 mg/m³);
- onsite monitoring undertaken for health and safety purposes indicates the emission rate would be approximately 25% lower than estimated; and
- of the dust generating activities undertaken below ground, not all TSP would escape through the ventilation shafts, with some settling or depositing on surfaces underground.

Dredging works

Cadia provided additional information (see **Appendix A5**) advising that detailed design identified that the tailings material between the NTSF and the STSF would need to be excavated using dredging techniques and stored in the STSF for the NTSF embankment construction works. Cadia proposes to construct a bund wall from waste rock to separate the dredged zone from the dredged material.

The CDPG raised concerns about this proposed change in the excavation method and potential impacts on air quality following drying out of the excavated material. However, the Department notes that the AQIA modelled the NTSF and STSF as unmitigated emissions sources, assuming that the whole surface is available as a wind erosion source. That is, the change in excavation method would be unlikely to change the modelling predictions for the modification.

Nevertheless, the Department has recommended a condition requiring Cadia to prepare an air quality validation report based on the detailed design within 3 months of approval of the modification.

On-going management and mitigation

Cadia's existing mitigation measures to reduce air quality impacts include the use of water carts on unsealed roads, sequential land rehabilitation, tailings deposition (up until the 2018 breakthrough of the NTSF), application of dust suppression products, dust extraction systems and implementation of a Management of Excessive Dust Procedure.

Since the NTSF embankment failure, Cadia's investment in dust management has equated to approximately \$29 million, which includes ongoing application of dust suppressant products (wood fibre and hydro-mulch) by both ground and aircraft vehicle to the surfaces of the NTSF and STSF (occurring until deposition of tailings on both facilities recommences) and an on-site monitoring system by operation of four real-time dust monitors established around the NTSF perimeter for PM₁₀ monitoring.

Cadia is also undertaking additional ongoing management of erosion rills caused during rain events by applying hay bales to the surface of the facilities to lower the velocity of water and reduce the risk of channels increasing and washing away dust suppressant products.

Nevertheless, since the 2018 breakthrough, the NTSF surface has become drier and is more susceptible to wind erosion and airborne dust generation with complaints from the public regarding dust

events increasing. The Department considers that the repair of the NTSF embankment to allow tailings deposition to continue is essential to mitigate dust lift off from the tailings facilities.

Hydrogen sulphide and odour

After incorporating a scrubber with 60% reduction efficiency, the NaHS Solutioning Plant would discharge hydrogen sulphide at a predicted emission rate of 1.67 g/s. At this emission rate, hydrogen sulphide would comply with the EPA Approved Methods criteria of 3.45 $\mu\text{g}/\text{m}^3$ at privately owned receivers as depicted in **Figure 9** below.

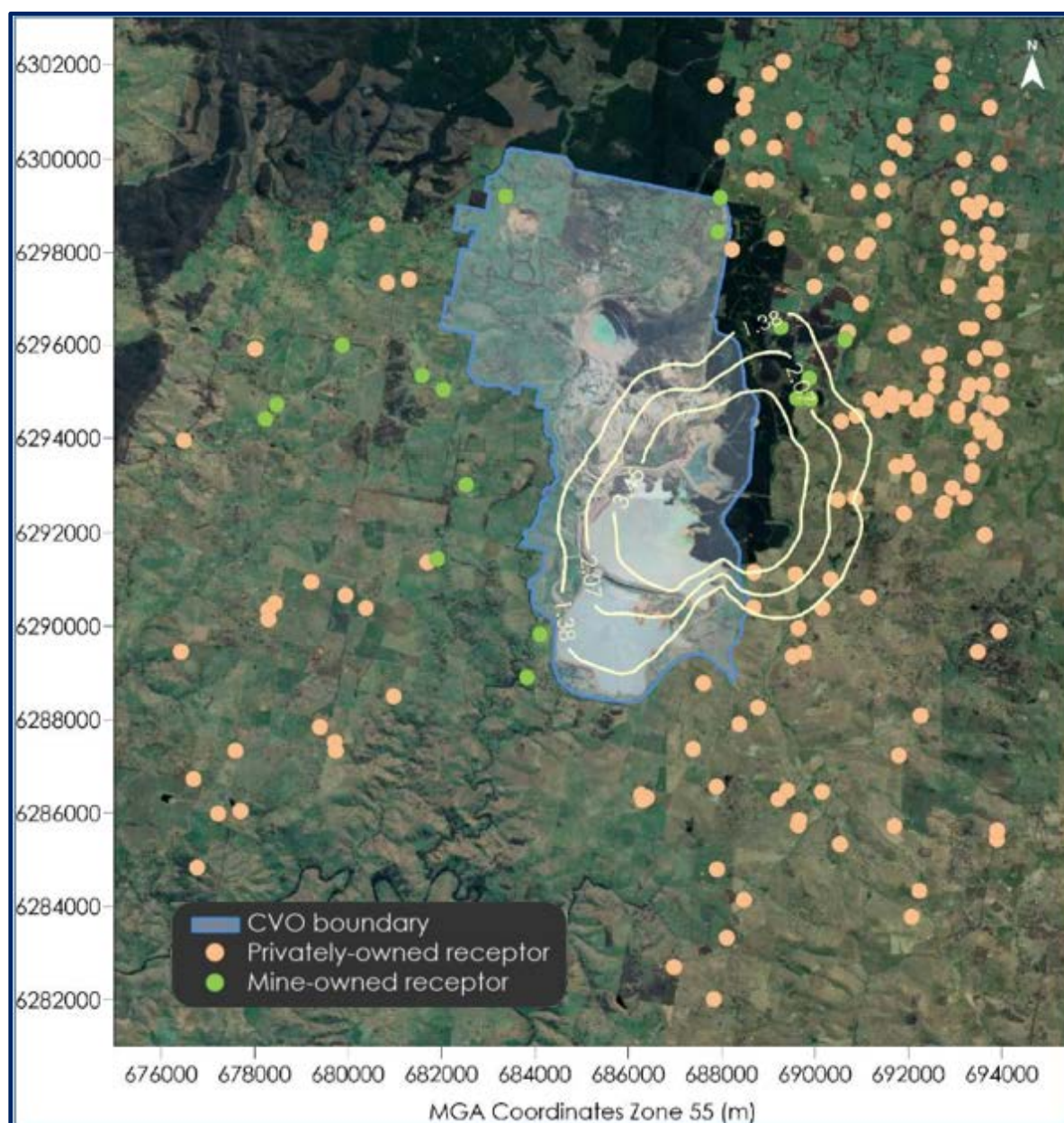


Figure 9 | Predicted 99th percentile nose-response average ground level hydrogen sulphide concentration ($\mu\text{g}/\text{m}^3$) from the NaHS Solutioning Plant (Source: Submission Report (MOD 14) – Cadia East Gold/Copper Project)

