Cadia Valley Operations Processing Rate Modification

Environmental Assessment | March 2015

NEWCREST MINING LIMITED

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EXECUTIVE SUMMARY

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

The approval includes all components of the mining operations at the Cadia Valley Operations (CVO) including the Cadia East underground mine, Cadia Hill open cut mine, Ridgeway underground mine, the Concentrate Dewatering Facilities, and ancillary infrastructure.

The CVO are located approximately 25 kilometres south-west of Orange, in the Central Tablelands of NSW. Cadia Holdings Pty Limited (CHPL) is the owner and operator of the CVO and is a wholly owned subsidiary of Newcrest Mining Limited.

A Modification of PA 06_0295 is proposed under Section 75W of the *Environmental Planning and Assessment Act, 1979* to facilitate an increase in the existing ore processing rate at the CVO (this Modification). The Processing Rate Modification would include:

- An increase in the approved ore processing rate at the CVO from 27 million tonnes per annum (Mtpa) to 32 Mtpa.
- Additional secondary crushing circuits at Concentrators 1 and 2.
- An upgrade of the existing regrind Vertimill at Concentrator 2.
- Installation of three additional regrind Vertimills at Concentrator 1.
- Installation of additional flotation cells at Concentrator 1.
- De-bottlenecking process improvements at the ore processing facilities and underground ore crushing and transport infrastructure.
- Temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are in place.

Importantly, there would be no change to the currently approved surface disturbance footprint or material increase in the CVO Life of Mine ore production as a result of the Modification.

In order to assess the potential environmental impacts of the proposed Modification, a number of environmental reviews were completed. A summary of the key findings of these environmental reviews and key commitments with respect to managing potential impacts is provided below:

- The Modification would result in negligible to marginal noise increases at nearby residential receivers and would continue to comply with the existing criteria in PA 06_0295.
- Air quality impacts associated with the Modification would be negligible and would not result in any additional exceedances of criteria at nearby residential receivers.
- The existing CVO water management system would continue to be implemented for the Project. Water supply is predicted to continue to meet demand for the CVO, incorporating the Modification.
- Existing mine traffic in the vicinity of the CVO has gradually decreased since its peak in Year 2 of operations associated with Cadia East construction. The Modification would result in a small increase in light vehicle trips during construction activities and an increase in heavy vehicle deliveries during the operational phase. The traffic impacts are expected to be minor, given that additional vehicle movements would be minor relative to the Cadia East construction peak.
- Modification infrastructure would be limited to existing/approved disturbance areas therefore there are no impacts predicted on heritage or biodiversity aspects.

The environmental reviews indicate that the existing environmental management and monitoring measures would continue to be implemented for the Modification and that the Modification therefore would not significantly increase potential environmental impacts in comparison to the approved CVO.

Notwithstanding, CHPL has committed to investigating noise and air quality mitigation measures during the design and implementation phases of the Modification.

1 INTRODUCTION

1.1 BACKGROUND

Project Approval (PA) for the Cadia East Project was granted by the New South Wales (NSW) Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 6 January 2010 (PA 06_0295). The approval includes all components of the mining operations at Cadia (as described in Schedule 1 of the PA [Attachment 1]) including the Cadia East underground mine, Cadia Hill open cut mine, Ridgeway underground mine, the Concentrate Dewatering Facilities, and ancillary infrastructure. These integrated operations are herein referred to as the Cadia Valley Operations (CVO).

The CVO are located approximately 25 kilometres (km) south-west of Orange, in the Central Tablelands of NSW (Figure 1). Cadia Holdings Pty Limited (CHPL) is the owner and operator of the CVO and is a wholly owned subsidiary of Newcrest Mining Limited.

The Cadia Hill open pit, Ridgeway underground mine and Cadia East underground mine are located in the Cadia Valley within Mining Lease (ML) 1405, ML 1472, ML 1481, ML 1449, ML 1689 and ML 1690 (Figure 2). The Concentrate Dewatering Facility is located approximately 25 km to the east of the Cadia Valley in the town of Blayney (Figure 1).

Operations at the Cadia Hill open pit ceased in 2012, and are currently under care and maintenance. With the Ridgeway Deeps extension, Ridgeway is currently scheduled to cease operations by 2017.

Cadia East involves panel cave mining to extract approximately 450 million tonnes (Mt) of ore over a period of 21 years. The ore contains gold, copper and some molybdenum. With Cadia East, the life of the CVO extends to approximately 2030. Figure 2 shows the approved General Arrangement at the end of the currently approved mine life.

The Cadia East underground mine is described in full in the Cadia East Project Environmental Assessment (the Cadia East EA) (CHPL, 2009a). Since the grant of PA 06_0295, the following Modifications have been granted:

- Mod 1 (2010) – a modification to allow construction of a decline beneath Cadia Hill open pit.
- Mod 2 (2010) – a modification of operations at the existing Blayney Dewatering Facility.
- Mod 3 (2011) – a modification to allow the realignment of a section of the concentrate and return water pipelines to Blayney.
- Mod 4 (2014) – a modification in relation to hydraulic preconditioning.
- Mod 5 (2014) – a modification in relation to blasting preconditioning.

A further Modification is proposed to facilitate an increase in the existing ore processing rate at the CVO (this Modification).

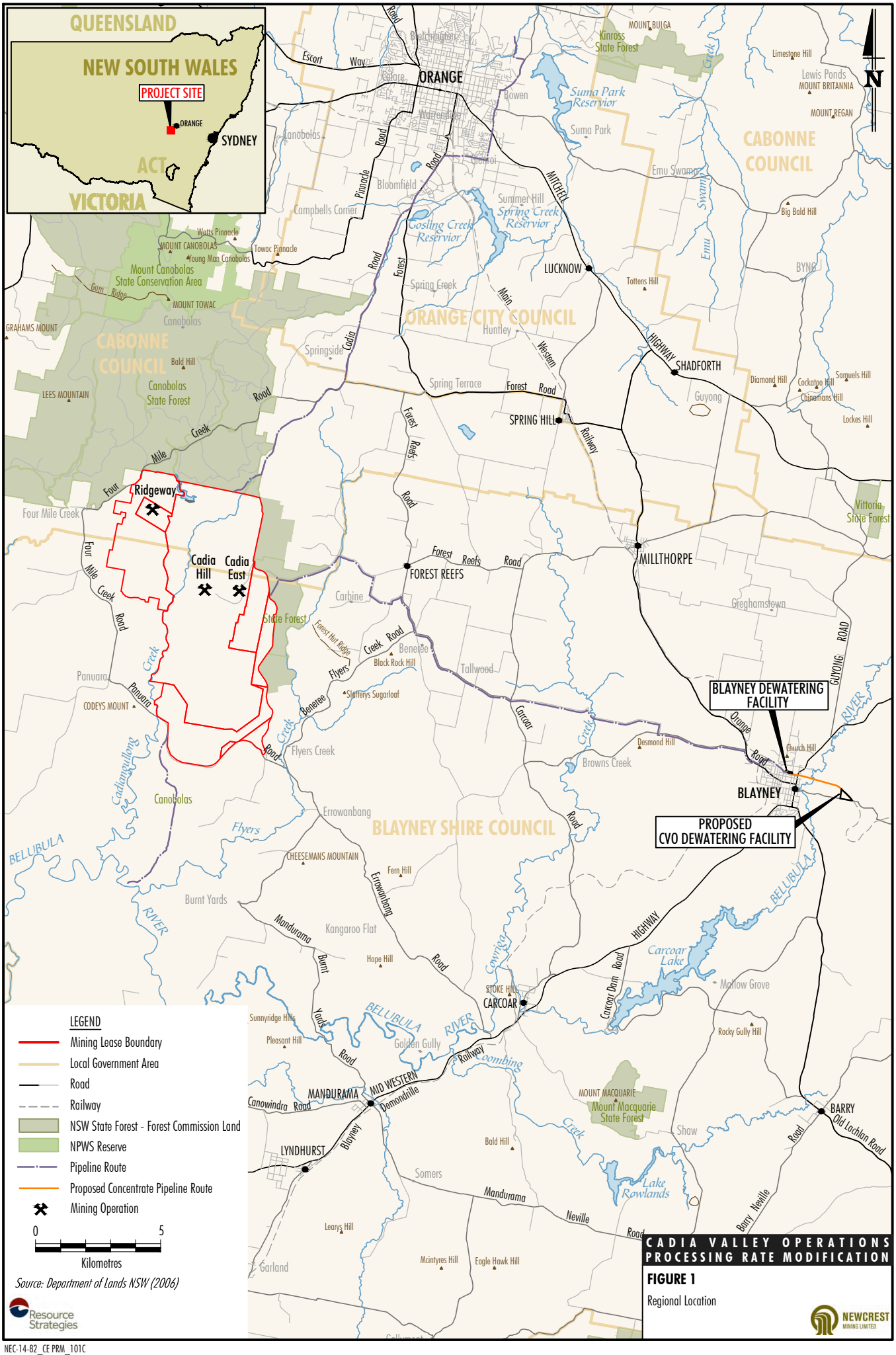
1.2 OVERVIEW OF THE PROPOSED MODIFICATION

The Processing Rate Modification would include:

- An increase in the approved ore processing rate at the CVO from 27 million tonnes per annum (Mtpa) to 32 Mtpa.
- Additional secondary crushing circuits at Concentrators 1 and 2.
- An upgrade of the existing regrind Vertimill at Concentrator 2.
- Installation of three additional regrind Vertimills at Concentrator 1.
- Installation of additional flotation cells at Concentrator 1.
- De-bottlenecking process improvements at the ore processing facilities and underground ore crushing and transport infrastructure.
- Temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are in place.

Importantly, there would be no change to the currently approved surface disturbance footprint or material increase in the CVO Life of Mine ore production as a result of the Modification.

Table 1 provides a snapshot of the proposed changes relevant to the Modification relative to the existing/approved CVO.



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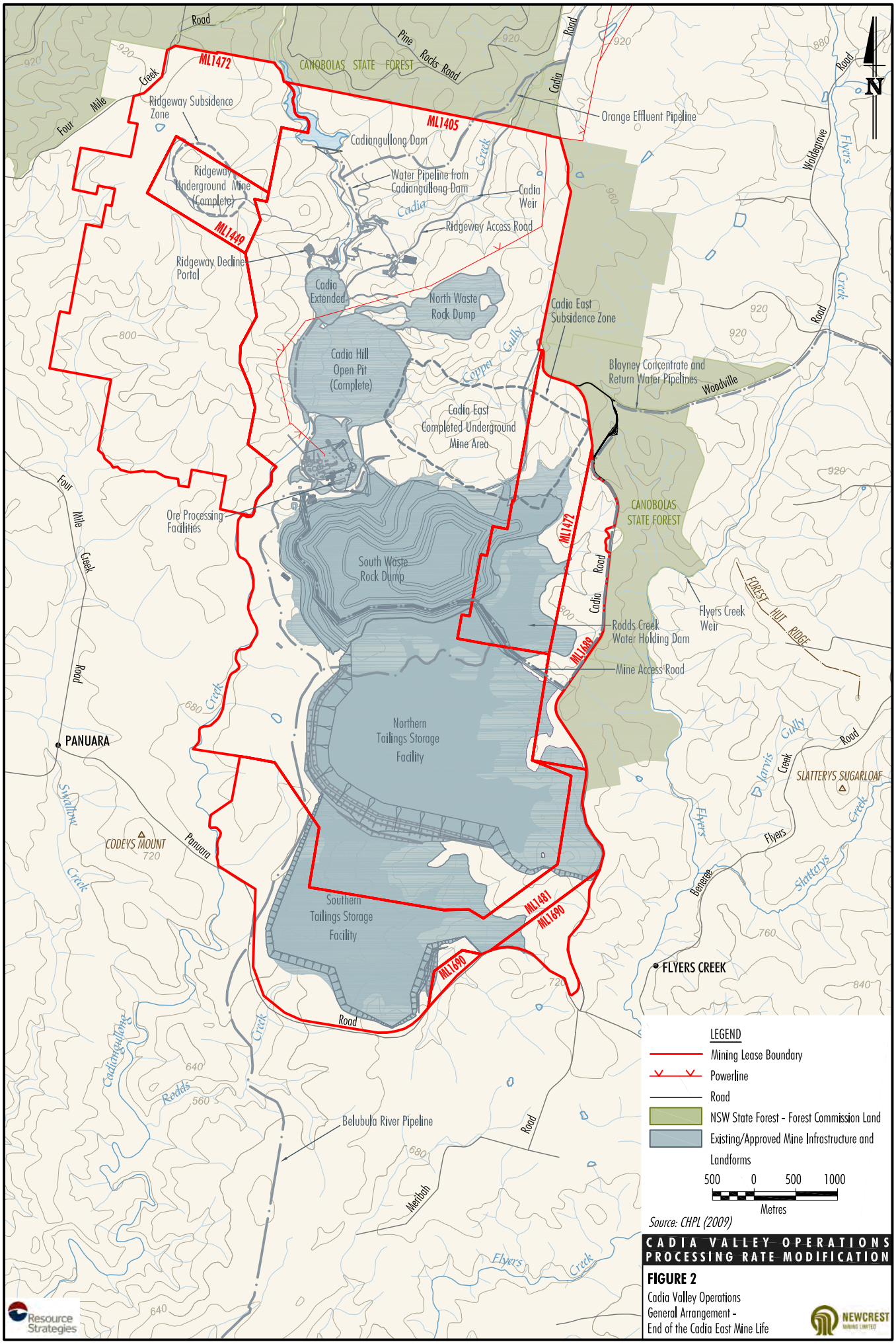

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Table 1
Snapshot of Changes relevant to the Modification

Project Development Component	Summary of the Existing/Approved CVO	Summary of the Modification
Mining Methods	Cadia East underground mine - underground panel caving, which would also involve development of a surface subsidence zone. Ridgeway - underground sublevel and block caving with associated surface subsidence zone.	No change.
Life of Mine Cadia East Ore Production	Approximately 449.5 Mt.	Approximately 456 Mt.
Life of Mine CVO Ore Production	Approximately 561 Mt since the commencement of the Cadia East Project.	Approximately 562 Mt.
Waste Rock Management	Minor amounts of waste rock to be deposited in the South Waste Rock Dump.	No change.
Life of Mine	Mining up until approximately 2030.	Mining up until approximately 2029.
Ore/Rock Preconditioning	Use of both underground techniques and surface boreholes to precondition the Cadia East orebody and host rock above the orebody.	No change.
Tailings Management	Raising of the Northern Tailings Storage Facility (NTSF) and Southern Tailings Storage Facility (STSF) via upstream embankment lifts.	No change to maximum Tailings Storage Facility (TSF) embankment elevations. Increased rate of tailings embankment lift.
Ore Processing	Processing of up to 27 Mtpa of gold and copper ore. Upgrades to the existing ore processing facilities and associated stockpiles and materials handling equipment.	Processing of up to 32 Mtpa of gold and copper ore. Upgrades to the existing Concentrators 1 and 2 including: • additional crusher at Concentrator 1; • additional flotation capacity installation at Concentrator 1; • installation of new regrind Vertimills at Concentrator 1; • additional crusher at Concentrator 2; • upgrades to the Concentrator 2 regrind Vertimill; and • plant de-bottlenecking process improvements within the existing Concentrators 1 and 2.
Concentrate Transport and Dewatering	Construction of a new CVO Dewatering Facility to the east of Blayney and eventual decommissioning of the existing Blayney Dewatering Facility. Installation of a new concentrate pipeline from the CVO to the CVO Dewatering Facility. Rail transportation of dewatered mineral concentrate to the eastern seaboard.	No change to CVO Dewatering Facility, concentrate pipeline or rail movements. Additional containers on product concentrate trains (from 68 to 106 containers per train).
Water Supply and Management	Augmentation and upgrade of the existing CVO water management/supply system including development of additional pipeline/pumping systems and raising of the Rodds Creek Water Holding Dam.	No change to water supply and management. Increase in water demand in-line with proposed increased processing rate.
Power Demand	Peak demand of 160 megawatts (MW).	Increase in peak demand to 164 MW.
Power Supply	Additional power supply infrastructure would be the subject of a separate approvals process.	No change.
Employment	An average of 880 employees up to a maximum of approximately 1,300 employees.	No change to operational employment. Additional 20 employees during construction of Modification infrastructure.

1.3 NEED FOR THE PROPOSED MODIFICATION

Since approval of the Cadia East Project (PA 06_0295), CHPL has continued to evaluate ore processing options, including studying opportunities to optimise operations.

As part of these studies, it has been identified that the ore processing capacity can be increased to 32 Mtpa by augmentation of ore processing infrastructure proposed as part of this Modification.

The increase in ore processing capacity would increase the amount of product mineral concentrate produced and improve Project economics; including the net benefit to the local region and the state of NSW.

1.4 LEGISLATIVE FRAMEWORK

The Cadia East Project (incorporating the CVO) was approved under Part 3A of the EP&A Act on 6 January 2010 (PA 06_0295).

The CVO is approved as a 'transitional Part 3A project' under clause 2 of Schedule 6A of the EP&A Act and therefore section 75W of the EP&A Act continues to apply to modifications to PA 06_0295, notwithstanding its repeal.[1]

As outlined in Section 1.5.2, CHPL consulted with the NSW Department of Planning & Environment (DP&E) in December 2014 with regards to seeking the necessary approvals for the Modification and based on this consultation, approval for the Modification is sought as a modification to PA 06_0295 under section 75W of the EP&A Act. Section 75W of the EP&A Act relevantly provides:

> ***75W Modification of Minister's approval***
>
> *(1) In this section:*
>
> ***Minister's approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.*
>
> ***modification of approval** means changing the terms of a Minister's approval, including:*
>
> *a) revoking or varying a condition of the approval or imposing an additional condition of the approval, and*
>
> *b) changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*
>
> *(2) The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*
>
> *(3) The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*
>
> *(4) The Minister may modify the approval (with or without conditions) or disapprove of the modification.*
>
> *…*

1.5 CONSULTATION

Consultation and engagement with the community and other stakeholders is a key focus at the CVO.

Key initiatives include:

- Comprehensive CVO community newsletters and information packs.
- Regular residents meetings.
- Consultation with community groups.
- Briefings with Government agencies.

1.5.1 Community Consultation

Community Consultative Committee

The CVO Community Consultative Committee (CCC) meets quarterly and is made up of representatives from the:

- local community; and
- Orange City, Blayney Shire and Cabonne Councils.

The Modification was raised at the CCC meetings on 17 November 2014 and 16 February 2015. At these meetings the CCC was briefed regarding the scope of the Modification and the environmental assessments to be undertaken.

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

Cadia Residents Meeting

Cadia residents were briefed regarding the Modification at the Cadia District Residents Meeting on 10 March 2015. At this meeting, the scope of the Modification and potential environmental impacts were discussed. A fact sheet outlining the scope of the Modification and potential environmental impacts was also distributed.

Cadia Valley Operations Newsletter

The CVO Newsletter is regularly distributed to the wider community and contains a comprehensive update of operations and activities at the CVO. The newsletter is available at www.cadiavalley.com.au/site/newsletter.

The April 2015 edition will contain a description of the scope of the Modification, likely assessment process and potential environmental impacts.

Meetings with Directly Affected Landowners

In March 2015, one-on-one briefing sessions will be offered to landowners identified as being potentially impacted by the Modification.

1.5.2 State and Local Government

The DP&E was consulted in December 2014 in regards to the Modification. Items discussed included:

- The application of section 75W of the EP&A Act to the Modification.
- The likely scope of environmental studies to be conducted for the Modification.
- Potential implications of the processing rate increase on the site water balance.
- Modification assessment process steps.

DP&E was provided a further briefing note in February 2015 concerning some changes to the scope of the Modification relative to the December 2014 meeting.

In February 2015, consultation occurred with the following three key NSW Government agencies:

- NSW Office of Water (NOW) – discussed implications of the Modification on the site water balance.
- Environment Protection Authority – discussed likely noise and air quality impacts and implications for the management of tailings on-site.
- Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy – discussed the implications on the ore processing facilities and for the management of tailings on-site.

Local Government Steering Group Committee

A meeting will be held in March 2015 with representatives from local government (Blayney, Cabonne and Orange Council areas) along with State and Federal members to discuss the scope of the Modification and potential environmental impacts.

1.5.3 Community Engagement

Key community engagement programs undertaken at CVO include:

- CVO Community Partnerships Program – a program designed to provide seed funding and/or long term investment in community development programs and key community sectors directly affected by CVO activities.
- Cadia District Enhancement Project – ongoing development and implementation of community projects to enhance the community values of the district directly surrounding the mine site.
- Capacity building programs – ongoing development of commercial arrangements with community organisations (including Anson Street School and Orange Local Aboriginal Land Council) to provide long term sustainable employment for key community groups.

1.6 DOCUMENT STRUCTURE

The remainder of this Environmental Assessment (EA) is structured as follows:

Section 1	Provides an introduction to the Modification and the purpose of this EA, describes the structure of this EA and provides a summary of the consultation undertaken.
Section 2	Describes the approved CVO.
Section 3	Outlines the proposed Modification.
Section 4	Provides an environmental impact assessment of the proposed Modification.
Section 5	Provides a conclusion to this EA.
Section 6	Lists documents and reports cited in this EA.

This EA is supported by the following specialist assessments:

Appendix A	Noise Assessment (Wilkinson Murray Pty Ltd).
Appendix B	Air Quality Assessment (ENVIRON Australia Pty Ltd).
Appendix C	Site Water Balance (Gilbert & Associates Pty Ltd).
Appendix D	Tailings Review (URS Australia Pty Ltd).

2 OVERVIEW OF CADIA VALLEY OPERATIONS

2.1 BACKGROUND

The CVO have provided significant economic stimulus and employment generation to the region since Cadia Hill was approved in 1996. Mining at the Cadia Hill open pit commenced in 1998 after a two year construction phase, and was placed in care and maintenance in 2012.

Ore production from the Ridgeway underground mine commenced in 2002. A significant extension to the mine, called Ridgeway Deeps, is currently in operational phase. With the Ridgeway Deeps extension, Ridgeway is currently scheduled to cease operations by 2017. Ridgeway Deeps uses block caving underground mining methods.

The Cadia East Project involves the underground mining of a significant orebody adjacent to Cadia Hill. Cadia East was approved in 2010 and uses the panel caving underground mine extraction method.

The CVO includes significant surface infrastructure developed since 1996, including ore processing, water management and staff facilities. Product concentrate is pumped to the Blayney Dewatering Facility as a slurry, where it is dewatered and transported via rail.

The Cadia East Project incorporates the CVO within the relevant Project Approval (PA 06_0295), therefore this Project Approval authorises all current activities on-site. The subsections below provide a summary of the Cadia East Project as well as other relevant aspects of the CVO as they relate to current operations.

2.2 CADIA EAST PROJECT

The major components of the Cadia East Project include (CHPL, 2009a):

- underground mining of approximately 450 Mt of ore from the Cadia East deposit using the panel caving mining method;
- development of underground crushing, handling and conveyor systems to transfer ore and waste rock to the surface;
- development of supporting infrastructure for the underground mine including multiple ventilation shafts, and personnel and equipment access systems;
- upgrade of the existing CVO ore processing facilities to accommodate the harder ore from Cadia East and to enable the total CVO ore processing rate to increase from 24 Mtpa to approximately 27 Mtpa;
- construction and operation of a molybdenum recovery plant with a capacity of up to 460,000 tonnes per annum (tpa) and trucking of molybdenum products off-site;
- placement of waste rock produced by the Project in the existing South Waste Rock Dump;
- raising of the existing NTSF and STSF embankments to accommodate approximately 450 Mt of Cadia East tailings;
- augmentation and upgrade of the existing CVO water management/supply system including development of additional pipeline/pumping systems and raising of the Rodds Creek Water Holding Dam;
- obtaining additional mining leases to facilitate the Project extensions of the STSF, NTSF, subsidence zone and Rodds Creek Water Holding Dam;
- re-alignment of a 1.1 km section of Cadia Road;
- construction of a new dewatering facility to the east of Blayney (to be known as the CVO Dewatering Facility);
- maintaining the existing Blayney Dewatering Facility to provide standby additional processing capacity during the peak production period from Year 3 to Year 7 and the decommissioning of this facility if it is deemed redundant after this time;
- installation of a new concentrate pipeline and return water pipeline between the Cadia Valley Operations and the CVO Dewatering Facility;
- increased rail transportation of dewatered mineral concentrate from Blayney to the eastern seaboard;
- augmentation, relocation and upgrade of supplementary surface facilities including workshops, administration and site access roads; and
- other associated modifications to existing infrastructure, plant, equipment and activities to allow mining of the Cadia East deposit and integration with the approved CVO.

Key features of the Cadia East Project (incorporating the CVO) are discussed below.

2.3 MINING METHODS

The ongoing Ridgeway Deeps operation uses block caving underground mining methods.

CHPL uses an underground mining method known as 'panel caving' to extract ore from the Cadia East deposit. Panel caving is used to mine large, low grade orebodies. It is a bulk mining method, which requires fracturing of the ore and host rock under controlled conditions. It results in caving of the overlying host rock and the formation of a 'subsidence zone' on the surface.

At its full extent, the Cadia East subsidence zone will occupy approximately 255 hectares and will resemble a dish-shaped depression surrounded by steep slopes between 100 and 320 metres (m) high on its margins. After mine closure the remaining underground mine workings and broken rock in the subsidence zone will gradually fill with water.

2.4 ORE PROCESSING

The existing CVO ore processing facilities use flotation cells to produce a gold/copper concentrate slurry. The gold/copper concentrate is then thickened and pumped via a buried concentrate pipeline to Blayney to be dewatered (Figure 1).

Given that the Cadia East Project involved increasing the ore processing rate from 24 Mtpa to approximately 27 Mtpa and also features harder ore than Cadia Hill and Ridgeway, augmentations to the ore processing facilities have recently been implemented, including the following additional items:

- crushing and screening plant;
- tailings thickener;
- flotation plant and substation;
- concentrate tank and pump;
- conveyors; and
- additional heavy vehicle workshop and lube facility.

The Cadia East Project will also involve the construction and operation of a molybdenum recovery plant (not yet constructed).

Processing of ore at the existing CVO does not involve the use of cyanide.

2.4.1 Process Consumables

Table 2 lists typical quantities (including approximate rate of consumption, transport volumes and storage capacity) of chemicals and reagents that are currently used at the CVO.

2.5 TAILINGS STORAGE

Tailings associated with the CVO are accommodated by progressive 'upstream' raises of the embankments of the existing NTSF and STSF.

Raises to the NTSF and STSF are undertaken by upstream lifts, using similar materials to the existing embankments (i.e. predominantly rockfill with a core of low permeability clay materials). The disturbance footprint associated with the upstream lifts of the NTSF and STSF is shown on Figure 2.

Table 2
Reagent Consumption, Transport and Storage Quantities

Reagent	Consumption (t/month)	Storage Volume (t)	Transport Volume (t)
Hydrated lime	1,184	300	25
Quicklime	725	150	25
Collector - S701	12	43	16
Promoter - S8761	24	48	16
Collector - aerophine 3418A	12	48	16
Frother - Methyl Isobutyl Carbinol	62	41	27
Flocculant	59	32	20
Antiscalent	11	10	10
Collector - XD103	1	48	16
Copper depressant - Aero 7260	2	48	16
Sodium hydrosulphide	276	78	25
Sulphuric acid	11	110	24

Source: CHPL (2009a).
t/month = tonnes per month. t = tonnes.

Geochemical characterisation testwork conducted for the Cadia East EA indicates that tailings from the processing of ore from the Cadia East deposit are non-acid forming and similar to the tailings produced from the processing of Cadia Hill and Ridgeway ore at the existing CVO.

The existing tailings storage facility seepage control methods and water management strategies include:

- General sub-excavation within storage areas to remove topsoil.
- Construction of a low permeability clay core embankment and foundation cut-off key beneath the embankment.
- Placement of reworked in-situ clay blanketing in selective areas of the storage floor, where and if required.
- Discharge of the tailings into the storages in a manner that maximises storage densities and reduced tailings permeability.

Seepage from the NTSF will continue to report to the STSF and decant pool. Seepage from the STSF will continue to report to the seepage collection ponds below the STSF. Float controlled electric pumps located at the seepage collection ponds return collected seepage water to the STSF. The seepage collection ponds and pumps will remain during the life of the Project.

2.6 WASTE ROCK MANAGEMENT

'Waste rock' is the uneconomic rock extracted during the mining operations to gain access to the ore. Only a relatively small amount of waste rock material is generated over the life of the Cadia East underground mining operations. The majority of the waste rock will be accommodated in the existing South Waste Rock Dump, which already contains approximately 430 Mt of waste rock primarily from the Cadia Hill open pit.

2.7 CONCENTRATE DEWATERING

The Cadia East Project will involve the construction of a new dewatering facility (the CVO Dewatering Facility) to accommodate the processing rate increase. The CVO Dewatering Facility (Figure 1) will be located adjacent to an existing industrial facility (the Blayney cold storage and Distribution warehouses) approximately 1.7 km east of Blayney township. Construction of the CVO Dewatering Facility is expected to commence in 2015.

Prior to its construction, the existing Blayney Dewatering Facility (Figure 1) will continue to be used.

2.8 WATER SUPPLY

The majority of water used at the existing CVO is recycled, including mine water, excess water in the tailings storage facilities and return water from the Blayney Dewatering Facility. Sources of make-up water include extraction from the Belubula River, Cadiangullong Dam, Flyers Creek Weir and Cadia Creek Weir, treated effluent from the Orange Sewage Treatment Plant and Blayney Sewage Treatment Plant, surface water runoff collected on-site, and extraction from groundwater bores.

The Cadia East Project involved augmentations and upgrades of the existing CVO water management/supply system which have included:

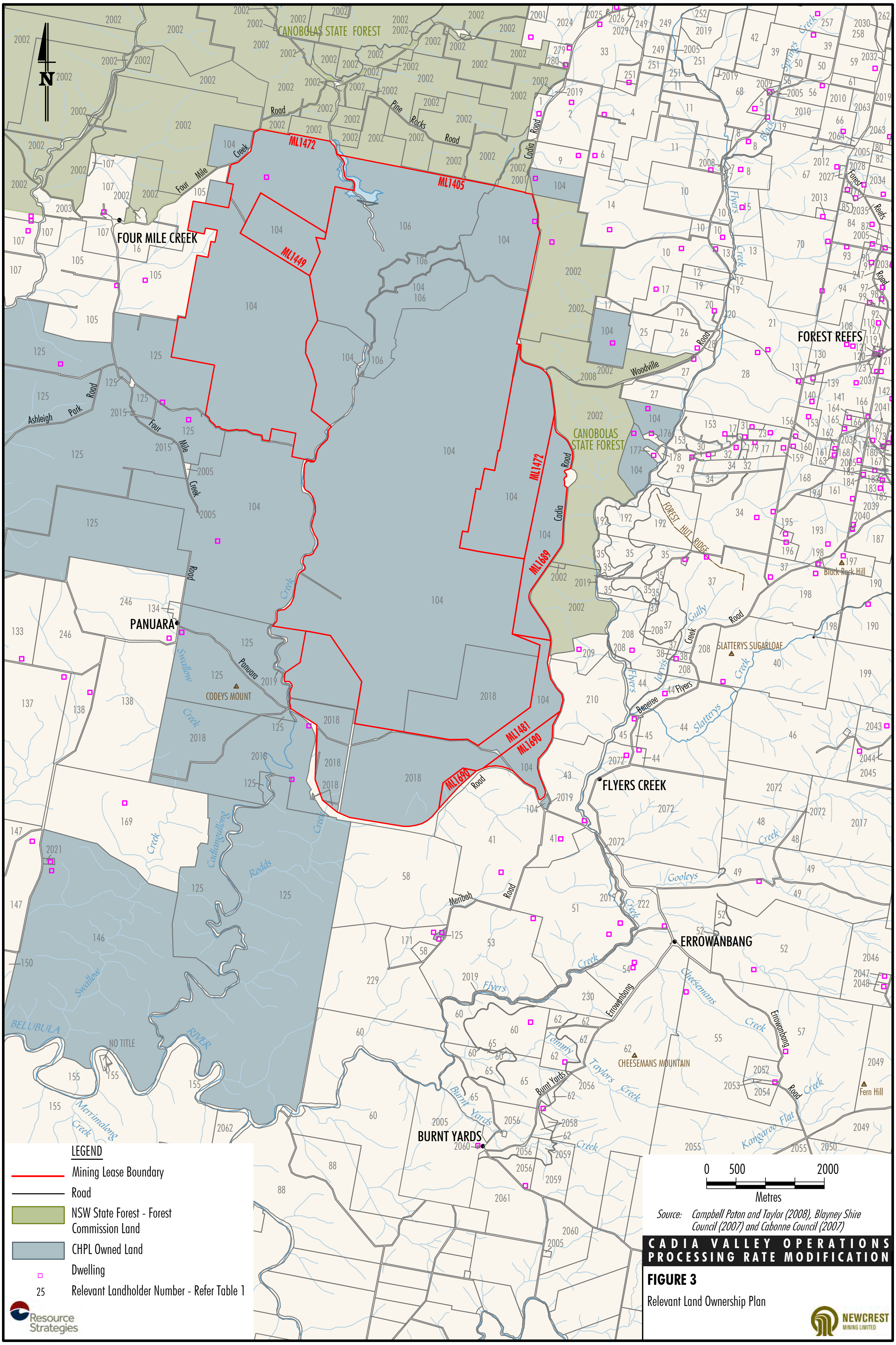
- Enlarging the capacity of the Rodds Creek Water Holding Dam.
- Installing a pipeline to transfer water from Cadiangullong Dam to Rodds Creek Water Holding Dam.
- Increasing the extraction capacity of the Belubula River pumping system from 20 megalitres per day (ML/day) to a maximum 30 ML/day.
- Extracting groundwater from an on-site borefield for process make-up water on an ongoing basis (not implemented at the time of writing).

2.9 WORKFORCE

The CVO workforce peaked during the Cadia East construction phase; however is expected to stabilise at approximately 880 full time equivalents.

2.10 LAND OWNERSHIP

Relevant land ownership information for parcels of land within the immediate vicinity of the CVO mining leases is provided on Figure 3, respectively. A land ownership list is provided in Table 3.



CADIA VALLEY OPERATIONS PROCESSING RATE MODIFICATION

FIGURE 3

Relevant Land Ownership Plan

NEC-14-82_CE PRM_105B

Table 3
Relevant Land Ownership List*

1	GT & JA Christou	48	M & G Logan	120	PR Masters
2	ER Nock	49	AG Roweth	121	MR Gersbach
4	DGT & ER Nock	50	CT Nixon	123	ME Harris
5	EW Pilcher	51	J Harries	125	Contango Agricultural Company Pty Limited
6	GJ Barnes	52	GW Nixon	127	EJ & JA Hay
7	AP & SJ Kennedy	53	CW & HE Knox	130	LV Shea
8	JE & HD Windberg	54	LB Gerathy	131	KJ Alexander & JM Wyse
9	JP & JA Cane	55	SJ Green	133	LC & LR Baker
10	A Wong	56	Est Late GP Reynolds	134	No title issued
11	JA & JS Wannan	57	AK Roweth	135	GJ Williamson
12	LJ Horton	58	AA Knox Pastoral Co Pty Ltd	137	MP & LA Ellis
13	PE & VJ Tilston	59	WA Trimmer	138	AC & A Bailey
14	DJ & CM Taylor	60	DA Paine	139	SC Pay
15	GH & EM Wolf	61	JE Rayner	140	DE Carson
16	M & LJC Croyston	62	DJ Green	141	RR Nydegger
17	P Hicks	65	TM Harris SG Barry	142	GM & LN Dickerson
19	RE & J Newton	66	TC & LC Ritchie	146	Cadia Holdings Pty Limited
20	AJ & DJ Penson	67	CJ & EM Coleman Pty Limited	147	JC & V Hamilton
21	ME MacKenzie Tudor	68	JE, JR & HD Windberg	150	Angullong Pty Limited
22	Cadia Holdings Pty Limited	70	HCM & EF Streatfeild	152	Cadia Holdings Pty Limited
23	TI & HE Smith	72	JR & SR Masters	153	WW Jones
24	Cadia Holdings Pty Limited	76	DI & KL Webb	155	M & F Retallack
25	RJ Hicks	80	TJM Hone & MJ Treanor	156	RJ & MP Burton
26	T & E Sharp	82	JP & CV Derrig	159	RW & EJ McNab
27	Contago Agricultural Company	84	CJ & DJ Stansfield	160	PE Schneider
28	AE & N Carson	85	Laurellen Pty Limited	161	RW & VR May
29	BD Worland	87	GM & NE Pinkerton	162	MR, PJ & LA Wyner, MC Gallogly, JM Davis & RI Cashman
30	DL & MS Pepper-Edwards	88	LF & AW Baker	163	JE & TA Keene
31	JH Cowper	90	AJ & BJ Wicks	164	Unknown
32	AM & C Colson	91	GM Pinkerton	165	DS & SA Cresswell
33	KJ & SL Gardiner	92	Mayville Pty Limited	166	TL Dickerson
34	AC Watterson	93	JP Corcoran	167	GG May
35	L Waterson	94	JI & KM Streatfeild	168	RW May
37	JM Cantrill	97	BW & DRC Jones	169	D & K Stone
38	JA & JL O'Connor	98	CF & JK Jones	171	GA Knox
39	GB & CM Hunt	99	HCM Streatfeild	173	The Uniting Church in Australia Property Trust (NSW)
40	J F McBeth Pty Limited	104	Cadia Holdings Pty Limited	174	JB Lewis & DJ Turk
41	CW Knox	105	KA Hughes	176	CL Suttie
42	IR McTier	106	BHP Gold Mines Limited	177	SW & KA Munro
43	G Knox	107	KC Williams	178	DA Chilcott
44	AR Colman	108	PA & B Shea	179	NJ & TE Masters
45	J Patrech & E Cottage	110	BG Britton & LP Grant	182	BJ Beach
46	Roanny Pty Limited	119	LK & NT Thomas	183	JG Corrie

Table 3 (Continued)
Relevant Land Ownership List*

184	JA & S Grindley	2005	The State of New South Wales	2043	D Fernance
185	BG May	2008	Cabonne Shire Council	2044	DP Cameron & RD Gossip
187	TE Pascoe	2009	CL Gifford	2045	A & IT White
190	HG Pascoe	2010	BP Reynolds	2046	FC & HH MacKillop
192	AC & JK Watterson	2012	DIA & FG Coleman	2047	T Williams
193	KP & MJ Scott	2013	MC & ST Coleman	2048	JM & ST Parker
194	HJ Margetson	2015	The Council of the Shire of Lyndhurst[1]	2049	C & F Roweth
195	WE & MF Faulkner	2017	RJ Griffin	2050	L Lowe
196	JE Foster & M Campbell	2018	Cadia Holdings Pty Limited & Contango Agricultural Company Pty Limited	2051	SI Green
197	PD Southwell	2019	Title not available	2052	AT Bennett
198	EP, K & SR Masters	2021	Cadia Holdings Pty Limited	2053	B & B Pastoral Pty Limited
199	GR Oborn	2022	Tile not issued	2054	DJ Bennett & JA Bright
208	SJ & RTC Wilson	2023	CW & J Hooper	2055	GR Garlick
209	R & F Ovendon	2024	H & HM Taylor	2056	SG Grace TM Harris
210	BP Reynolds & BP Kilby	2025	Orange City Council	2058	GJ Grosvenor & JC Taylor
222	KF Harries	2026	Unknown	2059	Healy Springs Pty Limited
229	HE Knox & AA Knox Pastoral Co Pty Limited	2027	CJ & EM Coleman	2060	EL Harris
230	Braeburn Grazing Company Pty Limited	2028	BS & KF Miller	2061	RJ Harris
246	CK Channell & KP & DV Donlan	2029	KM & WA McDonald	2062	Wongalong Pty Limited
247	The Council of the Shire of Blayney	2030	M Fadaee & M, M, S, S, S & S Samimi	2063	JT & DD Moad
249	P Cooper	2031	SS Baydiyan & D, M, S & S Samimi	2064	LC & TC Ritchie
251	JF & AK Blackwood	2032	KW & ME Matthews	2065	BL & JP Middleton
252	PL Ward & JM Winters	2034	JA Coulson	2066	K Smith
257	Buncarwal Pty Limited	2035	JA Annetts	2067	H & HM Taylor
258	PJ Girle & IR McTier	2036	KL Cowan	2068	LC & LR Baker
262	R King & L & MJ Matilka	2037	EG & WA Gainsford	2069	BH & EW Fisher
279	Unknown	2038	BA & LM Taylor	2070	PS Munro
280	KA & WA Potts	2039	HC Milward	2071	PL Ward & JM Winters
2001	The Minister for Public Works	2040	M Smith	2072	MJ & RC McKenzie
2002	State Forest of NSW – Forests NSW	2041	AM & SM Devenish		
2003	Her Most Gracious Majesty Queen Elizabeth The Second	2042	BJ & JR Baldwin		

Source: Campbell Paton and Taylor (2009).