The EPA was satisfied with the assessment presented in the AQIA and recommended conditions to require the hydrogen sulphide discharge concentration to comply with limits required in Schedule 4 of

the *Protection of the Environment Operation Clean Air Regulation* (Clean Air Regulation), and with assumptions used in the modelling, and includes:

- post commissioning emissions verification of the NaHS scrubber;
- limiting processing to 43 t of NaHS solution (35%) per day;
- a final output emission rate of hydrogen sulphide less than 1.67 g/s; and
- a final in-stack concentration limit of hydrogen sulphide concentration of 5 mg/m³.

Greenhouse gases

Cadia's AQIA included an assessment of the modified project's greenhouse gas emissions, including incremental changes in both Scope 1 (direct) and Scope 2 (off-site, indirect) emissions from the proposed modification, compared to the currently approved 32 Mtpa project as at Modification 6.

The modification would result in an increase of approximately 2% in Scope 1 and Scope 2 emissions (1.19 Mt CO_{2-e}/yr to 1.21 Mt CO_{2-e}/yr). Overall, the project's contribution to NSW's total annual greenhouse gas emission inventories (incorporating the modification) would be 0.9% (based on State and Territory Greenhouse Gas Inventories 2017).

Cadia proposes to continue to apply mitigation measures to reduce on-site greenhouse gas emissions including reducing energy consumption during project planning phases, regular maintenance of plant and equipment, and monitoring consumption of fuel and electricity.

Recommended conditions

The recommended conditions include:

- commissioning an independent air quality audit report to the satisfaction of the Planning Secretary prior to any change in processing rate implementation. The independent audit must:
 - o be prepared in accordance with the *Independent Audit Post Approval Requirements* (2020); and
 - o describe details and scheduling of all reasonable and feasible best practice measures that are being implemented for managing and minimising off-site air quality impacts of the project;
- monitoring emissions from the ventilation shafts, including requirement for monitoring of PM₁₀ and PM_{2.5} emissions and flow rates;
- updates to the air quality impact assessment and land acquisition criteria to include annual and 24-hour limits for PM_{2.5} emissions and changes to the PM₁₀ limit to align with changes in the EPA's approved methods;
- updates to the operating conditions, requiring implementation of reasonable and feasible best practice diesel emissions reduction technology for any new equipment, including 'non-road' diesel equipment, and an Air Quality Impact Validation Report based on detailed final design and equipment for the construction of the NTSF and STSF embankments and associated infrastructure within 3 months of approval of Modification 14;
- conditions relating to construction and operation of the NaHS Solutioning Plant consistent with the EPA's recommendations to ensure point source discharges comply with the Clean Air Regulations and emissions are consistent with assumptions used in the AQIA; and
- revision of the current Air Quality Monitoring Program to an Air Quality and Greenhouse Gas Management Plan, including a detailed air quality and meteorological monitoring program covering all the project's dust generating activities (including ventilation shafts), dust proactive and reactive

mitigation strategies (including for greenhouse gas emissions), key performance indicators and trigger action response plans.

It is also noted that the EPA would require a variation to the project's EPL, should the proposal be approved, and it would continue its monitoring and regulation in accordance with the EPL.

Summary

The Department considers that the most significant impact of the modification on air quality would be from the construction works associated with the NTSF repair and the embankment reconfiguration, with cumulative impacts from the increased processing rate a smaller contributor to air quality impacts. Although the project would result in an increase in greenhouse gas emissions, these are considered a minimal amount in comparison to the State's emissions inventories, with Cadia committing to ongoing reduction measures.

Consideration has also been given to the beneficial impact to air quality that the NTSF repair works would contribute to with the tailings facilities contributing approximately 48% of dust emissions from the site. This highlights the importance of repairing the embankment and recommencing pumping wet tailings into the storage facilities.

Subject to the recommended conditions, the Department is satisfied that air quality and greenhouse gas impacts can be appropriately managed and that the proposal would assist in reducing the currently exacerbated impacts to the community.

6.3 Noise

The modification would result in increased noise during construction and operation of the project from the infrastructure upgrades, stripping and haulage of waste rock for the construction of the tailings storage facility embankments, ongoing construction of the embankments during future lifts, surface pre-conditioning and road traffic associated with the increased workforce.

The proposal would generate up to 50 light vehicle movements and 16 heavy vehicle movements per day which would increase traffic noise impacts by up to 1 decibel (dB) during daytime peak hour and up to 2 dB during the peak night-time hours.

Community submissions raised concerns about noise impacts and the potential to impact sleep, with some residents raising in submissions they are impacted by noise from current operations.

Construction and operational impacts

Construction would occur during daytime hours (7 am to 6 pm Monday to Saturday and 8 am to 6 pm Sundays and Public Holidays); however, to reduce the NTSF repair works timeframe, Cadia is also seeking to be able to construct the NTSF embankment repair during evening and night.

Noise modelling undertaken for the proposal predicts that the proposed activities, including the use of mobile equipment during night hours for the NTSF repair works, would comply with the project approval and the *NSW Noise Policy for Industry* (NPfI) noise criteria, including sleep disturbance noise levels. The Department and the EPA were satisfied with the noise assessment presented with the proposal.

The Department notes that the noise assessment is conservative as it assessed construction impacts as part of the operational impacts (running concurrently), with construction impacts decreasing following the completion of the NTSF repair works (occurring for approximately 2 years).

The Department notes that because of ongoing detailed design since the lodgement of the modification application, some refinements to the proposed activities, including proposed dredging and haul route construction works have been identified by Cadia (see **Appendix A5**). While these changes are unlikely to be material given the conservative nature of the modelling, the Department has included a recommendation that Cadia prepare a noise impact validation report based on the detailed design within 3 months of approval of the modification. Nonetheless, the Department notes that strict noise limits apply and Cadia is required to comply with these limits.