[1] Crown Land.

* Relevant land ownership is shown on Figure 3, except for properties 2065 to 2071 which are located to the immediate north of Figure 3.

3 MODIFICATION DESCRIPTION

The Processing Rate Modification would include:

- an increase in the approved ore processing rate at the CVO from 27 Mtpa to 32 Mtpa;
- additional secondary crushing circuits at Concentrators 1 and 2;
- installation of three additional regrind Vertimills at Concentrator 1;
- installation of additional flotation cells at Concentrator 1;
- an upgrade of the existing regrind Vertimill at Concentrator 2;
- de-bottlenecking process improvements at the ore processing facilities and underground ore crushing and transport infrastructure; and
- temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are in place.

These elements are further described in the sub-sections below.

3.1 ORE PROCESSING FACILITIES UPGRADES

Ore processing at the CVO is currently undertaken at the Concentrator 1 and Concentrator 2 circuits (previously referred to as the low grade and high grade circuits, respectively).

In order to facilitate an increase in processing rate, additional plant items are required to augment the existing Concentrator 1 and Concentrator 2 circuits, as described in the sub-sections below and shown on Figure 4.

3.1.1 Concentrator 1

Crushing Capacity Upgrade

Additional secondary crushing and screening capacity would be installed (adjacent to the existing crushing/screening plant). The additional crushing circuit would include:

- an additional Metso MP1000 (or similar model) crusher, which would be located next to the existing crusher; and
- additional ore screening capacity.

Regrind Capacity Upgrade

Additional regrind capacity would be added to Concentrator 1 via the installation of three new Vertimills. Regrind upgrades would include:

- three additional Vertimill units (VTM3000 or similar model);
- additional pipework; and
- additional pumping and feed tank units.

Flotation Capacity Upgrade

A number of additional flotation cells and related infrastructure would be installed and operated to increase Concentrator 1 flotation capacity, including:

- up to 15 additional flotation cells (Outotec OK150, OK30 and OK8 or similar models);
- additional pumping and pipework from within the existing concentrator systems; and
- construction of an enclosure around the flotation cells and infrastructure.

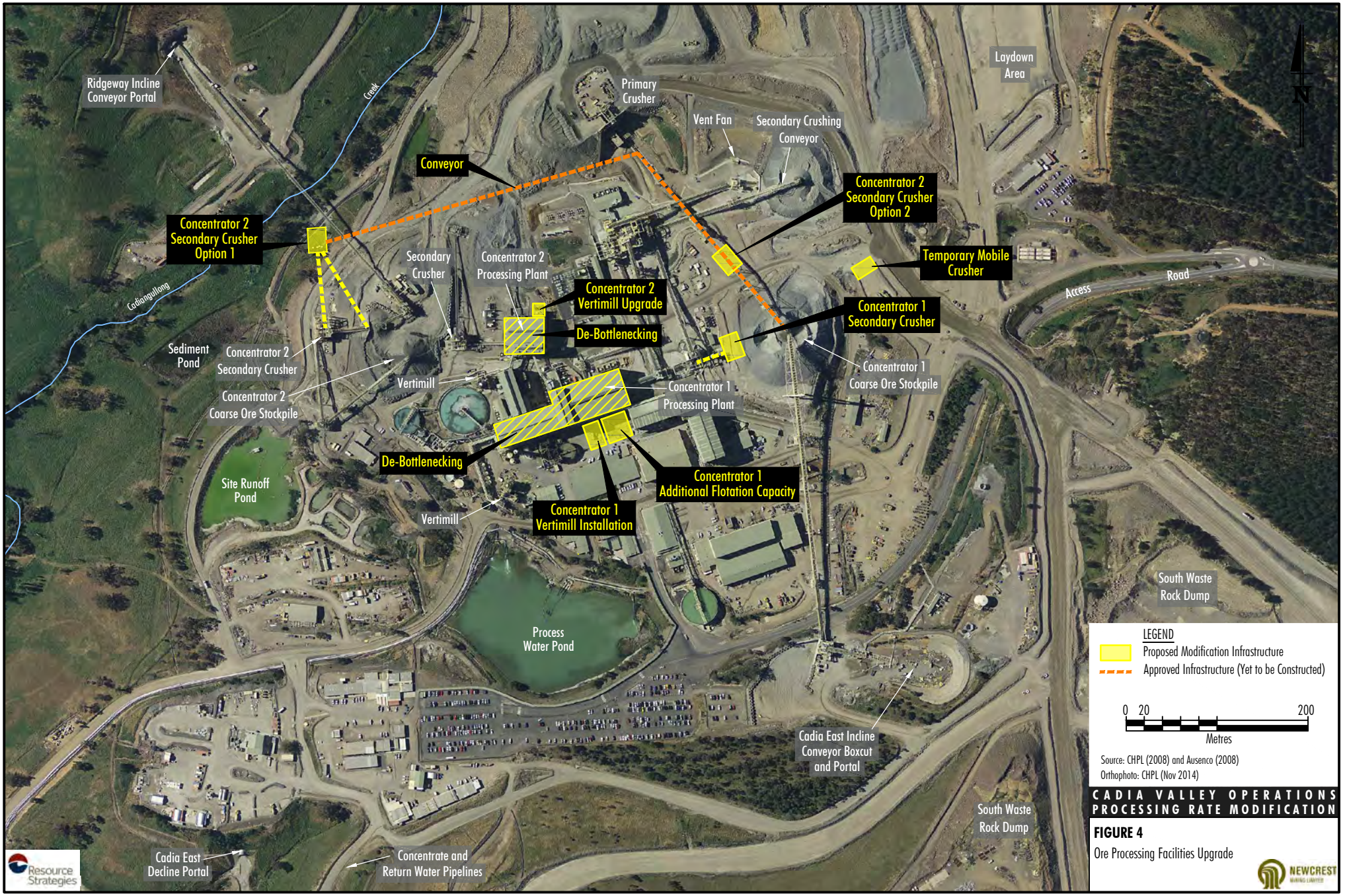
3.1.2 Concentrator 2

Crushing Capacity Upgrade

An additional secondary crushing circuit would be installed at Concentrator 2, including:

- an additional Metso MP800 crusher (or similar model);
- additional ore screening capacity;
- an additional surge bin; and
- an additional set of 1,500 tonnes per hour conveyors.

The additional crusher would either be located north of the existing Concentrator 2 secondary crusher (in-line with the conveyor) (i.e. Option 1), or it would be located north of the Concentrator 1 coarse ore stockpile (i.e. Option 2). Both options are shown on Figure 4.



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Regrind Capacity Upgrade

Additional regrind capacity would be installed at Concentrator 2. This would include the following elements:

- removal of the existing Vertimill (VTM1500 model);
- replacement with a higher capacity unit (VTM4500 or similar model); and
- installation of additional pumping/pipework to facilitate the additional capacity.

3.1.3 De-Bottlenecking

A series of de-bottlenecking process improvement steps would be undertaken within the existing footprint of Concentrators 1 and 2 as well as the underground ore crushing and screening areas.

De-bottlenecking would potentially include upgrades to the following:

- Cadia East underground crushing and conveying systems;
- materials crushing and conveying systems;
- hydrocyclone system and associated feed systems;
- pump and associated pipework for the tailings thickeners and tailings discharge lines; and
- Concentrator 1 Semi-Autogenous Grinding (SAG) mill discharge arrangement.

In addition to the plant changes, changes in operational practice and management systems to improve ore processing efficiencies would be implemented, including:

- reduction in maintenance shutdown frequency and duration;
- increasing the operational life of major components;
- reducing the time taken to conduct breakdown maintenance; and
- operational configurations to allow system modules to continue operation when some parts of the concentrator require maintenance.

3.2 CONSTRUCTION ACTIVITIES AND TRANSITIONAL ARRANGEMENTS

The upgrades of the existing Concentrator 1 and 2 circuits have been designed to minimise disruption to operations and would take approximately 12 months to complete.

During the construction period, it is proposed to operate a mobile conveyor stacker and crusher to provide additional crushing capacity for the interim period (Figure 4).

The transitional arrangements would include the use of two 45 t excavators as feed units and three trucks (of CAT 777 make/model) to facilitate the transfer of crushed ore from the Concentrator 1 coarse ore stockpile to the Concentrator 2 coarse ore stockpile.

3.3 MINE PRODUCTION RATE INCREASE AND LIFE OF MINE ORE PRODUCTION

As part of the Modification, the currently approved mining rate for Cadia East of 27 Mtpa would be increased to 32 Mtpa. This would be facilitated by an improvement of efficiency of underground operations and would not require significant additional infrastructure beyond what is currently approved.

Since the Cadia East EA, Newcrest has undertaken extensive geotechnical, resource definition and mine planning studies to more accurately estimate the available/mineable resource within the approved Lifts 0, 1 and 2. As a result of these studies, assumptions in regard to the amount of ore that can be produced from Lifts 0, 1 and 2 using the panel caving mining technique have been revised.

Consequently, even though the physical extent of Lifts 0, 1 and 2 would not change, some 6.5 Mt of additional Cadia East ore would be mined during the existing/approved mine life (i.e. a small amount of additional ore would be able to be extracted from Lifts 0, 1 and 2 areas using these assumptions).

Over the whole of the CVO life of mine, the increase is a negligible 1 Mt, which is due to the earlier than anticipated closure of the Cadia Hill open pit.

As a result of the Modification, mining at the CVO is anticipated to cease in 2029, rather than the currently anticipated 2030.

CHPL has reviewed the subsidence predictions calculated for the Cadia East EA (CHPL, 2009a). The review has concluded that there would be no material change in subsidence progression or extent.

3.4 IMPLICATIONS FOR TAILINGS STORAGE FACILITIES

URS Australia Pty Ltd (URS, 2015) (Appendix D) has reviewed the implications of the Modification on the TSFs. This review concluded that the tailings that would be generated at the CVO (as modified) can be accommodated within the TSFs on both an annual and life of mine basis.

Tailings seepage would continue to be managed in accordance with the existing seepage management measures (Section 2.5).

3.5 IMPLICATIONS FOR CADIA VALLEY OPERATIONS DEWATERING FACILITY

Construction of the CVO Dewatering Facility will commence in 2015 and is scheduled to be commissioned by April 2016. It is therefore expected to be operational in time for the increase in processing rate to 32 Mtpa.

No upgrades to the CVO Dewatering Facility or the concentrate and return water pipelines would be required for the Modification.

Given the additional mineral concentrate production, the capacity of product concentrate trains would be increased from approximately 68 to 106 containers. However, there would be no change in the number of trains on a weekly basis (i.e. approximately six trains [six arrivals and departures] per week).

3.6 WATER SUPPLY

Significant augmentations to the CVO water management system were undertaken as a result of the Cadia East Project (Section 2.8). Although the Modification would result in an increase in water demand in line with the increased production rate (18.5 percent [%]), Appendix C predicts that there would continue to be sufficient water to cater for the Project water demand (inclusive of the Modification) without the need to adjust or augment the existing water supply network. The results of the site water balance are described in Section 4.3.

3.7 CONSUMABLES

Details of process consumables used at the CVO are provided in Section 2.4.1.

It is anticipated that the use of process consumables, including process reagents, would increase in line with the proposed increase in processing rate (e.g. from 27 Mtpa to 32 Mtpa, approximately 18.5%).

Additional heavy vehicle movements would be undertaken in accordance with existing site protocols and procedures.

3.8 WORKFORCE

It is anticipated that approximately an additional 20 employees would be required during construction of the Modification infrastructure for a period of approximately 12 months.

3.9 CHANGES SOUGHT TO PROJECT APPROVAL CONDITIONS

3.9.1 Notification of Blast Events

CHPL maintains a Community Relations and Blasting Hotline (1800 063 043) and also publishes details of upcoming blast events on the CVO website (http://www.cadiavalley.com.au/site/vibration).

The telephone number and website details are regularly advertised through the CVO Newsletter, which is the main source of CVO news for community members. However, Condition 12, Schedule 3 of PA 06_0295 requires this notification to occur ‘in a local newspaper at least 2 times each year’.

As part of this Modification, CHPL is seeking to modify this condition (i.e. Condition 12, Schedule 3) to allow the advertisement to occur via the CVO Newsletter.

3.9.2 Road Noise Mitigation

Monitoring and management of noise on the surrounding road network is undertaken in accordance with the Noise Monitoring Program.

Condition 7, Schedule 3 of PA 06_0295 requires that CHPL provides noise mitigation measures upon request in certain circumstances, including for road noise exceedances:

> *the landowner of the residences on Forest Road, Orchard Road, Woodville Road or other road listed in Table 5 where subsequent noise monitoring shows traffic noise levels generated by the project exceed the traffic noise criteria in Table 5*

The NSW Government has released the *Voluntary Land Acquisition and Mitigation Policy – SSD Mining* (NSW Government, 2014). This policy restricts mitigation and acquisition rights to on-site operational and rail noise (i.e. not off-site road noise):

> *A consent authority can apply voluntary mitigation and voluntary land acquisition rights to reduce:*
>
> - *Operational noise impacts of a development on privately owned land; and*
> - *Rail noise impacts of a development on privately owned land near non-network rail lines (private rail lines), on or exclusively servicing industrial sites (see Appendix 3 of the RING);*
>
> ***But not:***
>
> - *Construction noise impacts, as these impacts are shorter term and can be controlled;*
> - ***Noise impacts on the public road or rail network;***

As part of this Modification, for consistency with the *Voluntary Land Acquisition and Mitigation Policy – SSD Mining*, CHPL is seeking to modify Condition 7, Schedule 3 to remove reference to road noise.

4 ENVIRONMENTAL REVIEW

4.1 NOISE

Wilkinson Murray Pty Limited (Wilkinson Murray) prepared a Noise Assessment for the Modification and is presented as Appendix A (Wilkinson Murray, 2015).

The Noise Assessment considered impacts associated with augmentations to the ore processing facilities, increased train capacity and potential for increased rail passby noise along the Main Western Railway (Appendix A).

4.1.1 Existing Environment

Cadia Valley Operations Mine Site

Noise monitoring undertaken at the CVO includes routine attended and unattended noise monitoring conducted as per the Noise Monitoring Program. The noise monitoring sites are shown on Figure 5.

Previous noise monitoring results which describe the existing noise environment have been reported in the 2013/2014 Annual Environmental Management Report (the AEMR) (CHPL, 2014a).

In accordance with the AEMR, monitoring undertaken from July 2012 to June 2014 identified that there were no exceedances of noise monitoring criteria at privately-owned residences (CHPL, 2014a, 2013).

A community hotline is maintained by CHPL in order to receive community feedback, including complaints. Review of complaints received over the AEMR reporting periods for 2012/13 and 2013/14 indicated that approximately one operational noise complaint per year was received by CHPL over those reporting periods. These complaints, along with an indication of the CHPL response in relation to the complaints received are described in Table 4.

Table 4
Description of Noise-related complaints
July 2012 - June 2014

Date	Description of Complaint	CHPL Action
24 June 2013	Report of haul truck noise during night and in the morning.	Haul to the South Waste Rock Dump identified as a potential problem and was eliminated after 10 pm.
14 July 2013	Report of operational noise coming from the south of the mine.	793C and 777 haul trucks were working on the South Waste Rock Dump rehabilitation. The 793C trucks working on the southern end of the dump were pulled up and the landowner confirmed the noise then ceased.

Source: CHPL (2013), (2014a).

4.1.2 Noise Review

NSW Government Policies

The NSW *Industrial Noise Policy* (INP) (Environment Protection Authority, 2000) states that the intrusiveness and amenity criteria have been selected to protect at least 90 percent (%) of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, then it is unlikely that most people would consider the resultant noise levels excessive.

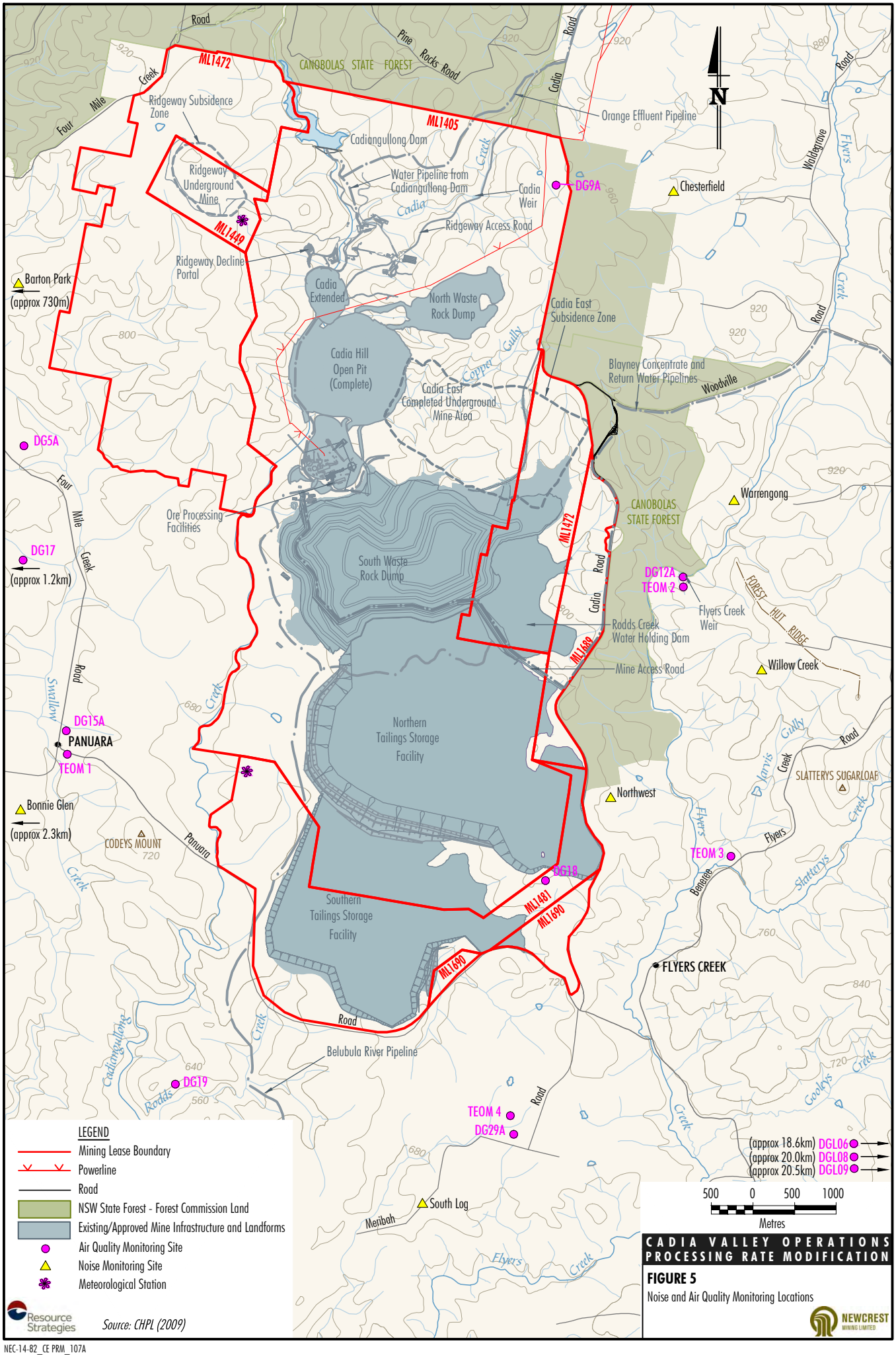
The Project Approval (06_0295) sets noise criteria for the Project (Condition 2, Schedule 3) consistent with the INP.