Existing project approval conditions to manage noise impacts at the mine include Cadia's Noise Monitoring Program which was prepared in consultation with the EPA and requires Cadia to conduct unattended and attended monitoring measures and implement a noise monitoring protocol for evaluating compliance with the project's noise impact and voluntary land acquisition criteria.

The Department considers that although the proposal is predicted to comply with the noise impact assessment criteria, the current Noise Monitoring Program could be improved to ensure that Cadia is implementing all reasonable and feasible measures to reduce noise impacts on surrounding receivers and has recommended preparation and implementation of a Noise Management Plan, as discussed in further detail below.

Road traffic noise

Cadia conducted a traffic noise assessment which addressed potential impacts to 40 residents located on Cadia Road, Orchard Road and Woodville Road (with Long Swamp Road assessed as Woodville Road). As a result of the proposal, road traffic noise levels would increase by up to a maximum of 1-2 dB for both the daytime and night-time peak hour criteria.

The Department notes that road traffic noise on Cadia Road was assessed as a 'Principal Haulage Route' under the Road Noise Policy and that under this criteria 4 receivers are already non-compliant with the relevant criteria (being receivers C04, C06, C07 and C08). Although these exceedances are already present, in accordance with the Road Noise Policy, traffic noise increases of up to 2 dB is considered to represent a minor impact, barely perceptible to the average person.

As such, given that the maximum increase in noise levels resulting from the modification is 2 dB, the Department considers that the current project conditions provide adequate mitigation for traffic noise impacts, which includes additional noise mitigation measures for any landowner on Orchard Road, Woodville Road or Cadia Road (where subsequent noise monitoring shows traffic levels generated by the project exceed the project approval traffic noise criteria).

Blayney Dewatering Facility

Cadia requested that the noise monitoring requirements at the Blayney Dewatering Facility be removed from the project's approval, providing additional information (see **Appendix A5**) that the site has been demolished and rehabilitated with only groundwater monitoring continuing (in accordance with the project's Rehabilitation Strategy). The Department considers that ongoing noise impacts are unlikely to occur at the site and has recommended that monitoring be removed from the project approval. No other conditions relating to the Blayney Dewatering Facility are recommended to be removed, subject to a separate approval process.

Recommended conditions

The Department has recommended the following changes to the project approval:

- requiring a Noise Impact Validation Report based on detailed final design for the construction of the NTSF and STSF embankments and associated infrastructure within 3 months of approval of Modification 14;
- revision of the Noise Monitoring Program into a Noise Management Plan that includes:
 - o real time and attended noise monitoring;
 - o a trigger, action, response plan based on noise complaints and real time noise monitoring;
 - o monitoring and management of traffic noise impacts; and
 - o a noise monitoring program that supports proactive and reactive management of noise impacts on site, evaluate and report on the effectiveness of noise management and include a program to calibrate and validate the real time noise monitoring results with the attended monitoring results over time;
- noise compliance reporting;
- inclusion of the proposed modification activities into the project's operating hours, allowing for the NTSF repair works to be completed at any time; and
- removal of the noise monitoring requirements for the Blayney Dewatering Facility.

Summary

Overall, the Department considers that the noise impacts associated with the proposed modification, including the maximum increase of 2 dB on road traffic noise to receivers are acceptable and can be appropriately managed through existing and recommended project conditions, including implementation of a Noise Management Plan incorporating real time and attended monitoring.

6.4 Water resources

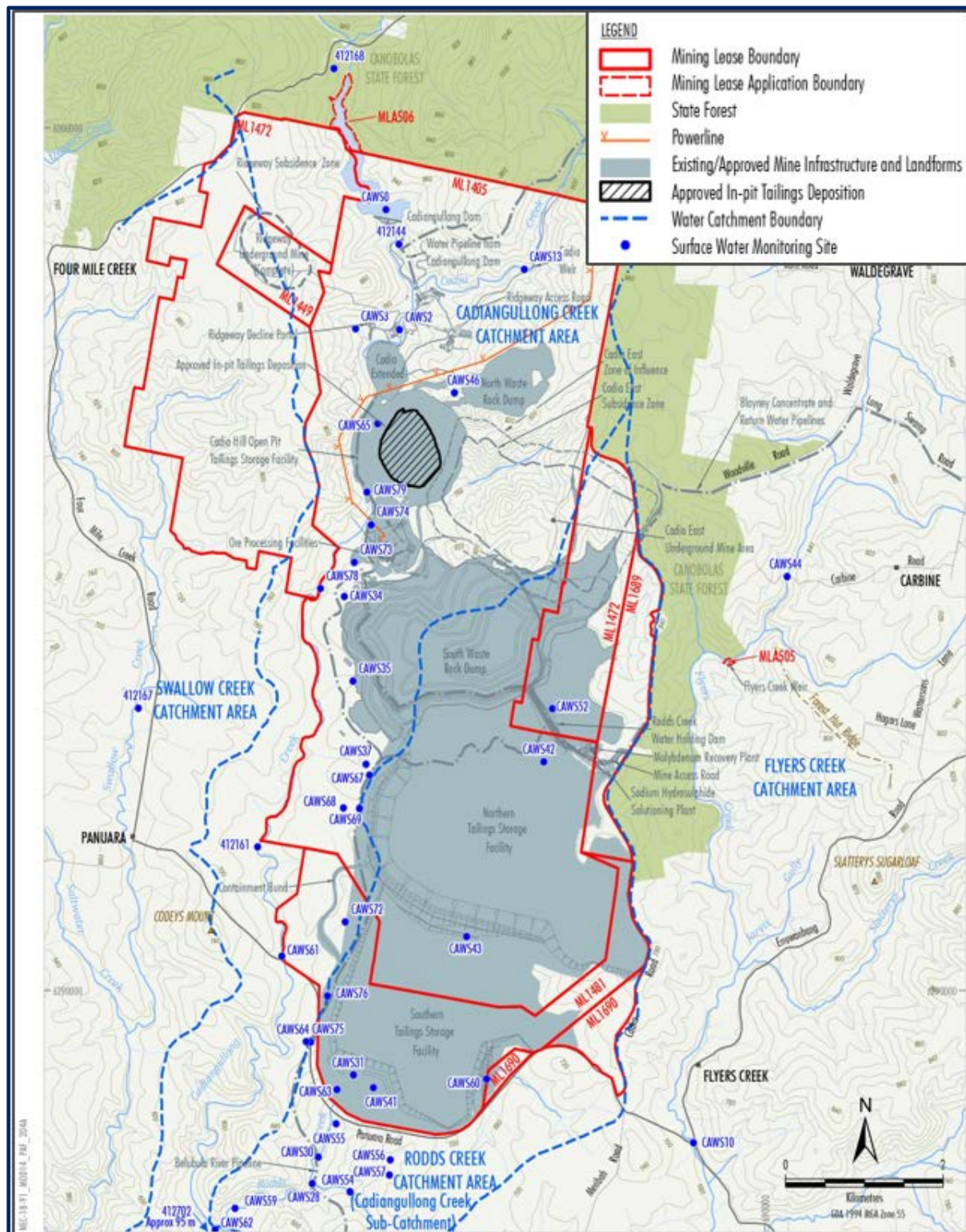
The Department considers the key issues associated with the proposal is the increase in water consumption associated with the increased processing rate, and ensuring that appropriate management measures continue to be applied to manage seepage and runoff from the construction and operation of the tailings facility.

Community submissions in particular raised concerns about increased water consumption by the mine, particularly with climate change and competition for water resources in the catchment and also concerns that downstream impacts to the Belubula River, including environmental monitoring, have not been fully considered.

Water supply

Water catchment context

The project is located within the Flyers Creek, Cadiangullong Creek and Swallow Creek catchment areas with all aspects of the proposal (including the NTSF and STSF embankment changes) located within the Cadiangullong Creek catchment area (see **Figure 10**), a tributary of the Belubula River which is regulated under the *Water Management Act 2000* through the *Water Sharing Plan for the Belubula Regulated River Water Source 2012*.



Water balance

Cadia sources water for operations of the project through a number of on-site storages including the Cadiangullong Creek Dam (holding up to 4,200 ML of water), Rodds Creek Dam (14,500 ML capacity water storage), and the tailings storage facilities, with catchment rainfall runoff forming a key component

of site water supply. Supplementary water is also supplied through a range of sources including treated effluent from Orange City Council, licensed extractions from the Belubula River and Flyers Creek, groundwater bores and returned water from the CVO Dewatering Facility.

The increase in processing rate from 32 to 35 Mtpa would increase site water demand by around 10% or approximately 7 ML/day (increasing daily water use by Cadia from an approximate 67 ML to 74 ML).

Modelling of climactic scenarios indicates that under Cadia's existing site water management, the average reliability of water supply for site operations would be 98.1%, with the lowest prediction being 89.5% reliability. DPIE Water and the NRAR were satisfied with the assessment method used by Cadia to predict water supply security noting the potential for water supply limitations during drier periods which may result in the need for a reduced processing rate or sourcing of additional water.

DPIE Water recommended conditions to the Department, including ensuring that sufficient water entitlement is held by the project and to account for the maximum predicted take for each water source prior to take occurring. DPIE Water also recommended revision of the project's Water Management Plan and designing any dams constructed on minor streams in accordance with relevant industry standards. DPIE Water noted that the proposed new storages would be considered excluded works under Schedule 1(3) of the *Water Management (General) Regulation 2018*.

Water supply mitigations

Cadia proposes to alter the existing site water management to support the NTSF and STSF embankment footprint extension and supply issues by enlarging existing water storages and constructing an additional 4 water storages.

Cadia would also construct ancillary infrastructure, including collection drains, a culvert to direct runoff to one of the proposed new water storages and a pipeline and pump system to transfer water from the storages to the NTSF and STSF. Although this would result in an estimated 25 ha increase in the area excised from the Cadiangullong Creek catchment (representing approximately 0.8% of the total catchment area) this was considered a small reduction in catchment area resulting in an indiscernible reduction in flow to Cadiangullong Creek compared to the approved operations.

Water quality

Water quality in the project area is influenced by local mineralisation and historic activities, with water quality of Cadiangullong Creek, from the upstream boundary of the project site, influenced by historic mine seepage.

The proposal would result in changes to the location of existing site water management storages and design and location of the tailings storage facility embankments, with Cadia presenting a range of existing management measures that would continue to be applied for the proposal to reduce and mitigate potential water quality impacts.

Tailings storage facility water management

Water management storages that collect tailings storage facility seepage would continue to be designed in accordance with the project's EPL criteria (a 1 in 100 year Australian Recurrence Interval (ARI) 72-hour rainfall event) and water management storages to collect sediment runoff would also continue to be designed and constructed in accordance with the project's EPL criteria (1 in 20 year ARI 72-hour event).

During construction of the embankments, Cadia would need to relocate the existing seepage management pond to the south of the STSF; however, this would ultimately be removed as part of site closure works, with water management to the south of the STSF comprising of revegetated wetlands to manage local surface water runoff.

The Department notes that in accordance with the project's approved Rehabilitation Strategy (Revision 3, dated 12 June 2020), all final water management requirements would be subject to water monitoring to confirm that the drainage from the tailings facilities and waste rock dumps meet the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000) for agricultural purposes (livestock drinking water, short and long term irrigation).

The Department also notes that following additional information provided by Cadia, the Resources Regulator was satisfied that surface water management of the tailings storage facilities regarding the final landform had been appropriately considered, subject to final detailed design to be provided as required under the Mining Act requirements.

In particular, the water drainage system for the tailings storage facilities for the final landform would be designed to promote surface drainage toward north-western corners of the tailings facilities into constructed wetlands through installation of a series of low-grade channels lined with geofabric and rocks and shaping of the facilities (see **Figure 7**).

Other water storage management

There is potential for spills from storages with spills predicted at the T7/T8 storage, site runoff pond and the southern leachate dam; however, Cadia proposed to manage the predicted spills through a review of the catchment, capacity and pumping capacity of the sites in order to ensure consistency with the hydrologic design criteria or requirements of the EPL. The operational water balance model would also be utilised by Cadia to provide on-going forecast of water supply reliability in order to plan for contingency measures including acquisition of any additional water access licences.

In addition, to account for runoff from a 1% annual exceedance probability, 72 hour duration rainfall event, all existing water management storages may need to be enlarged prior to construction of the outer batters of the NTSF and STSF to contain runoff from the design storm.