The NSW Government (2014) policy *Voluntary Land Acquisition and Mitigation Policy – SSD Mining* provides some useful context in regard to characterising the practical implications of exceedances of the INP criteria (Table 5).

Table 5
Characterisation of Noise Impacts and Potential Treatments

Residual Noise Exceeds INP Criteria By	Characterisation of Impacts
0-2dB(A) above the project-specific noise level (PSNL)	Impacts are considered to be **negligible**
3-5dB(A) above the PSNL in the INP but the development would contribute less than 1dB to the total industrial noise level	Impacts are considered to be **marginal**
3-5dB(A) above the PSNL in the INP and the development would contribute more than 1dB to the total industrial noise level	Impacts are considered to be **moderate**
>5dB(A) above the PSNL in the INP	Impacts are considered to be **significant**

Source: NSW Government (2014).



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Cadia Valley Operations Mine Site

Potential noise impacts at the Modification would result from increased noise associated with:

- the augmentations to the ore processing facilities and proposed transitional arrangements;
- loading trains with increased capacity at the CVO Dewatering Facility; and
- increased rail passby noise along the Main Western Railway.

Noise levels for the additional plant infrastructure for the Modification were modelled using the Environmental Noise Model at a number of residential receivers in the vicinity of the CVO (Appendix A).

The sound power levels associated with the additional plant infrastructure for the Modification are presented in Table 6.

The predicted noise levels for the Modification were compared with the Year 17 predicted noise levels in the Cadia East EA (CHPL, 2009a) as it is the scenario that best represents existing operations at the CVO.

A summary of noise impacts due to the Modification are provided below.

Construction and Transitional Arrangements Stage

The noise levels associated with the construction and transitional arrangements stage were assessed against the PA 06_0295 impact assessment criteria. Guidance with regard to the magnitude of noise increases is provided in NSW Government (2014) (Table 5).

This assessment found (Appendix A):

- the CVO noise levels including the Modification complied with the impact assessment criteria; and
- the Modification resulted in negligible to marginal increases in noise level at residential receivers (i.e. 1 – 4 dBA).

Operational Stage

The noise levels associated with the operational stage were assessed against the PA 06_0295 cumulative noise criteria.

This assessment found (Appendix A):

- the CVO noise levels including the Modification complied with the impact assessment criteria; and
- the Modification resulted in negligible increases in noise levels at residential receivers (i.e. 0 – 2 dBA); with some marginal increases (i.e. 3 dBA).

Table 6
Additional Plant Infrastructure Sound Power Levels

Item	Sound Power Level (dBA)	Modification Stage	
		Number of Items for Transitional Arrangements	Number of Items for Operations
Secondary Crusher / Mobile Crusher	119*	1	2
Vertimills	109*	-	3
Flotation Cell	95*	-	15
Conveyors	82#	-	6
CAT 777 Haul Truck	116*	3	-
45t Excavator	108*	2	-

Source: Appendix A.

* Sound power level per item.

\# Sound power level per metre.

Note: dBA = A-weighted decibels.

Cadia Valley Operations Dewatering Facility

There are currently approximately six laden train departures per week (i.e. the arrival and departure of up to one train per day). It currently takes approximately 6 hours to load a train which is restricted to occur during daytime hours (i.e. between 7.00 am and 6.00 pm). Train loading activities typically occur between 7.00 am and 1.00 pm (Appendix A).

Train capacity at the CVO Dewatering Facility is anticipated to increase from 68 to 106 containers due to the Modification. Time required to load the trains is also expected to increase proportionally. As a result it would take approximately 9.5 hours to load a train (Appendix A).

Assessment of rail noise impacts associated with the Modification at the CVO Dewatering Facility is presented in Appendix A:

> *The operational noise changes at the CVO Dewatering Facility primarily relate to the duration of noise generation over a daytime period rather than an increase in noise levels during a 15 minute period. The procedure and equipment used for loading trains would not change.*
>
> *Therefore, even though trains would be longer and the total duration to load them would be longer, the changes are considered insignificant in an INP intrusiveness assessment sense which focuses on a 15-minute period (i.e. noise levels over a 15 minute period would remain unchanged).*

Assessment against the relevant NSW INP amenity criteria determined that the Modification would result in up to approximately a 2 dBA increase in $L_{Aeq, day}$ noise levels. However, the predicted $L_{Aeq, day}$ noise levels would still comply with the INP amenity criteria (Appendix A). Therefore, additional noise at the CVO Dewatering Facility associated with the Modification is expected to be negligible.

Rail Noise

There is currently a maximum of one train arrival and departure per day associated with the CVO. The associated typical rail noise impacts were considered to be negligible in the Cadia East EA (Wilkinson Murray, 2009).

Assessment of rail noise impacts associated with the Modification is presented in Appendix A:

> *For the Modification, the Project train lengths would increase, resulting in slightly higher passby noise of a single train. Notwithstanding, as the proposed Modification would not change the number of Project rail movements in a typical day, rail noise associated with the Project is still considered negligible and no further detailed assessment is required.*

4.1.3 Mitigation Measures

As part of the Modification, CHPL would investigate the following mitigation measures at the design phase:

- selection of key infrastructure such as crushers, electric motors and conveyor gearboxes to consider sound power levels;
- full or partial enclosure/shrouding of key noise sources such as gear boxes, electric motors and crushers; and
- sheds and buildings to be enclosed with acoustic lining considered.

Noise monitoring would continue to be undertaken in accordance with the existing programme to assess compliance with noise criteria.

Investigation into noise related complaints and exceedances of criteria would continue to be undertaken in accordance with the CVO Noise Monitoring Program.

4.2 AIR QUALITY

Environ Australia Pty Ltd (ENVIRON) prepared an Air Quality review for the Modification which is presented as Appendix B.

This review considered air quality impacts associated with the construction and transitional arrangements stage, and the operational stage of the Modification in comparison to the Year 17 Cadia East EA emission inventory (Holmes Air Sciences, 2009).

4.2.1 Existing Air Quality Environment

Ambient air quality in the vicinity of the CVO is monitored using four Tapered Element Oscillating Microbalance (TEOM) analysers and a total of 11 dust deposition gauges supported by two meteorological monitoring stations (Figure 5).

The TEOMs measure the 24-hour average concentrations of particulate matter less than 10 microns (PM_{10}) which is converted to an annual average. Dust deposition is also measured using the network of standard dust deposition gauges located around the site (Figure 5).

The total suspended particulate (TSP) concentration is not measured directly on site, however, it is assessed by applying a scaling factor to the PM_{10} data (assuming that 40% of TSP is PM_{10}) (Appendix B).

Appendix B provides an analysis of recent air quality monitoring results, with a summary provided below.

The annual average PM_{10} and TSP concentrations were low throughout the period 2011 to 2014 and the criteria were not exceeded (Appendix B).

Annual dust deposition levels are generally low with the exception of three elevated records over the monitoring period. However, these elevated records were found to be attributable to non-mining activities (e.g. agriculture) (Appendix B).

Appendix B provides a summary of air quality in the vicinity of the Modification:

> *The ambient air quality in the vicinity of CVO is generally good, with annual average PM_{10} approximately 50% of the impact assessment criteria. Occasional short-term exceedances of the* (24 hour) *impact assessment criteria are recorded; however these are generally attributed to non-mining sources.*

A community hotline is maintained by CHPL in order to receive community feedback, including complaints. A review of complaints received over the 2012/13 and 2013/14 AEMR periods indicated that a total of four community complaints per annual reporting period were received in relation to dust issues. These complaints, along with an indication of the CHPL response in relation to the complaints received are described in Table 7. Review of complaints received indicates that dust emissions from the tailings storages are of most concern to complainants.

4.2.2 Air Quality Review

Construction and Transitional Arrangements Stage

Air quality and dust emissions would result from the following processing activities during the construction and transitional arrangements stage (Appendix B):

- crushing of material at the mobile crusher;
- excavators loading the mobile crusher from the Concentrator 1 coarse ore stockpile;
- hauling crushed ore between the Concentrator 1 coarse ore stockpile and the Concentrator 2 coarse ore stockpile; and
- loading and unloading crushed ore from trucks from the Concentrator 1 coarse ore stockpile to the Concentrator 2 coarse ore stockpile.

The expected increase of air quality emissions (estimated as increases in TSP) was estimated by ENVIRON (Appendix B) and compared with the Year 17 scenario in the Cadia East EA.

This provides an estimate of the likely contribution of the Modification to the local airshed.

Based on this review, the TSP emissions are expected to increase by approximately 4.3% over a 12 month period. Assuming a direct correlation between increase in emissions and ground level concentrations previously modelled (Holmes Air Sciences, 2009), the Modification is estimated to result in a maximum 24-hour PM_{10} concentration increase of 0.4 µg/m³ at residential receivers for transitional arrangements. This increase is minor and is not expected to cause adverse impacts (Appendix B).

Operational Stage

Air quality and dust emissions would result from the following processing activities during the Modification operational stage (Appendix B):

- increase in the approved ore processing rate from 27 Mtpa to 32 Mtpa;
- increase of waste rock handling proportional to the increase in the approved ore processing rate; and
- use of two additional crushing circuits at Concentrators 1 and 2.

Table 7
Description of Air Quality-related Complaints July 2012 - June 2014

Date	Description of complaint	CHPL Action	Monitoring data
5 September 2012	Report of excessive dust from work on the TSF embankment.	TSF construction crew ceased work. Dust monitoring indicated dust exceedance at complainant's residence. Modelling commissioned to determine extent of exceedance on private property in district. CVO surface operations procedures and tailings deposition strategy revised to better manage dust.	Elevated PM_{10} was measured at D4 – Meribah on this day (78.3 µg/m³). CHPL has reported that this included contributions from the TSF. Since this event, CHPL revised the tailings deposition strategy to keep a larger proportion of the TSF wet, to decrease potential dust emissions. All other sites recorded 24-hour PM_{10} concentrations less than 30 µg/m³.
25 October 2012	Report of dust from TSF.	Construction work on the TSFs ceased and the TSF spigots were moved onto dry areas.	No elevated 24-hour PM_{10} concentrations recorded at any site.
21 March 2013	Report of dust from TSFs.	CHPL inspected the TSFs and saw some dust lifting off the centre of the STSF. CHPL contacted the complainant to clarify where the dust was coming from and he confirmed it was coming from the STSF. CHPL and the complainant agreed that there was very little dust at that point in time due to a change in wind direction.	No elevated 24-hour PM_{10} concentrations recorded at any site.
12 April 2013	Report of dust off TSFs.	CHPL moved the TSF spigots on the STSF to try to cover the dry areas. The wind dropped shortly afterwards and resolved the problem.	No elevated 24-hour PM_{10} concentrations recorded at any site.
26 September 2013	Landowner reported dust to the south east of the mine.	Inspections identified the CVO ore processing facilities as the source of the dust. Additional water carts and sprays were used to control the dust.	No elevated 24-hour PM_{10} concentrations recorded at any site.
13 October 2013	Landowner reported dust to the south east of the mine.	CHPL identified the dust source as the plant area and increased water cart coverage and water sprays on the stockpiles.	No elevated 24-hour PM_{10} concentrations recorded at any site. D4 – Meribah was higher than other sites (33.7 µg/m³).
24 April 2014	Landowner reported dust coming from the NTSF.	CHPL opened additional TSF spigots to cover the dry areas and activated water carts. The wind decreased later in the day and resolved the problem.	No elevated 24-hour PM_{10} concentrations recorded at any site.
6 May 2014	Landowner concern over dust deposition impacting pasture growth.	Independent investigation to be arranged by landowner in consultation with CHPL.	No elevated 24-hour PM_{10} concentrations recorded at any site.

Source: CHPL (2013, 2014a); ENVIRON (2015).
Note: µg/m³= micrograms per cubic metre.

Given that the footprint of the TSFs would not change relative to the approved CVO, dust emissions associated with deposited tailings is not expected to change due to the Project.

Installation of three regrind Vertimills at Concentrator 1 and the additional flotation capacity are not expected to generate dust as these elements are wet processes (Appendix B).

The expected increase of air quality emissions (estimated as increases in TSP) was estimated by ENVIRON (Appendix B) and again compared with the Year 17 scenario in the Cadia East EA.

Based on this review, estimated overall TSP emissions for the operational stage of the Modification are expected to increase by 2.4% (Appendix B). Assuming a direct correlation between increase in emissions and ground level concentrations, the Modification is estimated to result in a maximum 24-hour PM_{10} concentration increase of 0.2 µg/m³ for ongoing operations. This increase is minor and is not expected to cause adverse impacts (Appendix B).

Worst-Case Daily Emissions

In order to assess the worst case emissions that could occur in a single 24 hour (e.g. associated with the continued use of crushers at their maximum tonnes per hour operating rate) period, the estimated worst case daily emissions for the Modification were analysed.

Using the same methodology as above, the corresponding estimated increases in overall TSP emissions for the construction and transitional arrangement stage, and operational stage were 6% and 3.9%, respectively. Assuming a direct correlation between emissions and ground level concentrations, on a worst case day the Modification may add 0.3 to 0.5 µg/m³ to the 24-hour PM_{10} concentrations at residential receivers.

The worst case emissions for the construction and transitional arrangements, and operational stages were considered to be a negligible (Appendix B).

Discussion

Review of air quality monitoring results by ENVIRON (2015) indicates that the CVO does contribute, in varying amounts to local air quality concentrations. However, on the days where elevated records of the 24 hour PM_{10} criteria are experienced, the indications are that these elevated records are strongly influenced by other sources.

The incremental impacts associated with the Modification are low, with worst-case ground level 24-hour PM_{10} concentrations estimated at between 0.3 to 0.5 µg/m³. Given these low concentrations, the potential for the Modification to be a source of additional exceedances with reference to Condition 17 of Schedule 3 of PA 06_0295 of the 24 hour PM_{10} criteria is considered to be low (ENVIRON, 2015).

4.2.3 Greenhouse Gas Emissions

Scope One Emissions

Scope one (direct) greenhouse gas emissions have been calculated by ENVIRON (2015) (Appendix B) based on diesel consumption during the construction and transitional arrangement stage of the Modification.

The scope one emissions generated are listed in Table 8.

Table 8
Estimated Modification Scope One Greenhouse Gas Emissions during Construction and Transitional Arrangement Stage

Source	Emissions (t CO_2-e/year)
Excavator	1,069
Mobile crusher	823
Hauling	362
Total	**2,254**

Source: Appendix B.

Note: t CO_2-e/year = tonnes of carbon dioxide equivalent generated per year.

The additional scope one emissions result in an increase of 5.6% for a 12 month period compared to the scope one emissions in the Cadia East EA (Holmes Air Sciences, 2009). No additional scope one emissions have been identified for ongoing Modification operations.

Scope Two Emissions

An increase in scope two (indirect) greenhouse gas emissions is predicted based on electricity consumption during the operational stage of the Modification.

There would be approximately 21,094 t CO_2-e/year of scope two emissions generated due to the Modification (Appendix B). This is equivalent to an increase of 2.4% in comparison to the scope two emissions calculated for the Cadia East Project (Holmes Air Sciences, 2009).

4.2.4 Mitigation Measures

As part of the Modification, CHPL would investigate the following mitigation measures at the design phase:

- enclosure of the crusher and use of water sprays; and
- enclosure or wind shielding of conveyor transfer points plus use of water sprays.

Air quality monitoring would continue to be undertaken in accordance with the existing CVO Air Quality Monitoring Program to assess compliance with air quality criteria.

Investigation into air quality related complaints and exceedances of criteria would continue to be undertaken in accordance with the CVO Air Quality Monitoring Program.

4.3 SITE WATER BALANCE

Gilbert & Associates Pty Ltd (Gilbert & Associates) prepared a Site Water Balance for the Modification which is presented as Appendix C (Gilbert & Associates, 2015).

This review considered the change in water available at the CVO due to the Modification.

4.3.1 Existing Site Water Balance

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

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

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

The main water supply infrastructure and operations are discussed further in Section 2.8.

4.3.2 Environmental Review

The site water balance was revised due to the Modification as the increase of the ore processing rate required an increase of water used on-site.

Methodology

Gilbert & Associates developed a site water balance model using the GoldSim® simulation package. The model predicts changes in the water balance over the mine life and assesses variation in the water balance associated with the Modification (Appendix C).

The site water balance uses the available climate record (i.e. 1895 to 2013) to generate water balance statistics for the performance of the water management system. The climate record includes historical climatic events (i.e. high, low and median rainfall periods) to provide a wide range of possible conditions experienced at the CVO (Appendix C).

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

Modelling Results

The site water balance predicted that water supply to the CVO would continue to perform to a very high level of reliability. Appendix C provides a summary of the site water balance results:

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

4.3.3 Mitigation Measures

Management and monitoring of water resources would continue to occur in accordance with the CVO Water Management Plan (CHPL, 2014b).

4.4 ROAD TRANSPORT

Traffic movements associated with the CVO represent a large proportion of traffic on local roads in the vicinity of the CVO.

Existing CVO-related traffic has gradually decreased since its peak in Year 2 of operation associated with the Cadia East construction peak (CHPL, 2009a).

Increased traffic associated with the Modification would be due to the slight increase of employment during the construction stage and increased heavy vehicle deliveries due to additional use of consumables on-site.

An additional 20 employees are anticipated to be required for the construction stage of the Modification, resulting in an expected increase of approximately 26 light vehicle movements per day (movements/day) (Chart 1).

Heavy vehicles movements associated with deliveries are expected to increase by 18.5% during the operational stage resulting in approximately 25 additional heavy vehicle movements/day (Chart 1).

In comparison to the existing vehicle movements/day caused by mine traffic, the Modification would have a negligible effect on traffic on local roads.

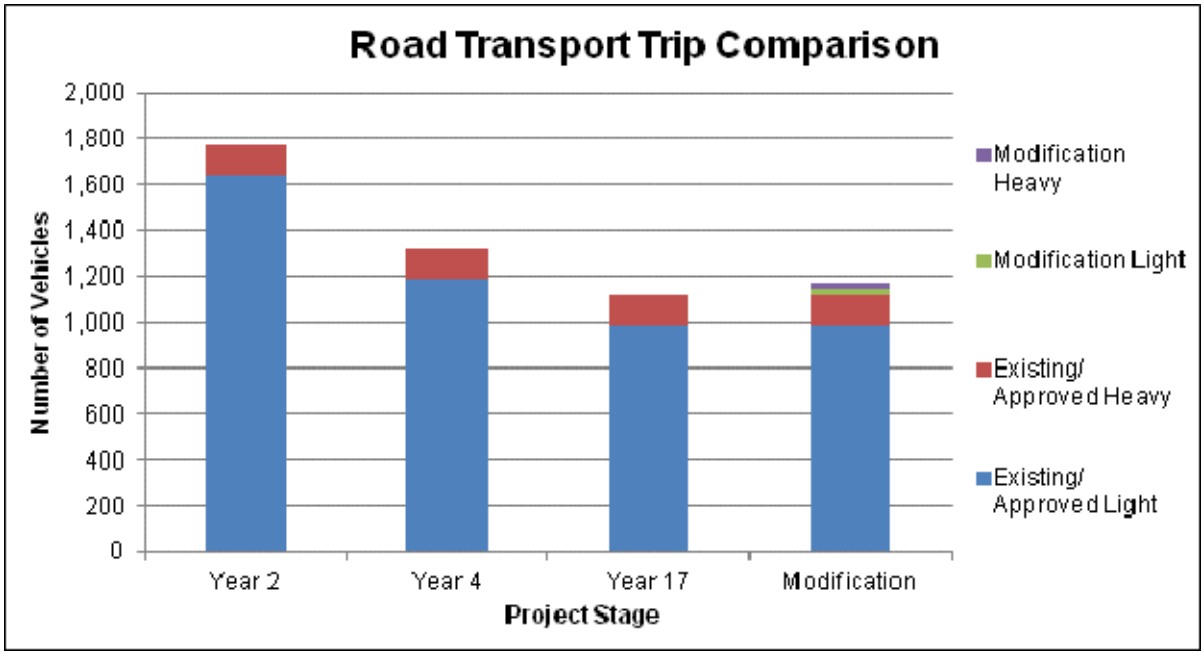

Chart 1 Road Transport Movement Comparison

4.5 HAZARD AND RISK

A Preliminary Hazard Analysis (PHA) was conducted as part of the Cadia East Project (CHPL, 2009b). The PHA identified potential hazards to people, their property and the environment associated with the Cadia East Project in accordance with State Environmental Planning Policy 33.