The EPA were satisfied that Cadia's proposed surface water management would appropriately manage potential water quality impacts and provided recommended conditions to the Department, including:

- seepage dams must be constructed to achieve an in-situ hydraulic conductivity of less than 1×10^{-9} metres/second via a clay liner of at least 1000 mm and must be constructed to retain all seepage;
- design, construction and maintenance of tailings seepage and run-off storages must maintain a minimum 1 in 100-year ARI 72-hour event without discharge;
- revision of the project's water monitoring program to provide alternative monitoring points moved as a result of the embankment changes and inclusion of pollutant parameters and monitoring for all new proposed water storages;
- a short-term verification monitoring program in consultation with the EPA; and
- revision of the project's Water Management Plan.

Groundwater

Potential impacts to groundwater flow and quality could result from the over-burden pre-conditioning works and the tailings storage facility embankment design change to centreline or downstream lifts which introduces a low permeability zone between embankment lifts.

Over-burden pre-conditioning works would result in a short-term increase of groundwater inflow due to the rock fracturing process; however, this would be within the project's overall licencing requirements. Impacts to groundwater quality from the over-burden pre-conditioning works are also not anticipated as the drilling mud (sump liquid) would be directed into the subsidence zone which forms a groundwater sink.

Although a low permeability zone between embankment lifts would be introduced with the proposed centreline and downstream construction, there would be no change to groundwater flow direction, with seepage continuing to be collected downstream of the STSF within the existing seepage retention pond. As such, there would be no significant changes to groundwater impacts from the tailings storage facility design changes as a result of the modification.

Groundwater licensing

Although DPIE Water raised concerns that Cadia did not have the required allocation of 289 ML from the Orange Basalt Groundwater Source, Cadia confirmed that no change to the predicted groundwater take would occur as a result of the proposal, describing that Cadia's actual water take from this source in 2019-2020 was considerably lower, being 60.2 ML.

Cadia would also continue to monitor water take and any relevant carryover balance in accordance with the *Water Sharing Plan for the NSW Murray Darling Basin Fractured Rock Groundwater Sources Order 2020*, would hold appropriate water licences for the project's water take and would continue to monitor groundwater take in accordance with the Water Management Plan.

Recommended conditions

In consideration of concerns raised by the community and recommendations from DPIE Water, NRAR and the EPA, the Department has recommended the following changes to the project's conditions:

- ensuring that the project has sufficient water for all stages of the project and implementing efficiency and best practice measures to minimise and conserve the use of water and if necessary, adjust the scale of operations to match the available water supply;
- inclusion of measures to accurately meter, monitor and report water take from surface water and groundwater sources or present a nominated strategy that permits ongoing review of actual versus modelled prediction of take where relevant;
- extending the monitoring program to the junction of Cadiangullong Creek and the Belubula River;
- revision of the Water Management Plan and all associated sub-plans including the Surface Water Monitoring Program, Groundwater Monitoring Program and Surface and Groundwater Contingency Plans, in consultation with the relevant agencies, within 3 months of approval of the modification;
- implementing design and construction criteria of the new tailings seepage dams and water storage dams; and
- requiring works within waterfront land to be carried out in accordance with the requirements of the *Guidelines for Controlled Activities on Waterfront Land* (NRAR 2018).

Summary

Following consultation with the EPA and DPIE Water and NRAR, the Department is satisfied that Cadia appropriately assessed the potential water quality and water supply impacts that may result from the proposal.

The Department considers that Cadia's water storages and water management system would provide adequate water supply to facilitate the increased processing rate 98.1% of the time.

The Department has recommended a condition that Cadia must ensure it has sufficient water for all stages of the project and must adjust the scale of operations to match available water supply. In accordance with this condition, Cadia would be required at times to reduce the processing rate or attain additional water supply.

6.5 Biodiversity

The tailings dam construction would require removal of vegetation consisting of remnant woodland, derived native grassland, native plantings and some exotic dominated pasture associated with the riparian zone of Rodds Creek.

Vegetation removal would result in direct impacts to 23.3 ha of Box-Gum Woodland (a Critically Endangered Ecological Community (CEEC)), 39 isolated scattered trees and 0.47 ha of rock outcrop which is potential habitat for threatened species.

The Department received submissions (and additional representations) from the community raising concerns about impacts on aquatic ecology including further downstream on the Belubula River, impacts associated with the removal of paddock trees, and adequacy of the existing Land and Biodiversity Management Plan. The Department is satisfied that these issues have been appropriately considered and that impacts have been assessed in accordance with the relevant methodologies as discussed below.

Methodology

Cadia provided a BDAR, assessing the disturbance area required for the NTSF and STSF embankment extensions, which was completed by Premise and prepared in accordance with the *NSW Biodiversity Conservation Act 2016* (BC Act) and the *Biodiversity Assessment Method* (DPIE, EES 2020). Although the BDAR required two revisions, the final BDAR was considered adequate by the BCS and the Department, addressing all residual concerns about the biodiversity assessment (see **Appendix A5**).

Land categorisation

Vegetation requiring removal was assessed in accordance with the Land Management Framework grouping vegetation into categories determined by section 60H of the *Local Land Services Act 2013* (LLS Act). Under the LLS Act, land (in rural land) is designated as either:

- **Category 1 land** - exempt land which is devoid of native vegetation or native vegetation that has regenerated on land that was lawfully cleared prior to 1990; or
- **Category 2 land** - regulated land where the Biodiversity Assessment Method applies.

Avoidance measures

In accordance with the BC Act, impacts to biodiversity values were assessed by the hierarchy of avoid, minimise and offset, requiring any impacts to biodiversity values first and foremost be avoided, where possible.

As the NTSF and STSF are both established facilities, and the change to centreline and downstream lifts is a necessity to increase the safety of the facilities, avoidance of vegetation removal for the proposed modification was not possible. Notwithstanding, Cadia included avoidance mitigations where possible during design which included avoidance of plantings located to the immediate south-east of the STSF along Panuara Road and locating the NaHS Solutioning Plant in a previously disturbed area.

Measures to minimise and offset residual impacts to biodiversity values is discussed in further detail below.

Impacts on Threatened Ecological Communities (TEC)

Plant communities and land categorisation

132.9 ha of Category 1 land and 34.6 ha of Category 2 land would be required to be disturbed, noting that the Biodiversity Assessment Method does not apply to Category 1 land. Two plant community types (PCTs) would be cleared, which have been categorised into vegetation zones based on condition type, as summarised in **Table 4** and shown in **Figure 11**.

Table 4 List of plant communities impacted by the proposal

PCT	Condition/Zone	Area (ha)	BC Act listing	Ecosystem Credit Liability
<i>White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion (266)</i>	Moderate	12.6	CEEC	349
	Scattered paddock trees	0.5	CEEC	9
<i>Blakey's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (277)</i>	Poor	3.55	CEEC	59
	Scattered paddock trees	0.35	CEEC	4
	Derived native grassland	1.0	Not listed	0
	Native plantings	5.3	CEEC	134
Total native vegetation		23.3		555
Non-native Category 2 land		11.3	NA	NA

PCT 266 and PCT 277 can form part of the *White Box – Yellow Box – Blakey's Red Gum Grassy Woodland and Derived Native Grassland* (Box-Gum Woodland) CEEC under both the BC Act and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); however, none of the Box-Gum Woodland in the study area met the Commonwealth criteria for the CEEC. An assessment of Serious and Irreversible Impacts on the community determined that although the proposal would require the permanent removal of this community, impacts to the community would not contribute significantly to the risk of the Box-Gum Woodland CEEC becoming locally or regionally extinct with serious or irreversible impacts unlikely to occur.



Figure 11 | Vegetation zones and distribution of PCT's within the study area (Source: Additional Information (MOD 14) – Cadia East Gold/Copper Project)

Fauna and Flora

Detailed surveys of the study area recorded 4 threatened birds (the Little Lorikeet, Superb Parrot, White-bellied Sea-Eagle and Flame Robin) and one threatened mammal (the Squirrel Glider). **Table 5** details the impacts and species credit offset requirements for these species, noting that under the Biodiversity Assessment Method only the Squirrel Glider and the Superb Parrot are assessed as species credits. In addition, due to the fauna survey being undertaken outside of the recommended timing for some species credit species, the threatened Striped Legless Lizard and the Pink-tailed Legless Lizard were also assumed present. No threatened flora listed under the BC Act or EPBC Act were identified in the BDAR study area.

Table 5 List of threatened flora and fauna

Species	BC Act Status	EPBC	Habitat disturbance area (ha)	Species Credit Liability
Squirrel Glider	Vulnerable	Not listed	18.7	361
Striped Legless Lizard	Vulnerable	Vulnerable	26.8	354
Pink-tailed Legless Lizard	Vulnerable	Vulnerable	17.9	328
Superb Parrot	Vulnerable	Vulnerable	25.3	445
Total			88.7	1,488

No impacts to the Murray Cod and Macquarie Perch were assessed as likely to occur as these fish species occur in large permanent rivers with deep waterholes, with no suitable habitat pertaining to these species located within or near the proposed modification area. Nevertheless, under the existing Land and Biodiversity Management Plan, Cadia has committed to implementing measures to avoid, mitigate and offset potential impacts to fauna and their habitats including aquatic ecosystem monitoring and undertaking aquatic and riparian rehabilitation.

Measures to minimise impacts

Although the additional disturbance area cannot be avoided to allow the construction of the NTSF and STSF to proceed as now proposed, Cadia has proposed a number of mitigation measures to minimise further impacts to residual biodiversity values such as avoidance of any accidental clearing by marking up adjacent vegetation, conducting vegetation clearance in accordance with the Vegetation Clearance Protocol documented in the approved Land and Biodiversity Management Plan, preparing targeted management strategies for threatened species identified during surveys (e.g. the Squirrel Glider and Superb Parrot) prior to disturbance (for construction and operation) and weed and pest control measures. Cadia also proposes to mitigate the loss of rock outcrop by moving any loose suitable material to offset areas to provide habitat to the Pink-tailed Legless Lizard.

Biodiversity offsets

Under the BC Act, the impact on native vegetation and species would generate 555 ecosystem credits and 1,488 species credits for flora and fauna species (as described in **Table 4** and **Table 5**). Both the Department and BCS are satisfied that the offset credit requirements have been correctly calculated.

Cadia proposes to satisfy the biodiversity offset credit requirements through a number of mechanisms allowed under the *NSW Biodiversity Offsets Scheme*, including contribution to the Biodiversity Trust

Fund, purchase of existing credits on the market, funding of a biodiversity conservation action, retirement of biodiversity credits and/or mine site ecological rehabilitation.

Cadia has advised the Department that it intends to establish land-based stewardship sites and has commenced early identification of candidate sites re-engaging Premise to commence surveying in accordance with the Biodiversity Assessment Method. The Department has recommended conditions requiring Cadia to retire biodiversity credits within 6 months of commencing construction of the proposed modification, noting that although BCS recommended that retiring of offsets should occur prior to impact on biodiversity values in accordance with section 7.14(4) of the BC Act, this does not apply to modifications.

The Department considers 6 months sufficient time for Cadia to retire credits associated with the proposal. However, noting potential delays in establishing Stewardship Agreements with the Biodiversity Conservation Trust, the Department has provided some flexibility in timing of formally securing the offsets, with an extension permitted, which would be subject to Cadia demonstrating that there has been substantive progress in retiring offset credits.

Recommended conditions

The Department has recommended the following conditions requiring Cadia to:

- revise the project's Land and Biodiversity Management Plan to a stand-alone Biodiversity Management Plan which:
 - o is prepared in consultation with the BCS, to the satisfaction of the Planning Secretary, prior to any vegetation clearance resulting in impacts to biodiversity values; and
 - o includes preparation of pre-clearance management strategies for threatened species known to utilise habitat features, particularly for the Superb Parrot and Squirrel Glider;
- include water quality monitoring of the Belubula River in the revised Water Management Plan, upstream and downstream of where the Cadiangullong Creek intercepts the Belubula River; and
- retire the required biodiversity credits in accordance with the Biodiversity Offsets Scheme of the BC Act.

The Department considers that the proposal's impacts on biodiversity is acceptable, subject to implementation of the recommended conditions.

6.6 Other issues

Table 6 summarises the Department's consideration of other issues related to the proposed modification.

Table 6 Assessment of other issues

Issue	Findings	Recommendations
Hazards	• The sodium hydrosulphide solutioning process and storage is potentially hazardous; however, risks are considered low provided proposed mitigation measures are applied. • The worst-case consequence (a fire involving the maximum stored sodium hydrosulphide flakes) is considered unlikely to cause fatal or injurious impacts to the closest off-site receptor located 1.8 km from the project site. Irritation risk from the event is also considered very low.	• Limit storage of sodium hydrosulphide flakes to 63 t. • Conduct a Hazard and Operability Study prior to construction of the NaHS Solutioning Plant.