Of most relevance to the Modification, the PHA identified potential hazards with respect to the storage of process reagents, management of tailings and the CVO Dewatering Facility. Identified potential hazards included (CHPL, 2009b):

- Leaks/spills associated with the concentrate slurry pipeline.
- Leaks/spills associated with the tailings management system.
- Leaks/spills, fire and theft incidents involving the on-site storage of chemicals and other dangerous goods.

The PHA assessed these potential hazards and concluded that, in the presence of controls, a 'low' level of residual risk was identified.

Although the Modification would increase the usage of process reagents and increase tailings and concentrate production; the same mitigation measures would continue to apply to these hazards. Consequently it is not considered that the significance of these hazards would change as a result of the Modification.

4.6 REGIONAL ECONOMY

The CVO are acknowledged as a key contributor to the regional economy. CVO activities generate approximately 14.3% of the Gross Regional Product and 6.5% of full time equivalent employment for the region (Western Research Institute, 2014).

CHPL is a significant regional employer, with employment levels expected to stabilise (following the Cadia East construction peak) at 880 full time equivalents. Approximately 93% of the CVO workforce are permanent residents within the region.

The total output economic impact of CVO generated in the 2012/2013 financial year was $1,548 M (Western Research Institute, 2014).

The Modification would result in a continuation of these significant contributions to region.

4.7 REHABILITATION

The aims of rehabilitation at the CVO are (CHPL, 2009a):

- add value to the current vegetation corridor programme (ecological value);
- allow for the future landuse of grazing, where appropriate and sustainable (agricultural value); and
- retain areas that may be important for future industry and infrastructure needs.

In the 2013/14 AEMR period, rehabilitation activities focused on (CHPL, 2014a):

- rehabilitation of portions of the north and south waste rock dumps;
- planning for vegetation corridors to link existing habitat with biodiversity offset and future rehabilitation areas; and
- provision of trees to local landcare groups.

For the Modification, rehabilitation would continue in accordance with the existing aims and objectives.

4.8 OTHER ENVIRONMENTAL IMPACTS

Disturbance associated with the Modification would occur in previously disturbed areas within the existing Mining Leases. Further, the subsidence zone extent would not change as a result of the Modification.

Consequently, surface disturbance impacts such as flora and fauna, Aboriginal heritage and European heritage impacts would not arise from the Modification and these aspects are not discussed further.

Similarly, as the Cadia East subsidence zone progression or extent would be unchanged due to the Modification, there would be no additional groundwater impacts relative to the approved CVO.

5 CONCLUSIONS

Since approval of the Cadia East Project (PA 06_0295), CHPL has continued to evaluate ore processing options, including studying opportunities to optimise operations.

As part of these studies, it has been identified that the ore processing capacity can be increased to 32 Mtpa by augmentation of existing/approved ore processing infrastructure.

The increase in ore processing capacity would increase the amount of mineral concentrate produced and improve Project economics; including the net benefit to the local region and the state of NSW.

The Modification would enable the existing ore processing capacity to be increased to 32 Mtpa via a number of augmentations to the existing ore processing facilities. No additional disturbance footprint would be required and there are no material changes to the approved mining methods, tailings management systems or water management infrastructure required.

In order to assess the potential environmental impacts of the proposed Modification, a number of environmental reviews were completed. A summary of the key findings of these environmental reviews and key commitments with respect to managing potential impacts is provided below:

- The Modification would result in negligible to marginal noise increases at nearby residential receivers and would continue to comply with the existing criteria in PA 06_0295.
- Air quality impacts associated with the Modification would be negligible and would not result in any additional exceedances of criteria at nearby residential receivers.
- The existing CVO water management system would continue to be implemented for the Project. Water supply is predicted to continue to meet demand for the CVO, incorporating the Modification.
- Existing mine traffic in the vicinity of the CVO has gradually decreased since its peak in Year 2 associated with Cadia East construction. The Modification would result in a small increase in light vehicle trips during construction activities and an increase in heavy vehicle deliveries during the operational phase. The traffic impacts are expected to be minor, given that additional vehicle movements are small relative to the Cadia East construction peak.
- Modification infrastructure would be limited to existing/approved disturbance areas therefore there are no impacts predicted on heritage or biodiversity aspects.

The environmental reviews indicate that the existing environmental management and monitoring measures would continue to be implemented for the Modification and that the Modification therefore would not significantly increase potential environmental impacts in comparison to the approved CVO.

Notwithstanding, CHPL has committed to investigating noise and air quality mitigation measures during the design and implementation phases of the Modification.

6 REFERENCES

CHPL (2009a) *Cadia East Project Environmental Assessment.*

CHPL (2009b) Cadia East Project Preliminary Hazard Analysis.

CHPL (2013) *Cadia Valley Operations Annual Environmental Management Report 2012/13*.

CHPL (2014a) *Cadia Valley Operations Annual Environmental Management Report 2013/14.*

CHPL (2014b) *Cadia Valley Operations Water Management Plan.*

Environ Australia Pty Ltd (2015) *Cadia Valley Operations – Processing Rate Modification: Air Quality Assessment.*

Environment Protection Authority (2000) *NSW Industrial Noise Policy.*

Gilbert & Associates (2015) *Cadia Valley Operations Processing Rate Modification Site Water Balance.*

Holmes Air Sciences (2009) *Cadia East Project Air Quality Impact Assessment.*

NSW Government (2014) *Voluntary Land Acquisition and Mitigation Policy –SSD Mining.*

URS Australia Pty Ltd (2015) *Cadia Valley Operations – Processing Rate Modification Tailings Review.*

Western Research Institute (2014) *Economic, Social & Community Impacts of Cadia Valley Operations*.
Website: http://www.cadiavalley.com.au/client_images/1642077.pdf.

Wilkinson Murray (2009) *Cadia East Project Noise and Blasting Impact Assessment.*

Wilkinson Murray (2015) *Cadia Valley Operations Processing Rate Modification Noise Assessment*.

Attachment 1

Consolidated Project Approval

Project Approval

Section 75J of the *Environmental Planning & Assessment Act 1979*

I approve the project application referred to in schedule 1, subject to the conditions in schedules 2 to 5.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- require regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

The Hon Tony Kelly MLC
Minister for Planning

Sydney 6 January 2010

SCHEDULE 1

Application No.:	06_0295
Proponent:	Cadia Holdings Pty Limited
Approval Authority:	Minister for Planning
Land:	See Appendix 1
Project:	Cadia East Project, including the: • Cadia East underground mine; • Cadia Hill open cut mine; • Ridgeway underground mine; • Blayney and CVO Dewatering Facilities; and • ancillary infrastructure, together known as the Cadia Valley Operations.

Blue type represents September 2010 modification
Red type represents October 2010 modification
Green type represents August 2011 modification
Light blue type represents May 2014 modification
Orange represents August 2014 modification

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DEFINITIONS

AHD	Australian Height Datum
Ancillary Infrastructure	Infrastructure that is ancillary to the operation of the project, including: • items listed in Table 2-3 of the EA, plus project-related items within new mining lease application areas described in the EA; • the concentrate and water pipelines to the Blayney and CVO dewatering facilities; and • the pipeline, pumps, powerlines and access tracks associated with the Belubula River pumping station and Flyers Creek weir
Annual Review	The review required by condition 2 of schedule 5
BCA	Building Code of Australia
CCC	Community Consultative Committee
Councils	Orange City Council, Blayney Shire Council and Cabonne Shire Council
Day	The period from 7am to 6pm on Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays
Department	Department of Planning and Environment
DRE	Division of Resources and Energy
EA	Environmental Assessment titled *Environmental Assessment Cadia East Project* (2 volumes), dated June 2009, including the Response to Submissions
EA (Mod 1)	Environmental Assessment titled *Cadia Holdings Pty Ltd Cadia Hill Decline Environmental Assessment*, dated July 2010
EA (Mod 2)	Environmental Assessment titled *Cadia Holdings Pty Ltd Blayney Dewatering Facility Environmental Assessment*, dated August 2010
EA (Mod 3)	Environmental Assessment titled *Cadia Holdings Pty Ltd Concentrate and Return Water Pipeline Modification Environmental Assessment*, dated June 2011
EA (Mod 4)	Environmental Assessment titled *Cadia East Surface Preconditioning Program Environmental Assessment,* dated February 2014
EA (Mod 5)	Environmental Assessment titled *Cadia East Surface Blasthole Preconditioning Program Environmental Assessment,* dated July 2014
EPA	*Environment Protection Authority*
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2000*
EPL	Environment Protection Licence issued by EPA under the *Protection of the Environment Operations Act 1997*
Evening	The period from 6pm to 10pm
Feasible	Feasible relates to engineering considerations and what is practical to build
Heritage Branch	Heritage Branch of the Department
Incident	A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits or performance measures/criteria in this approval
Land	Land means the whole of a lot, or contiguous lots owned by the same landowner, in a current plan registered at the Land Titles Office at the date of this approval
Mining Operations	Includes all ore extraction, processing and transportation activities carried out on site
Minister	Minister for Planning, or delegate
Negligible	Small and unimportant, such as to be not worth considering
Night	The period from 10pm to 7am on Monday to Saturday, and 10pm to 8am on Sundays and Public Holidays
NOW	NSW Office of Water
OEH	Office of Environment and Heritage
Offset Strategy	The conservation and enhancement program described in the EA
Previous EAs	The previous environmental impact assessments for the project, as listed in Appendix 3
Privately-owned land	Land that is not owned by a public agency or a mining company (or its subsidiary)
Project	The development as described in the EA (and previous EAs)
Proponent	Cadia Holdings Pty Limited, or its successors in title
Reasonable	Reasonable relates to the application of judgement in arriving at a decision, taking into account: mitigation benefits, cost of mitigation versus benefits provided, community views and the nature and extent of potential improvements
Rehabilitation	The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment
Response to Submissions	The Proponent's responses to issues raised in submissions, including those titled *Cadia East Project – Responses Submissions,* dated 17 November 2009, and *Cadia East Project – Biodiversity Offset*, dated 28 September 2009
Site	The land referred to in schedule 1, and listed in Appendix 1
Secretary	Secretary of the Department, or nominee

SCHEDULE 2
ADMINISTRATIVE CONDITIONS

OBLIGATION TO MINIMISE HARM TO THE ENVIRONMENT

1. The Proponent shall implement all reasonable and feasible measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.

TERMS OF APPROVAL

2. The Proponent shall carry out the project generally in accordance with the:
   (a) EA;
   (b) EA (Mod 1);
   (c) EA (Mod 2);
   (d) EA (Mod 3);
   (e) EA (Mod 4);
   (f) EA (Mod 5); and
   (g) conditions of this approval

   Note: The general layout of the project is shown in Appendix 2.

3. If there is any inconsistency between the above documents, the most recent document shall prevail to the extent of the inconsistency. However, the conditions of this approval shall prevail to the extent of any inconsistency.

4. The Proponent shall comply with any reasonable requirement/s of the Secretary arising from the Department's assessment of:
   (a) any reports, strategies, plans, programs, reviews, audits or correspondence that are submitted in accordance with this approval; and
   (b) the implementation of any actions or measures contained in these documents.

LIMITS ON APPROVAL

5. Mining operations may take place until 30 June 2031.

   Note: Under this approval, the Proponent is required to rehabilitate the site and perform additional undertakings to the satisfaction of the Secretary and DRE. Consequently this approval will continue to apply in all other respects other than the right to conduct mining operations until the site has been properly rehabilitated.

6. The Proponent shall not process more than 27 million tonnes of ore from the project in a calendar year.

7. The Proponent shall not use any cyanide or mercury to process or extract gold/copper from the project.

SURRENDER OF CONSENTS

8. Within 12 months of the date of this approval, or as otherwise agreed by the Secretary, the Proponent shall surrender all existing development consents for the project in accordance with sections 75YA and 104A of the EP&A Act, to the satisfaction of the Secretary.

   Note: This approval will apply to all components of the Cadia Valley Operations from the date of approval. The existing management and monitoring plans/strategies/programs/protocols for the project will continue to apply until the approval of the comparable plan/strategy/program under this approval.

STRUCTURAL ADEQUACY

9. The Proponent shall ensure that all new buildings and structures, and any alterations or additions to existing buildings and structures, are constructed in accordance with the relevant requirements of the BCA.

   Notes:
   - *Under Part 4A of the EP&A Act, the Proponent is required to obtain construction and occupation certificates for the proposed building works;*
   - *Part 8 of the EP&A Regulation sets out the requirements for the certification of the project.*

DEMOLITION

10. The Proponent shall ensure that all demolition work is carried out in accordance with *AS 2601-2001: The Demolition of Structures,* or its latest version.

PROTECTION OF PUBLIC INFRASTRUCTURE

11. The Proponent shall:
    (a) repair, or pay the full costs associated with repairing, any publicly-owned infrastructure that is damaged by the project; and

(b) relocate, or pay the full costs associated with relocating, any publicly-owned infrastructure that needs to be relocated as a result of the project,

except where such works have been compensated through the planning agreement referred to in condition 13 below.

OPERATION OF PLANT AND EQUIPMENT

12. The Proponent shall ensure that all plant and equipment used at the site is:
    (a) maintained in a proper and efficient condition; and
    (b) operated in a proper and efficient manner.

PLANNING AGREEMENT

13. Within 12 months of the date of this approval, unless otherwise agreed by the Secretary, the Proponent shall enter into a planning agreement with the Councils in accordance with Division 6 of Part 4 of the EP&A Act, that provide for contributions to the Councils for:
    - upgrade of Council's road infrastructure affected by the project; and
    - general community enhancement to address social amenity and community infrastructure requirements arising from the project.

    The contributions shall be generally consistent with the terms of the offer made in the Proponent's letter dated 17 December 2009, and summarised in Appendix 7.

    If there is any dispute between the Proponent and any of the Councils during the formal drafting of the planning agreement, then any of the parties involved may refer the matter to the Secretary for resolution.

STAGED SUBMISSION OF STRATEGIES, PLANS OR PROGRAMS

14. With the approval of the Secretary, the Proponent may submit any management plan, strategy or monitoring program required by this approval on a progressive basis, or for a discrete component of the project.

SCHEDULE 3
ENVIRONMENTAL PERFORMANCE CONDITIONS

ACQUISITION OF AFFECTED PROPERTIES

Acquisition Upon Request

1. Upon receiving a written request for acquisition from the owner of the land listed in Table 1, the Proponent shall acquire the land in accordance with the procedures in conditions 5-7 of schedule 4.

Table 1: Land subject to acquisition upon request

MC & PA Ewens

Note: To interpret the location referred to in Table 1, see the applicable figure in Appendix 2.

NOISE

Impact Assessment Criteria

2. The Proponent shall ensure that the noise generated by the project does not exceed the noise impact assessment criteria in Table 2 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land.

Table 2: Noise Impact Assessment Criteria dB(A) $L_{Aeq\ (15min)}$

Location	***Day***	***Evening***	***Night***	***Night ($L_{A1\ (1\ min)}$)***
Mining Operations				
41-CW Knox ('Meribah'), 43-CJ Healey ('Triangle Park'), 138-AC & A Bailey ('Mayburies'), 45-CC Colman ('Mirrabooka'), 246-CK Channell and KP & DV Donlan ('Eastburn'), 209-JI McLennan ('Northwest'), 171-GA Knox ('South Log')	43	38	38	45
1-GT & JA Christou ('Coorabin'), 137-MP & LA Ellis ('Argyle'), 169-RL & SL Chamberlain ('Weemalla')	43	38	37	45
44-AR Colman ('Triangle Flat'), 105-KA Hughes ('Barton Park'), 133-LC & LR Baker ('Bonnie Glen')	43	38	36	45
Other privately owned land	43	38	35	45
Blayney Dewatering Facility				
Location 1	50	50	39	49
Location 2	50	50	36	46
Location 3	46	46	37	47
Location 4	46	46	36	46
Location 5	58	58	45	55
CVO Dewatering Facility				
MC & PA Ewens	50	42	42	45
GP Nixon & Sons	43	35	35	45
D Palmer	40	39	35	45
H Tetlaw	40	36	35	45
ML Gardner	40	35	35	45
GJ Keen	39	35	35	45
D Somervaille	38	38	35	45

Notes:

- *To interpret the locations referred to Tables 2-5, see the applicable figures in Appendices 2 and 4.*
- *Noise generated by the project is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.*
- *The noise limits do not apply if the Proponent has an agreement with the relevant owner/s of these residences/land to generate higher noise levels, and the Proponent has advised the Department in writing of the terms of this agreement.*
- *Noise associated with the mining operations may exceed the night time limits in Table 2 at Property 22 – JL Gill by 1 decibel during construction of the Cadia East mine.*
- *Noise associated with the construction of the upgrade to the Blayney Dewatering Facility may exceed the noise impact assessment criteria in Table 2 by up to 3 decibels at all locations except Location 4, and is to be measured in accordance with the relevant procedures in the EPA's Interim Construction Noise Guideline.*

Land Acquisition Criteria

3. If the noise generated by the project exceeds the criteria in Table 3 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 5-7 of schedule 4.

Table 3: Land acquisition criteria dB(A) $L_{Aeq\ (15min)}$

Location	Day	Evening	Night
Mining Operations			
All privately-owned land	43	43	40
CVO Dewatering Facility			
D Palmer	45	44	40
H Tetlaw	45	41	40
GP Nixon & Sons, ML Gardner, GJ Keen	44	40	40
D Somervaille	43	43	40

Note: Noise generated by the project is to be measured and evaluated in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.

Cumulative Noise Criteria

4. The Proponent shall implement all reasonable and feasible measures to ensure that the noise generated by the project combined with the noise generated by other mines and industries does not exceed the amenity criteria in Table 4 at any residence on privately-owned land or on more than 25 per cent of any privately-owned land, to the satisfaction of the Secretary.

Table 4: Cumulative noise criteria dB(A) $L_{Aeq\ (period)}$

Location	Day	Evening	Night
Mining Operations			
All privately-owned land	50	45	40
CVO Dewatering Facility			
D Palmer	55	45	40
H Tetlaw, GP Nixon & Sons, ML Gardner, GJ Keen, D Somervaille	50	45	40

Note: Cumulative noise is to be measured in accordance with the relevant requirements, and exemptions (including certain meteorological conditions), of the NSW Industrial Noise Policy.

Traffic Noise Impact Assessment Criteria

5. The Proponent shall take all reasonable and feasible measures to ensure that the traffic noise generated by the project does not exceed the traffic noise impact assessment criteria in Table 5.