Issue	Findings	Recommendations
	- Should the scrubber fail, emissions from the NaHS Solutioning Plant were considered not likely to cause irritation impacts. - The Department's Hazards team were satisfied with the Preliminary Hazard Analysis and additional information provided (see Appendix A5) and considered the information to be consistent with the relevant guidelines.	
Aboriginal Heritage	- No known Aboriginal heritage sites would be impacted by the proposed modification and the risk of finding unidentified items is low. - One existing potential archaeological deposit located approximately 10 m outside of the proposed modification area would be managed via a protective barrier, with Cadia proposing to review and revise, if necessary, the Aboriginal Cultural Heritage Management Plan for the project. - Heritage NSW were satisfied with the adequacy of the assessment, including the Aboriginal participation and consultation, and agreed that Cadia should revise the existing management plan to ensure protection measures are in place for the potential archaeological deposit. - The Department considers impacts to known and unknown Aboriginal items can be appropriately managed through existing and revised conditions.	Revise the Aboriginal Cultural Heritage Management Plan to include the potential archaeological deposit (PAD AHIMS 44-5-0133).
Traffic and Transport	- The proposed modification would include an additional 50 trips per day (25 return trips) of light vehicles for the additional 35 operational personnel and 16 (one-way trips) of heavy vehicles per day because of the increased processing rates. - Additional traffic associated with the proposed modification would be sufficiently low enough that it would not significantly vary from normal day to day and peak traffic conditions. - TfNSW was satisfied with the assessment of traffic and transport impacts and recommended the Department apply a Driver's Code of Conduct condition to the project.	Prepare and implement a Traffic Management Plan, which includes a Drivers Code of Conduct.
Historic Heritage	- One site of local Historic heritage value within the proposed modification area would be impacted (the Te Anau Homestead). - An agreement has been completed with the Heritage NSW to demolish the Te Anau Homestead, including surrounding outbuildings. - Cadia is also seeking a demolition permit from Blayney Shire Council in accordance with the requirements of the Heritage Management Plan for the project. - The Department received several submissions from the public raising concerns about heritage impacts to items located in the Errowanbang area, referring to potential future additional tailings storage facilities. - Any future planning application would be subject to separate assessment and the Department has therefore not considered this further in the assessment of the current application.	Include Te Anau Homestead in Heritage Management Plan.
Visual	Submissions from the public raised concerns about the visual impact of the NTSF, should the NTSF repair works be	Comply with existing conditions.

Issue	Findings	Recommendations
	approved and continued deposition of the tailings facility to the approved height (an additional 40 m), and potential night lighting impacts. - Additional visual impacts associated with the proposed modification would be limited to the extensions of the footprints of the NTSF and the STSF and the construction of the NaHS Solutioning Plant which would be located next to the existing Molybdenum Plant and not visible from public viewpoints. - No significant changes to night-lighting and potential lighting impacts are anticipated because of the proposal. - Although submitters raised concerns about the remaining lifts to the NTSF resulting in visual impacts, these impacts have already been assessed and approved, with the tailings embankment changes unlikely to be discernable from existing visual impacts. - Visual impacts of the waste rock dump would be reduced as the final height would be reduced by being transferred to the embankments of the tailings facilities. - The Department notes that there is an existing condition for owners of private land with significant direct views to the mining operations to request for additional visual screening at any time (for residences less than 5 km, unless in exceptional circumstances), and considers that no additional conditions would be required for the proposed modification.	
Health	- Community raised concerns about silica and health impacts associated with air concentration of respirable crystalline silica. - Cadia commissioned a <i>Tailings Dust Environmental Health Assessment and Monitoring Project Review</i> (Serinus 2021) (see Appendix A5). - The report found that although the tailings contained significant concentrations of quartz (when in the respirable size range is a major component of respirable crystalline silica), the respirable fraction of quartz in the tailings was below levels classified as hazardous according to the <i>United Nations Globally Harmonised System of Classification and Labelling of Chemicals</i>. - The Department notes that these findings were from the tailings located within the project site and not resulting from an assessment of airborne tailings or tailings identified outside of the project site. - No changes to methods of processing gold/copper or tailings are proposed as part of the modification and repair of the NTSF would facilitate natural air quality mitigations to the tailings facilities, reducing dust and airborne impacts currently experienced by the community.	- Comply with existing conditions. - Revise air quality conditions.
Schedule of Land	Cadia provided additional information to the Department (see Appendix A5), detailing that the Lot and DP's for the CVO Dewatering Facility have changed due to sub-division of the land and that the schedule of land in the project approval is now incorrect.	Revise schedule of land for the CVO Dewatering Facility.
Community Consultative	The Department received requests from the community to join the project's CCC, with a review of the CCC's latest	Consult with the CCC for the revised Air

Issue	Findings	Recommendations
Committee (CCC)	minutes identifying that an additional 2 community members or stakeholder group representatives could be accommodated in the committee. - The Department notified Cadia to commence the selection process for the community representatives for the CCC and review eligibility of the existing CCC community representatives, in accordance with the Department's 2019 CCC guidelines. - Due to significant community representations received throughout the assessment of the modification, the Department also recommends that the CCC be engaged to consult on the revised Air Quality Management Plan.	Quality Management Plan.
Subsidence	- The additional pre-conditioning works would result in subsidence within the project's approved subsidence zone with no additional fracturing anticipated beyond what was previously assessed in the 2009 groundwater model. - Any additional impact outside of the subsidence zone is considered unlikely.	Comply with existing conditions.

7 Evaluation

The Department has undertaken a comprehensive assessment of the merits of the modification application and supporting information in accordance with the relevant requirements of the EP&A Act, including the relevant 'matters for consideration', considering all information provided by Cadia, government agencies, the public and special interest groups.

Overall, the Department considers that the proposal would facilitate Cadia's continued operations and allow the benefits of the project to continue to be realised, including the significant local and regional employment and economic/business opportunities. Without repair of the NTSF breach and construction of the embankments to the proposed downstream/centreline lifts, Cadia would have to ultimately cease its approved operations once the capacity of the Cadia Hill open cut pit is exceeded. That is the repair and proposed change in embankment design and construction is essential for ongoing operations.