Table 5: Traffic noise impact assessment criteria dB(A)

Road	Day/Evening	Night
Forest Road, Orange Road	60 $L_{Aeq\ (15\ hours)}$	55 $L_{Aeq\ (9\ hours)}$
Cadia Road, Orchard Road, Four Mile Creek Road, Woodville Road, Panuara Road	55 $L_{Aeq\ (1\ hour)}$	50 $L_{Aeq\ (1\ hour)}$

Note: Traffic noise generated by the project is to be measured in accordance with the relevant procedures in the EPA's Environmental Criteria for Road Traffic Noise.

Operating Hours

6. The Proponent shall comply with the operating hours in Table 6.

Table 6: Operating Hours

Activity	Day	Time
Construction		
Rodds Creek water holding dam raise; tailings storage facilities raises; new pipelines	Any day	Day
Cadia East underground mine development; upgrade of ore processing facilities	Any day	Any time
Dewatering facilities	Monday – Friday	7.00am to 6.00pm
	Saturday	8.00am to 1.00pm
	Sunday and Public Holidays	None
Operation		
Mine complex operations; Dewatering facilities	Any day	Any time
Blayney Dewatering Facility – train loading	Any day	7.00am to 7.00pm
CVO Dewatering Facility – train loading	Any day	Day

Note: Construction and maintenance activities may be conducted outside the hours in Table 6 provided that the activities are not audible at any residence beyond the boundary of the site.

Additional Noise Mitigation Measures

7. Upon receiving a written request from:
   - the landowner of the properties identified as:
     - MC & PA Ewens (unless the landowner has requested acquisition); or
     - GP Nixon & Sons; or
   - the landowner of privately-owned land where subsequent operational noise monitoring shows the noise generated by the project exceeds the noise limits in Table 2 by more than:
     - 1 dB(A), in the case of daytime noise levels at the location identified as ML Gardner; or
     - 2 dB(A), in the case of all other locations; or
   - the landowner of the residences on Forest Road, Orchard Road, Woodville Road or other road listed in Table 5 where subsequent noise monitoring shows traffic noise levels generated by the project exceed the traffic noise criteria in Table 5,

   the Proponent shall implement additional noise mitigation measures such as double glazing, insulation, and/or air conditioning at any residence on the land in consultation with the landowner.

   These additional mitigation measures must be reasonable and feasible.

   If within 3 months of receiving this request from the landowner, the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

   Within 3 months of this approval, the Proponent shall notify all applicable landowners that they are entitled to receive additional noise mitigation measures, to the satisfaction of the Secretary.

Continuous Improvement

8. The Proponent shall:
   (a) implement all reasonable and feasible best practice noise mitigation measures;

(b) investigate ways to reduce the noise generated by the project, including off-site road (particularly on Forest Road, Orchard Road and Woodville Road during the night and early morning periods) and rail noise and maximum noise levels which may result in sleep disturbance; and
(c) report on these investigations and the implementation and effectiveness of these measures in the Annual Review,
to the satisfaction of the Secretary.

Noise Monitoring

9. The Proponent shall prepare and implement a detailed Noise Monitoring Program for the project to the satisfaction of the Secretary. This program must:
(a) be prepared in consultation with EPA, and be submitted to the Secretary for approval within 3 months of the date of this approval; and
(b) include:
- a combination of unattended and attended monitoring measures; and
- a noise monitoring protocol for evaluating compliance with the relevant noise impact assessment and land acquisition criteria in this approval.

BLASTING AND VIBRATION

Blasting Impact Assessment Criteria

10. The Proponent shall ensure that blasting at the project does not exceed the criteria in Table 7.

Table 7: Blasting impact assessment criteria

Location	***Time of Blasting***	***Airblast overpressure (dB(Lin Peak))***	***Ground vibration (mm/s)***	***Allowable exceedance***
Residence on privately owned land	Any time	120	10	0%
	Day	115	5	5% of the total number of blasts over a period of 12 months
	Evening	105	2	
	Night, and all day on Sundays and Public holidays	95	1	
Heritage sites, including Cadia Engine House and Surrounds (but excluding Little Cadia Copper Mine)	Any time	-	15	0%

Note: The impact assessment criteria for Cadia Engine House and Surrounds apply in the absence of any anti-vibration strengthening. Alternative criteria may be approved under the Historical Heritage Management Plan (see condition 43) if anti-vibration strengthening works are implemented.

Operating Conditions

11. During mining operations on site, the Proponent shall implement best blasting practice to:
(a) protect the safety of people, property, public infrastructure, and livestock;
(b) protect items of Aboriginal and non-indigenous cultural heritage significance; and
(c) minimise the dust and fume emissions from blasting at the project,
to the satisfaction of the Secretary.

Public Notice

12. During mining operations on site, the Proponent shall:
(a) notify the landowner/occupier of any residence within 2 kilometres of blasting operations who registers an interest in being notified about the blasting schedule at the mine, or any other landowner nominated by the Secretary;
(b) operate a Blasting Hotline, or alternate system agreed to by the Secretary, to enable the public to get up-to-date information on the blasting schedule at the project;
(c) publish an up-to-date blasting schedule on its website (for open pit and major underground blasting operations); and
(d) advertise the blasting hotline number and website information in a local newspaper at least 2 times each year,
to the satisfaction of the Secretary.

Property Inspections

13. The Proponent shall advise the owners of privately-owned land that they are entitled to a structural property inspection to establish the baseline condition of buildings and other structures on the property:
    (a) within 2 months of the date of this approval, for properties within 2 kilometres of blasting operations occurring at the date of this approval; and
    (b) at least 2 months prior to blasting within 2 kilometres of additional properties.

14. If the Proponent receives a written request for a structural property inspection from any such landowner, the Proponent shall:
    (a) within 2 months of receiving this request commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to inspect the condition of any building or structure on the land (prior to blasting taking place within 2 kilometres of the property, if possible), and recommend measures to mitigate any potential blasting impacts; and
    (b) give the landowner a copy of the property inspection report.

Property Investigations

15. If any landowner of privately-owned land within 2 kilometres of blasting operations, or any other landowner nominated by the Secretary, claims that buildings and/or structures on his/her land have been damaged as a result of blasting at the project, the Proponent shall within 3 months of receiving this request:
    (a) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to investigate the claim; and
    (b) give the landowner a copy of the property investigation report.

    If this independent property investigation confirms the landowner's claim, and both parties agree with these findings, then the Proponent shall repair the damages to the satisfaction of the Secretary.

    If the Proponent or landowner disagrees with the findings of the independent property investigation, then either party may refer the matter to the Secretary for resolution.

    If the matter cannot be resolved within 21 days, the Secretary shall refer the matter to an Independent Dispute Resolution Process (see Appendix 8).

Blast Monitoring Program

16. The Proponent shall prepare and implement a Blast Monitoring Program for the project to the satisfaction of the Secretary. This program must:
    (a) be prepared in consultation with EPA, and be submitted to the Secretary for approval within 3 months of the date of this approval; and
    (b) include a protocol for evaluating blast-related impacts (including blast-induced seismic activity) on, and demonstrating compliance with the blasting criteria in this approval for:
        - privately-owned residences and structures;
        - items of Aboriginal and non-indigenous cultural heritage significance (including the Cadia Engine House and Surrounds); and
        - publicly-owned infrastructure.

AIR QUALITY

Impact Assessment Criteria

17. The Proponent shall ensure that the dust emissions generated by the project do not cause additional exceedances of the air quality impact assessment criteria listed in Tables 8, 9 and 10 at any residence on privately owned land, or on more than 25 percent of any privately owned land.

Table 8: Long term impact assessment criteria for particulate matter

Pollutant	***Averaging period***	***Criterion***
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 9: Short term impact assessment criterion for particulate matter

Pollutant	***Averaging period***	***Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 10: Long term impact assessment criteria for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

Land Acquisition Criteria

18. If the dust emissions generated by the project exceed the criteria in Tables 11, 12, and 13 at any residence on privately owned land, or on more than 25 percent of any privately owned land, the Proponent shall, upon receiving a written request for acquisition from the landowner, acquire the land in accordance with the procedures in conditions 5-7 of schedule 4.

Table 11: Long term land acquisition criteria for particulate matter

Pollutant	Averaging period	Criterion
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 12: Short term land acquisition criteria for particulate matter

Pollutant	Averaging period	Criterion	Percentile[1]	Basis
Particulate matter < 10 µm (PM_{10})	24 hour	150 µg/m^3	99[2]	Total[3]
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3	98.6	Increment[4]

[1]Based on the number of block 24 hour averages in an annual period.
[2]Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Secretary in consultation with EPA.
[3]Background PM_{10} concentrations due to all other sources plus the incremental increase in PM_{10} concentrations due to the mine alone.
[4]Incremental increase in PM_{10} concentrations due to the mine alone.

Table 13: Long term land acquisition criteria for deposited dust

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter - Deposited Matter - Gravimetric Method.

Operating Conditions

19. The Proponent shall:
    (a) ensure any visible air pollution generated by the project is assessed regularly, and that operations are relocated, modified, and/or stopped as far as is reasonable and feasible to minimise air quality impacts on privately-owned land;
    (b) ensure that the real-time air quality monitoring and meteorological monitoring data are assessed regularly, and that operations are relocated, modified and/or stopped as required to ensure compliance with the relevant air quality criteria; and
    (c) implement all reasonable and feasible measures to minimise off-site odour and fume emissions generated by the project,
    to the satisfaction of the Secretary.

Air Quality Monitoring

20. The Proponent shall prepare and implement a detailed Air Quality Monitoring Program for the project to the satisfaction of the Secretary. This program must:
    (a) be prepared in consultation with EPA, and be submitted to the Secretary for approval within 3 months of the date of this approval; and
    (b) include:
        - a combination of real-time monitors, high volume samplers and dust deposition gauges to monitor the dust emissions of the project; and

- an air quality monitoring protocol for evaluating compliance with the relevant air quality impact assessment and land acquisition criteria in this approval.

METEOROLOGICAL MONITORING

21. During the life of the project, the Proponent shall ensure that there is a suitable meteorological station in the vicinity of the site that complies with the requirements in the *Approved Methods for Sampling of Air Pollutants in New South Wales* guideline.

SOIL AND WATER

Water Supply

22. The Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations to match its licensed water entitlements, to the satisfaction of the Secretary.

Note: The Proponent is required to obtain all necessary water licences and approvals for the project under the Water Act 1912 and/or Water Management Act 2000.

Discharge Limits

23. The Proponent shall not discharge any water from the site except as may be expressly provided by an EPL, or in accordance with section 120 of the *Protection of the Environment Operations Act 1997*.

Compensatory Water Supplies

24. The Proponent shall provide compensatory water supplies to any landowner of privately-owned land whose water entitlements are impacted (other than an impact that is negligible) as a result of the project, in consultation with NOW and to the satisfaction of the Secretary.

The compensatory water supply measures must provide an alternative long-term supply of water that is equivalent to the loss attributed to the project. Equivalent water supply must be provided (at least on an interim basis) within 24 hours of the loss being identified.

If the Proponent and the landowner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

If the Proponent is not able to provide an alternative long-term supply of water, the Proponent shall provide alternative compensation to the satisfaction of the Secretary, which may involve acquisition in accordance with the procedures in conditions 5-7 of schedule 4.

Notes:

- *For the purposes of this condition:*
  - *privately-owned land means any privately-owned land with direct water dependency on Swallow Creek, Cadiangullong Creek, Rodds Creek, Flyers Creek or Diggers Creek/Panuara Rivulet, and any land within the maximum predicted 1 metre groundwater drawdown contour as indicated on the plans in Appendix 5, or any other privately-owned land as notified by the Secretary;*
  - *a water entitlement includes an accessible riparian water right or licensable quantity;*
  - *a water entitlement is considered to be impacted if the project results in a loss in pumping yield in bores or pumps, or impacts the quality of the water such that its use is materially affected. (These impact assessment criteria are required to be further quantified in the Site Water Management Plan – see conditions 30-35 below).*
- *Compensatory water supplies may be achieved through provision of baseflow offsets within the applicable catchment (see condition 25 below), or through measures on privately-owned land such as lowering or duplicating pumps, deepening or replacing bores, and/or provision of interim water supplies.*
- *The Proponent is not required to provide additional compensatory water supplies where such long-term compensation has already been provided under previous consents for the project.*
- *In resolving any dispute under this condition, the Secretary will consult closely with NOW.*

Baseflow Offsets

25. The Proponent shall offset the loss of baseflow to the Belubula River and associated creeks caused by the project, in consultation with NOW, and to the satisfaction of the Secretary. The offsets shall be provided either incrementally or on one occasion:

(a) prior to the baseflow loss being realised, or within 12 months of the date of this approval for any existing realised baseflow losses that have not previously been offset; and

(b) within the catchments where the baseflow loss is realised, as far as is reasonable and feasible,

unless otherwise approved by the Secretary.

Notes:

- *The offsets should be provided via the retirement of adequate water entitlements to account for the loss attributable to the project.*

- *Relevant compensatory water supplies implemented under condition 24 may be subtracted from the offsets required under this condition.*
- *The Proponent is not required to provide additional baseflow offsets where such offsets have already been provided under previous consents for the project. These existing offsets are to be described and evaluated in the Surface and Ground Water Contingency Plan (see condition 35 below).*

26. At least 6 months prior to the cessation of mining operations, the Proponent shall demonstrate that it has made adequate provision to provide long-term offsets to account for the permanent baseflow loss caused by the project, in consultation with NOW, and to the satisfaction of the Secretary.

Note: The long-term offsets may be provided via the retiring of adequate water entitlements to account for the permanent loss attributable to the project.

Cadiangullong Creek Flows

27. The Proponent shall manage water releases from Cadiangullong Dam to provide:
    (a) flows of at least:
        - 3.4 ML/day, for periods when inflows into the dam are more than 3.4 ML/day and the water level in the dam is at or above the lowest valve level on the multi-level offtake (ie. 773.0 metres AHD);
        - the volume equal to the inflow into the dam, for periods when inflows into the dam are between 0.4 and 3.4 ML/day and the water level in the dam is at or above the lowest valve level on the multi-level offtake;
        - 0.4 ML/day, for periods when inflows into the dam are less than 0.4 ML/day and the water level in the dam is at or above the lowest valve level on the multi-level offtake;
        - the volume equal to the inflow into the dam, up to 0.4ML/day, for periods when the water level in the dam is below the lowest valve level on the multi-level offtake and above the level of the scour valve (ie. 762.8 metres AHD); and
        - zero, when the water level in the dam is below the level of the scour valve; and
    (b) releases of up to 4 medium flows (of the order of 12 to 15 ML/day) per year, each for a duration of 1 to 3 days, with timing and frequency of such flows determined by hydrographs of typical medium flows,

    to the satisfaction of, and unless otherwise approved by, NOW.

28. The Proponent shall not extract any water from Cadiangullong Dam when the volume in the dam drops to 10 percent or less of its total capacity (ie. 778.8 metres AHD), unless otherwise approved by NOW. Flow releases (see condition 27 above) shall be continued during any such period, except when the level of water in the dam drops below the level of the dam's scour valve (ie. 762.8 metres AHD).

Flyers Creek Flows

29. The Proponent shall ensure that natural environmental flows of up to 3.5 ML/day into Flyers Creek weir are allowed to pass uninterrupted downstream, and any approved water extraction is limited to medium and high flows, to the satisfaction of NOW.

Site Water Management Plan

30. The Proponent shall prepare and implement a Water Management Plan for the project to the satisfaction of the Secretary. This plan must:
    (a) be prepared in consultation with NOW and EPA, and be submitted to the Secretary for approval within 6 months of the date of this approval; and
    (b) include a:
        - Site Water Balance;
        - Erosion and Sediment Control Plan;
        - Surface Water Monitoring Program;
        - Groundwater Monitoring Program; and
        - Surface and Ground Water Contingency Plan.

31. The Site Water Balance must:
    (a) include details of:
        - sources and security of water supply;
        - water use on site;
        - water management on site;
        - any off-site water transfers;
        - reporting procedures; and
    (b) investigate and implement all reasonable and feasible measures to minimise water use by the project.

32. The Erosion and Sediment Control Plan must:
    (a) be consistent with the requirements of *Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition, 2004* (Landcom);
    (b) identify activities that could cause soil erosion and generate sediment;

(c) describe measures to minimise soil erosion and the potential for the transport of sediment to downstream waters;
(d) describe the location, function, and capacity of erosion and sediment control structures; and
(e) describe what measures would be implemented to maintain the structures over time.

33. The Surface Water Monitoring Program must include:
(a) detailed baseline data, based on sound statistical analysis, to benchmark the pre-mining natural variation in surface water flows and quality in creeks and other waterbodies that could potentially be affected by the project;
(b) surface water and stream health impact assessment criteria;
(c) a program to monitor and assess:
- impacts on surface water flows and quality;
- impacts on water users;
- stream health conditions in Swallow Creek, Cadiangullong Creek, Rodds Creek, Flyers Creek and Diggers Creek, including riparian vegetation;
- potential acid rock drainage;
- potential leakage or spillage from tailings, mineral concentrate and effluent pipelines;

(d) a program for the ongoing verification and refinement of the surface water model; and
(e) reporting procedures for the results of the monitoring program and model verification.

34. The Groundwater Monitoring Program must include:
(a) detailed baseline data, based on sound statistical analysis, to benchmark the pre-mining natural variation in groundwater levels, yield and quality (including privately-owned bores within the maximum predicted 1 metre groundwater drawdown contour, as indicated on the plans in Appendix 5);
(b) groundwater impact assessment criteria (including for monitoring bores and privately-owned bores);
(c) a program to monitor:
- impacts on the groundwater supply of potentially affected landowners;
- impacts on springs and groundwater dependent ecosystems;
- the volume of groundwater seeping into open pit and underground mine workings;
- regional groundwater levels and quality in all potentially affected aquifers;
- potential acid rock drainage;

(d) a program for the ongoing verification and refinement of the groundwater model; and
(e) reporting procedures for the results of the monitoring program and model verification.

35. The Surface and Ground Water Contingency Plan must include:
(a) a protocol for the investigation, notification and mitigation of any exceedances of the surface water, stream health and groundwater impact assessment criteria;
(b) measures to mitigate and/or compensate potentially affected landowners in accordance with the compensatory water supply requirements in condition 24 above;
(c) a protocol for providing advance warning and water supply measures for landowners of privately-owned land that are predicted to exceed the surface or ground water impact assessment criteria at some stage during the project life;
(d) a protocol for investigating, evaluating and providing the baseflow offsets required under condition 25 above, including a detailed evaluation (in the initial plan) of offsets provided under previous consents for the project; and
(e) the procedures that would be followed if any significant unforeseen impacts on surface or ground water are detected during the project.

REHABILITATION AND BIODIVERSITY OFFSETS

Rehabilitation

36. By the end of 2010, the Proponent shall prepare a Rehabilitation Strategy for the project to the satisfaction of the Secretary. This strategy must:
(a) be prepared by a team of suitably qualified and experienced experts whose appointment has been endorsed by the Secretary;
(b) be prepared in consultation with relevant stakeholders, including the Councils and the CCC;
(c) investigate options for the future use of disturbed areas including voids upon the completion of mining;
(d) describe and justify the proposed rehabilitation strategy for the site, including the post-mining landform and use; and
(e) define the rehabilitation objectives for the site, as well as the proposed completion criteria for this rehabilitation.

Note: The strategy should build on the concept strategy depicted in Appendix 6.

37. The Proponent shall:
(a) carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance; and

(b) achieve the rehabilitation objectives in the Rehabilitation Strategy (see condition 36),
to the satisfaction of the Minister for Mineral Resources.

Biodiversity Offsets

38. The Proponent shall:
(a) implement the biodiversity offset strategy as described in the EA, and summarised in Table 14 (and shown conceptually in Appendix 6); and
(b) investigate ways to salvage and beneficially use resources (including timber, fauna habitat, seed and soil resources) in areas subject to subsidence as far as is reasonable and feasible,
to the satisfaction of the Secretary.

Table 14: Biodiversity Offset Strategy

Area	***Minimum Size***
Black Rock Range Offset Area – Enhancement Area	653 ha
Black Rock Range Offset Area – Revegetation Area	173 ha
Flyers Creek and Belubula River Offset Area	112 ha
Total	**938 ha**

39. Within 2 years of the date of this approval, the Proponent shall make suitable arrangements to provide appropriate long term security for the offset areas to the satisfaction of the Secretary.