The other elements of the modification including pre-conditioning, the NaHS solutioning plant and the proposed increase in production rate from 32 to 35 Mtpa are proposed to improve efficiency of operations and resource recovery.

The Department acknowledges that the proposal, including the increased processing rate and the construction works for the NTSF and the STSF, would result in additional environmental impacts compared to the approved project. The Department has carefully considered the residual impacts of the proposal in consultation with key government agencies, and considered the key issues are safety of the tailings storage facilities, air quality, water quality and supply, biodiversity and road traffic noise.

The proposal is essential to increasing geotechnical stability and safety of the NTSF and STSF based on the finding and recommendations of the Independent Technical Review Board, and for the return of wet tailings deposition in order to reduce dust emissions from the most significant source of dust from the site.

In relation to air quality impacts, overall dust emissions would increase by 22%, with the majority of these emissions due to the construction works required for the NTSF repair and the transition to the downstream and centreline lift embankments. Based on the air quality modelling, dust lift off from the existing tailings facilities is the largest contributor to overall site emissions. While Cadia has implemented mitigation measures to minimise dust lift off since the failure of NTSF, these emissions would be more efficiently managed with deposition of wet tailings.

Cumulative air quality impacts associated with the increase in production rate were one of the key issues raised by the community. The Department has recommended conditions to manage air quality impacts including setting contemporary ambient particulate matter (PM_{2.5} and PM₁₀) criteria consistent with the EPA's Approved Methods, requiring an Air Quality and Greenhouse Gas Management Plan to be prepared in consultation with the EPA and CCC, and requiring an independent air quality audit to be undertaken to the satisfaction of the Planning Secretary, prior to increasing the annual production rate to 35 Mtpa.

In regard to biodiversity impacts, the Department notes that the proposal would disturb up to 23.3 ha of box-gum woodland endangered ecological community, 39 isolated scattered trees and 0.47 ha of rock outcrop. Due to the nature of the proposal, avoidance of impact is not possible, nevertheless, the impacts would be managed through mitigation measures, such as pre-clearing protocols, and the impacts to biodiversity values would be offset.

Regarding impacts to water supply and water quality, the proposal would result in an additional 10% demand in water which can be supplied by Cadia's existing water management system to a reliability of 98.1%. The Department's recommended conditions include ensuring that Cadia has sufficient water supply for all stages of the project and adjusting the scale of operations to match available water supply. The Department has also recommended additional water quality monitoring to commence monitoring of downstream impacts of the project on the Belubula River.

In relation to noise impacts, the construction and operational noise from the proposal is predicted to comply with existing noise limits. However, as a result of an increase in traffic, the maximum increase in noise impacts to receivers would be 2 dB, which would not generally be perceptible against background noise levels. Nevertheless, existing project conditions provide adequate mitigation to any residential receiver that may be potentially impacted and the Department has recommended inclusion of traffic noise management mitigation measures in the revised Noise Management Plan.

The Department considers that all material concerns raised by the community have been appropriately considered within the assessment or through the proposed conditions. The Department has also recommended some administrative changes to contemporise key requirements to improve transparency and environmental regulation, including requiring consultation with the CCC for the revised Rehabilitation Strategy and Air Quality and Greenhouse Gas Management Plan to ensure there is comprehensive input from the community on these key documents. There are also recommended changes to reporting and auditing requirements, along with management plan requirements.

Additionally, the modification would deliver economic benefits to the Orange, Blayney and Cabonne regions and NSW as a whole by generating \$39 million in additional royalties to the NSW Government, and support up to 35 full-time equivalent operational jobs and result in a \$46 million Net Present Value of total net production benefits to the NSW economy for the remaining life of the project.

The Department has carefully weighed the impacts of the proposal against the benefits. The Department considers that the proposed modification can be undertaken without any significant

environmental impacts beyond those already assessed and approved and that any other residual impacts can be adequately managed and mitigated by the revised project approval and updated management plans and monitoring programs, in consultation with relevant agencies.

On balance, the Department considers that the benefits of the proposal outweighs its costs and is in the public interest and approvable, subject to the revised conditions.

8 Recommendation

The Department has drafted an Instrument of Modification (see **Appendix B**) for the proposed modification, as well as a consolidated version of the project approval as modified (see **Appendix C**).

It is recommended that the Executive Director, Resource Assessments, as delegate of the Minister for Planning and Public Spaces:

- **considers** the findings and recommendations of this report;
- **determines** that the application (MP06_0295 MOD14) falls within the scope of section 4.55(2) of the EP&A Act;
- **accepts and adopts** all of the findings and recommendations in this report as the reasons for making the decision to grant approval to the application;
- **agrees** with the key reasons for approval listed in the draft notice of decision;
- **modifies** the approval (MP06_0295); and
- **signs** the attached Instrument of Modification (**Appendix B**).

Prepared by:

Emily Murray

Environmental Assessment Officer
Resource Assessments

Recommended by:



30/11/2021

Mandana Mazaheri

Team Leader
Resource Assessments

Recommended by:



30/11/2021

Steve O'Donoghue

Director
Resource Assessments

9 Determination

The recommendation is **Adopted** / ~~Not adopted~~ by:

A handwritten signature in black ink, appearing to read "Clay Preshaw". The signature is written in a cursive, flowing style.

13/12/2021

Clay Preshaw

Executive Director - Energy, Resources and Industry Assessments
as delegate of the Minister for Planning and Public Spaces

Appendices

Appendix A – List of Key Documents

A1 - Modification Report: Refer to folder “Modification Application” on the Department’s website at

<https://www.planningportal.nsw.gov.au/major-projects/project/36686>

A2 - Submissions: Refer to folder “Submissions” on the Department’s website at

<https://www.planningportal.nsw.gov.au/major-projects/project/36686>

A3 - Submissions Report: Refer to folder “Response to Submissions” on the Department’s website at

<https://www.planningportal.nsw.gov.au/major-projects/project/36686>

A4 – Agency Advice: Refer to folder “Agency Advice” on the Department's website at

<https://www.planningportal.nsw.gov.au/major-projects/project/36686>

A5 – Additional Information: Refer to folder “Additional Information” on the Department's website at

<https://www.planningportal.nsw.gov.au/major-projects/project/36686>

Appendix B – Instrument of Modification

Appendix C – Consolidated Project Approval