40. Within 6 months of the approval of the Landscape Management Plan (see condition 41 below), the Proponent shall lodge a conservation and biodiversity bond with the Department to ensure that the offset strategy is implemented in accordance with the performance and completion criteria of the Landscape Management Plan. The sum of the bond shall be determined by:
(a) calculating the full cost of implementing the offset strategy; and
(b) employing a suitably qualified quantity surveyor to verify the calculated costs,
to the satisfaction of the Secretary.

Notes:
- *If the offset strategy is completed to the satisfaction of the Secretary, the Secretary will release the conservation bond.*
- *If the offset strategy is not completed to the satisfaction of the Secretary, the Secretary will call in all or part of the conservation bond, and arrange for the satisfactory completion of the relevant works.*
- *If amendments to the Mining Act 1992 allow the Minister for Mineral Resources to require rehabilitation securities under a Mining Lease which apply to the implementation of rehabilitation works outside the boundary of a Mining Lease, the Proponent may transfer the conservation bond required under this approval to the Minister of Mineral Resources provided the Secretary and DRE agree to the transfer.*

Landscape Management Plan

41. The Proponent shall prepare and implement a Landscape Management Plan for the project to the satisfaction of the Minister for Mineral Resources and the Secretary. This plan must:
(a) be prepared in consultation with OEH, NOW and the Councils, and be submitted to the Secretary within 18 months of the date of this approval;
(b) include:
(i) the rehabilitation objectives for the site and offset areas;
(ii) a description of the short, medium, and long term measures that would be implemented to:
- rehabilitate the site in accordance with the Rehabilitation Strategy (see condition 36);
- implement the offset strategy; and
- manage the remnant vegetation and habitat on the site and in the offset areas;

(iii) detailed performance and completion criteria for the site rehabilitation and implementation of the offset strategy;
(iv) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for:
- progressively rehabilitating disturbed areas;
- implementing revegetation and regeneration within the disturbance areas and offset areas, including establishment of canopy, sub-canopy (if relevant), understorey and ground strata;
- investigating ways to salvage and beneficially use resources in areas subject to subsidence (including timber, fauna habitat, seed and soil resources);
- protecting vegetation and soil outside the disturbance areas;
- rehabilitating creeks and drainage lines on the site (both inside and outside the disturbance areas);
- managing potential acid forming material (including ensuring effective isolation of potential acid forming material in rock dumps);
- managing salinity;
- conserving and reusing topsoil;

- undertaking pre-clearance surveys;
- managing impacts on terrestrial and aquatic fauna (including a Squirrel Glider conservation strategy);
- landscaping the site to minimise visual impacts;
- collecting and propagating seed for rehabilitation works;
- salvaging and reusing material from the site for habitat enhancement;
- controlling weeds and feral pests, including terrestrial and aquatic species;
- managing grazing and agriculture on site;
- controlling access;
- bushfire management;
- managing and minimising any potential adverse impacts associated with the final voids; and
- managing and minimising any adverse socio-economic effects associated with mine closure;

(v) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;

(vi) a description of the potential risks to successful rehabilitation and/or revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and

(vii) details of who would be responsible for monitoring, reviewing, and implementing the plan.

ABORIGINAL HERITAGE

Aboriginal Cultural Heritage Management Plan

42. The Proponent shall prepare and implement an Aboriginal Cultural Heritage Management Plan for the project to the satisfaction of the Secretary. This plan must:

(a) be prepared in consultation with OEH and the Aboriginal community, and be submitted to the Secretary for approval within 6 months of the date of this approval;

(b) include a:

- detailed salvage program and management plan for Aboriginal sites and potential archaeological deposits within the project disturbance area;
- detailed description of the measures that would be implemented to protect and monitor Aboriginal sites outside the project disturbance area;
- description of the measures that would be implemented if any new Aboriginal objects or skeletal remains are discovered during the project; and
- protocol for the ongoing consultation and involvement of the Aboriginal communities in the conservation and management of Aboriginal cultural heritage on the site.

HISTORICAL HERITAGE

Historical Heritage Management Plan

43. The Proponent shall prepare and implement a Historical Heritage Management Plan for the project to the satisfaction of the Secretary. This plan must:

(a) be prepared in consultation with the Heritage Branch and be submitted to the Secretary for approval within 6 months of the date of this approval;

(b) include:

- compilation of archival recording, excavation and/or salvage of heritage items within the project disturbance area, including the Wire Gully Gold Workings and the Little Cadia Copper Mine;
- a detailed conservation management strategy for heritage items outside the project disturbance area but within the vicinity of the site, including a:
  - description of the measures that would be implemented to protect heritage items from disturbance, including disturbance from blasting activities;
  - program to monitor the effects of blasting on relevant heritage items; and
  - an Interpretation Plan for the Cadia Village.

Note: The Little Cadia Copper Mine is outside the zone of subsidence for the Cadia East mine but within its zone of influence, and therefore may potentially be subject to impact. It is proposed to conserve the site in-situ, if possible.

TRANSPORT

Road Construction

44. The Proponent shall:

(a) realign the affected sections of Cadia Road, and reconstruct the Cadia Road / Woodville Road intersection, at least 6 months before causing any subsidence of the affected roads; and

(b) construct the CVO Dewatering Facility site intersection on Newbridge Road, prior to the commencement of construction of the facility,

to the satisfaction of the applicable Council.

Road Haulage

45. The Proponent shall transport all concentrate:
    (a) to the Blayney Dewatering Facility and CVO Dewatering Facility by pipeline; and
    (b) from the Blayney Dewatering Facility and CVO Dewatering Facility by rail.

    If during the life of the project pipeline or rail services are not available to transport the concentrate the Proponent may apply to the Secretary for permission to temporarily use truck facilities until such time as pipeline or rail services are returned to normal service.

46. The Proponent shall ensure that all traffic accessing the Blayney Dewatering Facility does so via Marshalls Lane and Gerty Street. Hill Street shall not be used except with the written permission of Blayney Shire Council.

VISUAL

CVO Dewatering Facility

47. Prior to the commencement of construction of the CVO Dewatering Facility, the Proponent shall prepare:
    (a) architectural plans for the facility in a manner that achieves a suitable standard of design; and
    (b) a Landscape Plan for the facility, including provision for vegetative screening to minimise the visual impacts on adjacent receivers,
    in consultation with Blayney Shire Council, and to the satisfaction of the Secretary.

    Following approval, these plans must be implemented to the satisfaction of the Secretary.

Mining Operations Additional Visual Impact Mitigation

48. Upon receiving a written request from an owner of privately-owned land with significant direct views from a residence to the mining operations, the Proponent shall implement additional visual impact mitigation measures (such as landscaping treatments or vegetation screens) in consultation with the landowner, and to the satisfaction of the Secretary.

    These mitigation measures must be reasonable and feasible, and must be implemented within a reasonable timeframe.

    If within 3 months of receiving this request from the owner, the Proponent and the owner cannot agree on the measures to be implemented, or there is a dispute about the implementation of these measures, then either party may refer the matter to the Secretary for resolution.

    Notes:
    - *The additional visual impact mitigation measures must be aimed at reducing the visibility of the mine from significantly affected residences and do not necessarily require measures to reduce visibility of the mine from other locations on the affected properties. The additional visual impact mitigation measures do not necessarily have to include measures on the affected property itself (i.e. the additional measures may consist of measures outside the affected property boundary that provide an effective reduction in visual impacts).*
    - *Except in exceptional circumstances, the Secretary will not require additional visual impact mitigation to be undertaken for residences that are more than 5 kilometres from the mining operations.*

Visual Amenity and Lighting

49. The Proponent shall:
    (a) implement all reasonable and feasible measures to mitigate visual and off-site lighting impacts of the project;
    (b) ensure no outdoor lights shine above the horizontal; and
    (c) ensure that all external lighting associated with the project complies with *Australian Standard AS4282 (INT) 1997 – Control of Obtrusive Effects of Outdoor Lighting*,
    to the satisfaction of the Secretary.

WASTE

Waste Minimisation

50. The Proponent shall:
    (a) minimise the waste generated by the project;
    (b) ensure that the waste generated by the project is appropriately stored, handled and disposed of;
    (c) manage on-site sewage treatment and disposal in accordance with the requirements of the applicable Council; and
    (d) report on waste management and minimisation in the Annual Review,
    to the satisfaction of the Secretary.

SCHEDULE 4
ADDITIONAL PROCEDURES

Notification of Landowners

1. Within 1 month of the date of this approval, the Proponent shall notify the owners of the land listed in Table 1 of schedule 3 in writing that they have the right to require the Proponent to acquire their land at any stage during the project.

2. If the results of monitoring required in schedule 3 identify that impacts generated by the project are greater than the relevant impact assessment criteria, except where a negotiated agreement has been entered into in relation to that impact, then the Proponent shall, within 2 weeks of obtaining the monitoring results, notify the Secretary, the affected landowners and tenants (including tenants of mine-owned properties) accordingly, and provide quarterly monitoring results to each of these parties until the results show that the project is complying with the criteria in schedule 3.

Independent Review

3. If a landowner of privately-owned land considers the project to be exceeding the impact assessment criteria in schedule 3, then he/she may ask the Secretary in writing for an independent review of the impacts of the project on his/her land.

   If the Secretary is satisfied that an independent review is warranted, the Proponent shall within 3 months of the Secretary's decision:
   (a) consult with the landowner to determine his/her concerns;
   (b) commission a suitably qualified, experienced and independent person, whose appointment has been approved by the Secretary, to conduct monitoring on the land, to:
      - determine whether the project is complying with the relevant impact assessment criteria in schedule 3; and
      - identify the source(s) and scale of any impact on the land, and the project's contribution to this impact; and
   (c) give the Secretary and landowner a copy of the independent review.

4. If the independent review determines that the project is complying with the relevant impact assessment criteria in schedule 3, then the Proponent may discontinue the independent review with the approval of the Secretary.

   If the independent review determines that the project is not complying with the relevant impact assessment criteria in schedule 3, then the Proponent shall:
   (a) implement all reasonable and feasible measures, in consultation with the landowner, to ensure that the project complies with the relevant criteria, and conduct further monitoring to determine whether these measures ensure compliance; or
   (b) secure a written agreement with the landowner to allow exceedances of the relevant impact assessment criteria,

   to the satisfaction of the Secretary.

   If the further monitoring referred to under paragraph (a) above determines that the project is complying with the relevant impact assessment criteria, then the Proponent may discontinue the independent review with the approval of the Secretary.

Land Acquisition

5. Within 3 months of receiving a written request from a landowner with acquisition rights, the Proponent shall make a binding written offer to the landowner based on:
   (a) the current market value of the landowner's interest in the property at the date of this written request, as if the property was unaffected by the project, having regard to the:
      - existing and permissible use of the land, in accordance with the applicable planning instruments at the date of the written request; and
      - presence of improvements on the property and/or any approved building or structure which has been physically commenced at the date of the landowner's written request, and is due to be completed subsequent to that date, but excluding any improvements that have resulted from the implementation of the 'additional noise mitigation measures' in condition 7 of schedule 3 or 'compensatory water supplies' in condition 24 of schedule 3;
   (b) the reasonable costs associated with:
      - relocating within the same local government area, or to any other local government area determined by the Secretary; and
      - obtaining legal advice and expert advice for determining the acquisition price of the land, and the terms upon which it is to be acquired; and
   (c) reasonable compensation for any disturbance caused by the land acquisition process.

However, if at the end of this period, the Proponent and landowner cannot agree on the acquisition price of the land and/or the terms upon which the land is to be acquired, then either party may refer the matter to the Secretary for resolution.

Upon receiving such a request, the Secretary shall request the President of the NSW Division of the Australian Property Institute to appoint a qualified independent valuer to:

(a) consider submissions from both parties;
(b) determine a fair and reasonable acquisition price for the land and/or the terms upon which the land is to be acquired, having regard to the matters referred to in paragraphs (a)-(c) above;
(c) prepare a detailed report setting out the reasons for any determination; and
(d) provide a copy of the report to both parties.

Within 14 days of receiving the independent valuer's report, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the independent valuer's determination.

However, if either party disputes the independent valuer's determination, then within 14 days of receiving the independent valuer's report, they may refer the matter to the Secretary for review. Any request for a review must be accompanied by a detailed report setting out the reasons why the party disputes the independent valuer's determination. Following consultation with the independent valuer and both parties, the Secretary shall determine a fair and reasonable acquisition price for the land, having regard to the matters referred to in paragraphs (a)-(c) above and the independent valuer's report. Within 14 days of this determination, the Proponent shall make a binding written offer to the landowner to purchase the land at a price not less than the Secretary's determination.

If the landowner refuses to accept the Proponent's binding written offer under this condition within 6 months of the offer being made, then the Proponent's obligations to acquire the land shall cease, unless the Secretary determines otherwise.

6. The Proponent shall pay all reasonable costs associated with the land acquisition process described in condition 5 above.

7. If the Proponent and landowner agree that only part of the land shall be acquired, then the Proponent shall also pay all reasonable costs associated with obtaining Council approval for any plan of subdivision (where permissible), and registration of the plan at the Office of the Registrar-General.

SCHEDULE 5
ENVIRONMENTAL MANAGEMENT, REPORTING AND AUDITING

ENVIRONMENTAL MANAGEMENT

Environmental Management Strategy

1. The Proponent shall prepare and implement an Environmental Management Strategy for the project to the satisfaction of the Secretary. The strategy must:
   (a) be submitted to the Secretary for approval within 6 months of the date of this approval;
   (b) provide the strategic framework for environmental management of the project;
   (c) identify the statutory approvals that apply to the project;
   (d) describe the role, responsibility, authority and accountability of all key personnel involved in the environmental management of the project;
   (e) describe the procedures that would be implemented to:
      - keep the local community and relevant agencies informed about the operation and environmental performance of the project;
      - receive, handle, respond to, and record complaints;
      - resolve any disputes that may arise during the course of the project;
      - respond to any non-compliance; and
      - respond to emergencies;
   (f) include:
      - copies of the various strategies, plans and programs that are required under the conditions of this approval once they have been approved; and
      - a clear plan depicting all the monitoring to be carried out in relation to the project.

Annual Review

2. By the end of 2010, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Secretary. This review must:
   (a) describe the works that were carried out in the past year, and the works that are proposed to be carried out over the next year;
   (b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the
      - the relevant statutory requirements, limits or performance measures/criteria;
      - the monitoring results of previous years; and
      - the relevant predictions in the EA and previous EAs;
   (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
   (d) identify any trends in the monitoring data over the life of the project;
   (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and
   (f) describe what measures will be implemented over the next year to improve the environmental performance of the project.

Revision of Strategies, Plans and Programs

3. Within 3 months of:
   (a) an annual review under condition 2 above;
   (b) an incident report under condition 5 below;
   (c) an audit under condition 7 below; or
   (d) any modification of this approval,
   the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.

   Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.

Community Consultative Committee

4. Within 6 months of the date of this approval, the Proponent shall establish Community Consultative Committee (CCC) for the project to the satisfaction of the Secretary. This CCC must be established and operated in general accordance with the *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (Department of Planning, 2007, or its latest version).

   Notes:
   - *The CCC is an advisory committee. The Department and other relevant agencies are responsible for ensuring that the Proponent complies with this approval. In accordance with the Guideline, the Committee should comprise an independent chair and appropriate representation from the Proponent, affected councils and the general community.*

- *In establishing the CCC, the Department will accept the continued representation from existing CCC members, however the Proponent should ensure that adequate representation is achieved for landowners within the area surrounding the Cadia East underground mine.*

REPORTING

Incident Reporting

5. The Proponent shall notify the Secretary and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.

Regular Reporting

6. The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Secretary.

INDEPENDENT ENVIRONMENTAL AUDIT

7. By the end of December 2011, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:
   (a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;
   (b) include consultation with the relevant agencies;
   (c) assess the environmental performance of the project and assess whether it is complying with the requirements in this approval and any relevant EPL or Mining Lease (including any assessment, plan or program required under these approvals);
   (d) review the adequacy of strategies, plans or programs required under the abovementioned approvals; and
   (e) recommend appropriate measures or actions to improve the environmental performance of the project, and/or any assessment, plan or program required under the abovementioned approvals.

   Note: This audit team must be led by a suitably qualified auditor and include experts in surface water, groundwater and any other fields specified by the Secretary.

8. Within 6 weeks of the completion of this audit, or as otherwise agreed by the Secretary, the Proponent shall submit a copy of the audit report to the Secretary, together with its response to any recommendations contained in the audit report.

ACCESS TO INFORMATION

9. From the end of June 2010, the Proponent shall make the following information publicly available on its website:
   (a) a copy of all current statutory approvals for the project;
   (b) a copy of the current environmental management strategy and associated plans and programs;
   (c) a summary of the monitoring results of the project, which have been reported in accordance with the various plans and programs approved under the conditions of this approval;
   (d) a complaints register, which is to be updated on a monthly basis;
   (e) a copy of the minutes of CCC meetings;
   (f) a copy of any Annual Reviews (over the last 5 years);
   (g) a copy of any Independent Environmental Audit, and the Proponent's response to the recommendations in any audit; and
   (h) any other matter required by the Secretary.

APPENDIX 1
SCHEDULE OF LAND

EXISTING MINING LEASES		
Lot Number	**Deposited Plan Number**	**Parish**
2	1093785	Clarendon
9	113692	Clarendon
10	113692	Clarendon
128	750371	Clarendon
127	750371	Clarendon
126	750371	Clarendon
125	750371	Clarendon
124	750371	Clarendon
96	750371	Clarendon
95	750371	Clarendon
97	750371	Clarendon
212	865598	Clarendon
211	865598	Clarendon
93	750371	Clarendon
100	576778	Clarendon/Waldegrave
8	209035	Waldegrave
40	705768	Waldegrave
1	47553	Waldegrave
158	750371	Clarendon
134	750371	Clarendon
153	750371	Clarendon
6	511485	Clarendon
100	750371	Clarendon
87	750371	Clarendon
5	865599	Clarendon
99	750371	Clarendon
A	437767	Clarendon
166	750371	Clarendon
6	865599	Clarendon
103	750371	Clarendon
C	437767	Clarendon
101	576778	Waldegrave
2	47553	Waldegrave
3	47553	Waldegrave
15	234195	Waldegrave
18	234195	Waldegrave
4	209035	Waldegrave
3	209035	Waldegrave
17	234195	Waldegrave
6	209035	Waldegrave
7	655732	Waldegrave
19	234195	Waldegrave
20	234195	Waldegrave
21	750415	Waldegrave
41	705768	Waldegrave
8	47553	Waldegrave
22	750415	Waldegrave
7	47553	Waldegrave
23 part	1078095	Waldegrave
49	750371	Clarendon
3	113692	Clarendon
10	252284	Waldegrave
6	47553	Waldegrave

EXISTING MINING LEASES		
Lot Number	**Deposited Plan Number**	**Parish**
240	750415	Waldegrave
193	750415	Waldegrave
192	750415	Waldegrave
241	750415	Waldegrave
2	47552	Waldegrave
151	750415	Waldegrave
155	750415	Waldegrave
152	750362	Blake
64	750362	Blake
5	47552	Blake
1	816924	Blake
275	750415	Waldegrave
242	750415	Waldegrave
252	750415	Waldegrave
5	47553	Waldegrave
254	750415	Waldegrave
3	47552	Waldegrave
1	47552	Waldegrave
2	816924	Blake/Waldegrave
20	750415	Waldegrave
7001	1020360	Waldegrave
253	750415	Waldegrave
255	750415	Waldegrave
287	750415	Waldegrave
295	823457	Waldegrave
16	234195	Waldegrave
247	750415	Waldegrave
272	750415	Waldegrave
248	750415	Waldegrave
251	750415	Waldegrave
1	750362	Blake
2	750362	Blake
5	750362	Blake
21	825426	Blake
3	731180	Blake
3	750362	Blake
4	750362	Blake
1	731180	Blake
22	825426	Blake
6	47552	Blake/Waldegrave
24 part	750362	Blake
25	750362	Blake
201 part	1037198	Carlton
21 part	1038104	Blake
38	750362	Blake
39	750362	Blake
102 part	1040753	Blake/Waldegrave
3 part	871086	Blake
Crown roads and public roads located within and between the above titles		
Crown land located within and between the above titles		

MINING LEASE APPLICATION AREA		
Lot Number	**Deposited Plan Number**	**Parish**
23 part	1078095	Waldegrave
102 part	1040753	Blake/Waldegrave
22 part	1078095	Waldegrave
Cadia Road part	Between Lot 23 DP1078095 and Lot 22 DP1078095	Waldegrave
3 part	871086	Blake
21 part	1038104	Blake

BLAYNEY DEWATERING FACILITY		
Lot Number	**Deposited Plan Number**	**Parish**
299	1004555	Lindsay
1	1006860	Lindsay

CVO DEWATERING FACILITY		
Lot Number	**Deposited Plan Number**	**Parish**
2	1073048	Napier
3	1073048	Napier

CONCENTRATE PIPELINE (from Cadia Valley to Blayney Dewatering Facility)		
Lot Number	**Deposited Plan Number**	**Parish**
255	750415	Waldegrave
16	234195	Waldegrave
248	750415	Waldegrave
272	750415	Waldegrave
22	750415	Waldegrave
8	47553	Waldegrave
23	1078095	Waldegrave
	Location Description	**Parish**
CADIA ROAD	North of Lot 23 DP1078095 to intersection with Woodville Road	Waldegrave
WOODVILLE ROAD	North of Lot 23 DP1078095 generally in a east and north east direction to the intersection with Long Swamp Road	Waldegrave
LONG SWAMP ROAD	North of Lot 10 DP1009643 generally in a east and south east direction to the intersection with Carbine Road	Beneree
CARBINE ROAD	East of Lot B DP961816 generally in a south direction to the intersection with Ovington Lane	Beneree
OVINGTON LANE	North of Lot 340 DP1049610 generally in a south east and east direction to the intersection with Waterson Lane	Calvert
WATERSON LANE	West and North of Lot 1 DP750367 generally in a North and North East direction to the intersection with Tallwood Road	Calvert
TALLWOOD ROAD	West of Lot 4 DP1061305 generally in a South, South East and East direction to Lot 7001 DP1020284	Calvert
Lot Number	**Deposited Plan Number**	**Parish**
7001	1020284	Calvert
	Location Description	**Parish**
TALLWOOD ROAD	South West and West of Lot 335 DP750367 generally in a South, South East and East direction to intersection with Matthews Road	Calvert
MATTHEWS ROAD	North of Lot 1 DP1093688 generally in a East South East and South direction to the intersection with Browns Creek Road	Lindsay
BROWNS CREEK ROAD	South of Lot 130 DP874276 East direction to the intersection with Millthorpe Road	Lindsay
MILLTHORPE ROAD	West and South West of Lot 1 DP827318 to Lot 1 DP829674	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
1	829674	Lindsay

CONCENTRATE PIPELINE (from Cadia Valley to Blayney Dewatering Facility)		
Lot Number	**Deposited Plan Number**	**Parish**
2	829674	Lindsay
1	241681	Lindsay
	Location Description	**Parish**
PALMER STREET, BLAYNEY	East of Lot 1 DP241681 to Lot 28 DP1061031	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
28	1061031	Lindsay
48	1063125	Lindsay
20	1082402	Lindsay
	Location Description	**Parish**
DOUST STREET, BLAYNEY	Generally East and South East to a point near Lot 9 DP1097231	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
9	1097231	Lindsay
10	1097231	Lindsay
	Location Description	**Parish**
MAIN WESTERN RAILWAY CORRIDOR	Generally in a North direction	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
1	DP1006860	Lindsay

NEW CONCENTRATE PIPELINE (from Cadia Valley to Blayney Dewatering Facility then to CVO Dewatering Facility)		
Lot Number	**Deposited Plan Number**	**Parish**
255	750415	Waldegrave
16	234195	Waldegrave
248	750415	Waldegrave
272	750415	Waldegrave
22	750415	Waldegrave
8	47553	Waldegrave
23	1078095	Waldegrave
	Location Description	**Parish**
CADIA ROAD	North of Lot 23 DP1078095 to intersection with Woodville Road	Waldegrave
WOODVILLE ROAD	North of Lot 23 DP1078095 generally in a east and north east direction to the intersection with Long Swamp Road	Waldegrave
LONG SWAMP ROAD	North of Lot 10 DP1009643 generally in a east and south east direction to the intersection with Carbine Road	Beneree
CARBINE ROAD	East of Lot B DP961816 generally in a south direction to the intersection with Ovington Lane	Beneree
OVINGTON LANE	North of Lot 340 DP1049610 generally in a south east and east direction to the intersection with Waterson Lane	Calvert
WATERSON LANE	West and North of Lot 1 DP750367 generally in a North and North East direction to the intersection with Tallwood Road	Calvert
TALLWOOD ROAD	West of Lot 4 DP1061305 generally in a South, South East and East direction to Lot 7001 DP1020284	Calvert
Lot Number	**Deposited Plan Number**	**Parish**
7001	1020284	Calvert
	Location Description	**Parish**
TALLWOOD ROAD	South West and West of Lot 335 DP750367 generally in a South, South East and East direction to intersection with Matthews Road	Calvert
MATTHEWS ROAD	North of Lot 1 DP1093688 generally in a East South East and South direction to the intersection with Browns Creek Road	Lindsay
BROWNS CREEK ROAD	South of Lot 130 DP874276 East direction to the intersection with Millthorpe Road	Lindsay
MILLTHORPE ROAD	West and South West of Lot 1 DP827318 to	Lindsay

NEW CONCENTRATE PIPELINE (from Cadia Valley to Blayney Dewatering Facility then to CVO Dewatering Facility)		
	Lot 1 DP829674	
Lot Number	**Deposited Plan Number**	**Parish**
1	829674	Lindsay
2	829674	Lindsay
1	241681	Lindsay
	Location Description	**Parish**
PALMER STREET, BLAYNEY	East of Lot 1 DP241681 to Lot 28 DP1061031	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
28	1061031	Lindsay
48	1063125	Lindsay
20	1082402	Lindsay
	Location Description	**Parish**
DOUST STREET, BLAYNEY	Generally East and South East to a point near Lot 9 DP1097231	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
9	1097231	Lindsay
10	1097231	Lindsay
	Location Description	**Parish**
MAIN WESTERN RAILWAY CORRIDOR	Generally in a North direction	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
1	DP1006860	Lindsay

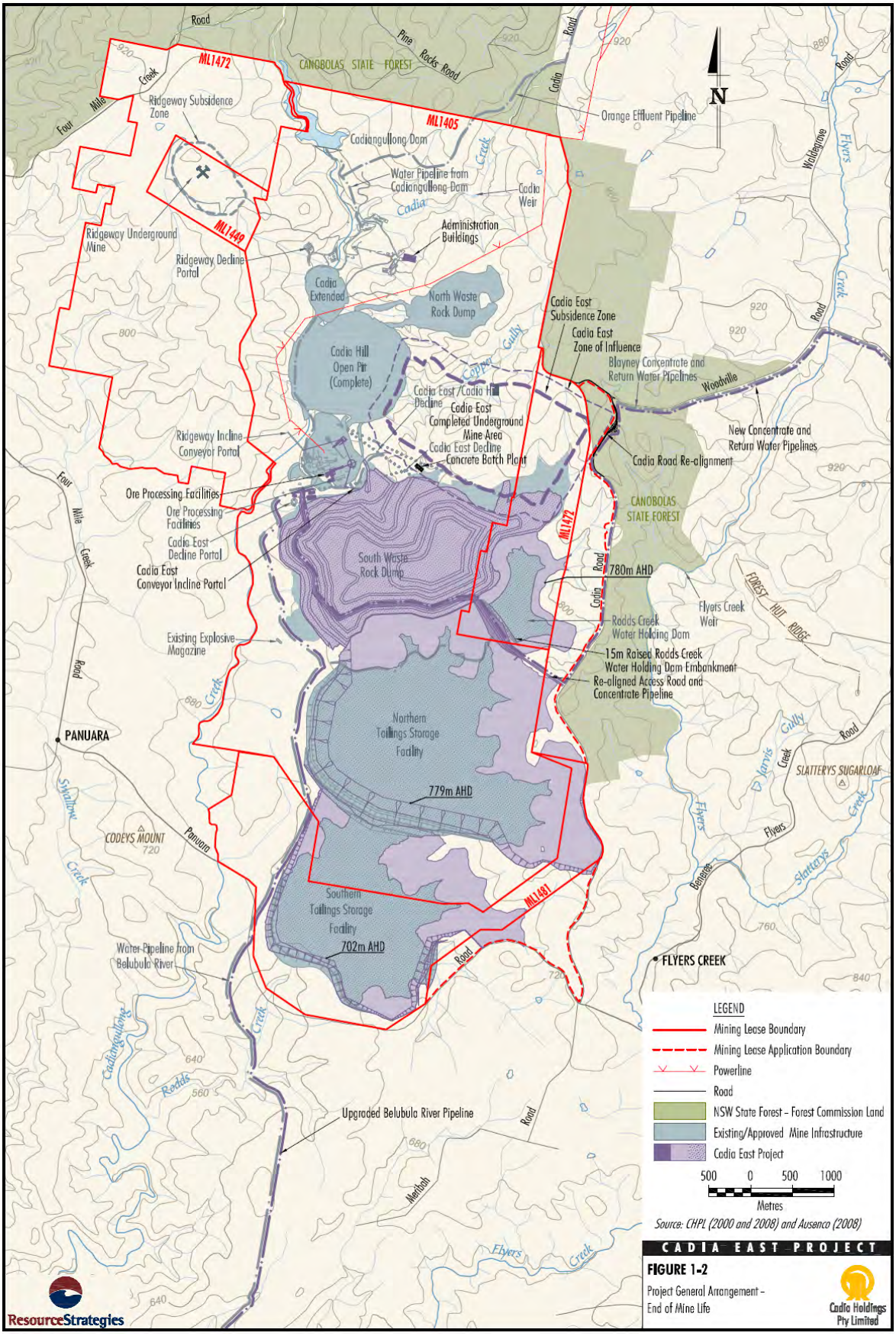
NEW CONCENTRATE PIPELINE (from Blayney Dewatering Facility to CVO Dewatering Facility)		
	Location Description	**Parish**
MAIN WESTERN RAILWAY CORRIDOR	Generally in a East direction to Lot 1 DP1098682	Lindsay
Lot Number	**Deposited Plan Number**	**Parish**
1	1098682	Napier
2	1073048	Napier
3	1073048	Napier

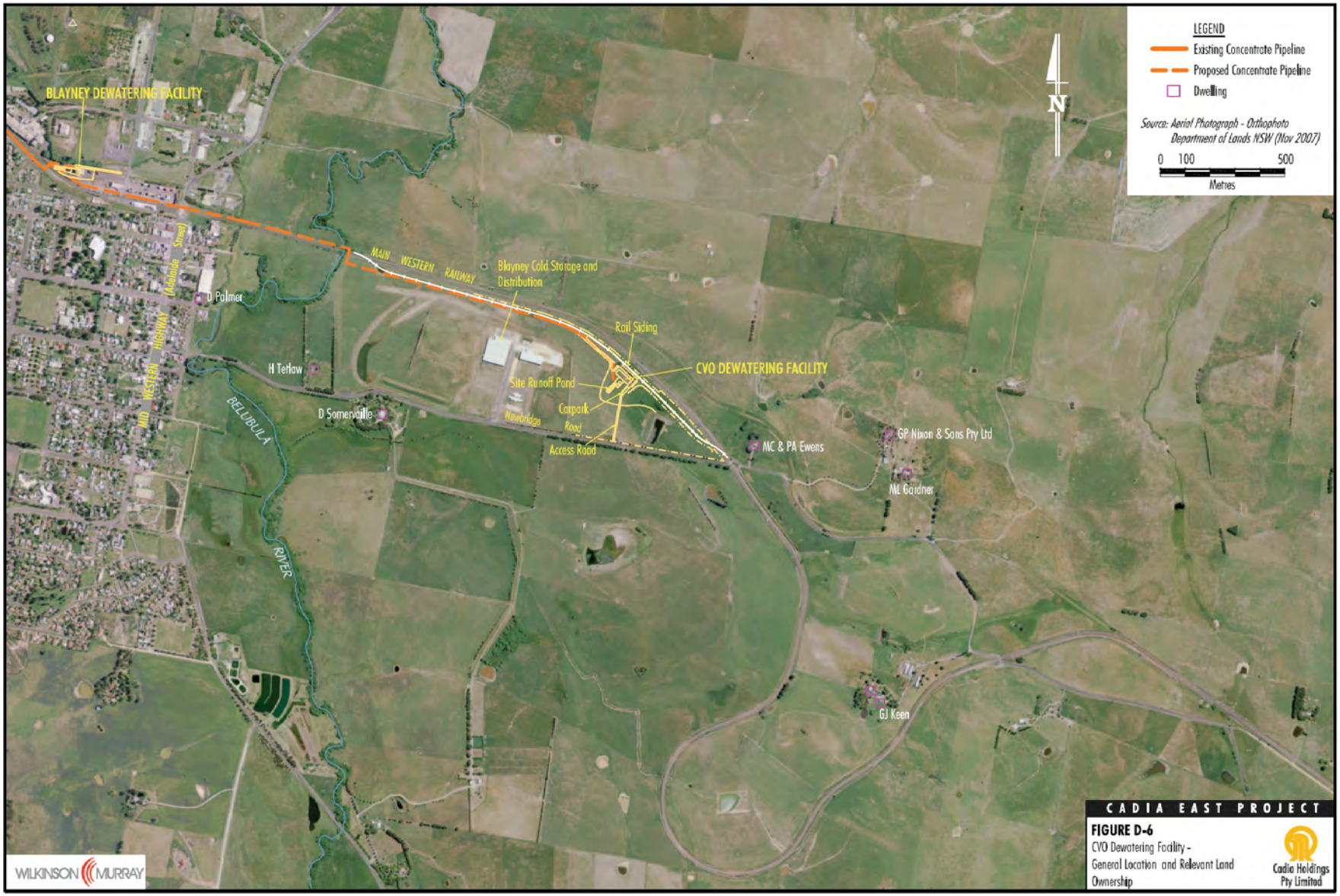
BELUBULA RIVER PIPELINE		
Lot Number	**Deposited Plan Number**	**Parish**
21	825426	Blake
1	731180	Blake
24	750362	Blake
25	750362	Blake
201	1037198	Carlton
21	1038104	Blake

PANUARA ROAD		Blake
Lot Number	**Deposited Plan Number**	**Parish**
22	1038104	Blake
141	1082789	Blake/Carlton
	Location Description	**Parish**
Crown land	Between Lot 141 DP1082789 and Lot 180 DP750386	Blake/Carlton

FLYERS CREEK WEIR		
Lot Number	**Deposited Plan Number**	**Parish**
Crown land	Between Lot 22 DP1078095 and Lot 32 DP750367	Waldegrave
22	1078095	Waldegrave
2	776655	Waldegrave
Cadia Road part	Between Lot 23 DP1078095 and Lot 22 DP1078095	Waldegrave

APPENDIX 2
PROJECT LAYOUT PLANS




BLAYNEY DEWATERING FACILITY
MAIN WESTERN RAILWAY
Blayney Cold Storage and Distribution
Rail Siding
CVO DEWATERING FACILITY
Site Runoff Pond
Carpark
Newbridge Road
Access Road
Mid Western Highway (Adelaide Street)
D Palmer
H Terlow
D Somerville
BELUBULA RIVER
MC & PA Ewens
GP Nixon & Sons Pty Ltd
ML Gardner
GJ Keen
N
LEGEND
Existing Concentrate Pipeline
Proposed Concentrate Pipeline
Dwelling
Source: Aerial Photograph - Orthophoto
Department of Lands NSW (Nov 2007)
0 100 500
Metres
WILKINSON MURRAY
CADIA EAST PROJECT
FIGURE D-6
CVO Dewatering Facility -
General Location and Relevant Land Ownership
Cadia Holdings Pty Limited

APPENDIX 3
PREVIOUS EAS

Cadia Hill Mine
Development Application 44/95 and Environmental Impact Statement titled Cadia Gold Mine, dated October 1995, and prepared by AGC Woodward-Clyde Pty Limited, as amended by the following:

- Submissions to the Commission of Inquiry;
- Modification Application MOD-92-11-2002-i;
- Statement of Environmental Effects titled Cadia Hill Gold Mine, dated October 2002, and prepared by Resource Strategies Pty. Ltd.;
- Modification application MOD 98-9-2003 I, and accompanying Statement of Environmental Effects titled Cadia Hill Gold Mine – Cadia North Waste Rock Modification, dated September 2003 and prepared by Cadia Holdings Pty Limited;
- Statement of Environmental Effects titled Cadia Valley Operations – Concentrate Road Transport;
- Modification, dated March 2004, and prepared by Cadia Holdings Pty Limited and Resource Strategies;
- Statement of Environmental Effects titled Cadia Valley Operations South Dump Modification dated May 2004, and prepared by Cadia Holdings Pty Limited; and
- Cadia Hill Gold Mine – Development Consent Modification Application, dated 11 May 2007;
- Cadia Hill Gold Mine – Development Consent Modification Application and supporting documentation, dated 30 November 2007;
- Modification application 44/95 MOD 7, and accompanying Statement of Environmental Effects titled Cadia Valley Operations – South Waste Rock Dump Modification, dated February 2008;
- Modification application DA 44/95 MOD 8, and accompanying supporting documentation titled Cadia Valley Operations Water Efficiency Modification – Environmental Review, dated September 2008;
- Modification application 44/95 MOD 9, and accompanying supporting documentation titled Cadia Valley Operations Processing Rate Modification – Environmental Review, dated October 2008;
- Modification application MOD 10 and supporting documentation dated 25 August 2009.

Ridgeway Mine
Development Application 134-04-00, and Environmental Impact Statement titled Ridgeway Gold Project, dated April 2000, and prepared by Resource Strategies Pty Limited, as amended by the following:

- Submission to the Commission of Inquiry
- application to modify a development consent numbered 134-04-00/ M1, submitted to the Department of Urban Affairs and Planning on 7 April 2001, in accordance with Section 96(1A) of the Act, and supporting documentation produced by Resource Strategies Pty Limited, dated April 2001;
- the modification application MOD-Cadia-2004, and accompanying Statement of Environmental Effects titled Cadia Valley Operations – Concentrate Road Transport Modification, dated March 2004, and prepared by Cadia Holdings Pty Limited and Resource Strategies;
- Statement of Environmental Effects titled Cadia Valley Operations South Dump Modification, dated May 2004, and prepared by Cadia Holdings Pty Limited;
- Ridgeway Project – Development Consent Modification Application, dated 10 May 2007;
- Modification application 134-04-00 MOD 6, and accompanying Statement of Environmental Effects titled Cadia Valley Operations – South Waste Rock Dump Modification, dated February 2008;
- Modification application 134-04-00 MOD 7, and accompanying supporting documentation titled Ridgeway Project Modification – Environmental Review, dated March 2008,
- Modification application 134-04-00 MOD 8, and accompanying supporting documentation titled Cadia Valley Operations Water Efficiency Modification – Environmental Review, dated September 2008,
- Modification application 134-04-00 MOD 9, and accompanying supporting documentation titled Cadia Valley Operations Processing Rate Modification Environmental Review, dated October 2008,
- Modification application 134-04-00 MOD 10, and accompanying supporting documentation titled Cadia Valley Operations High Grade Circuit Modification – Environmental Review, dated October 2009.

Ridgeway Deeps Mine Extension
DA 257-10-2004 and Statement of Environmental Effects, dated October 2004, and prepared by Resource Strategies Pty Ltd, as amended by:

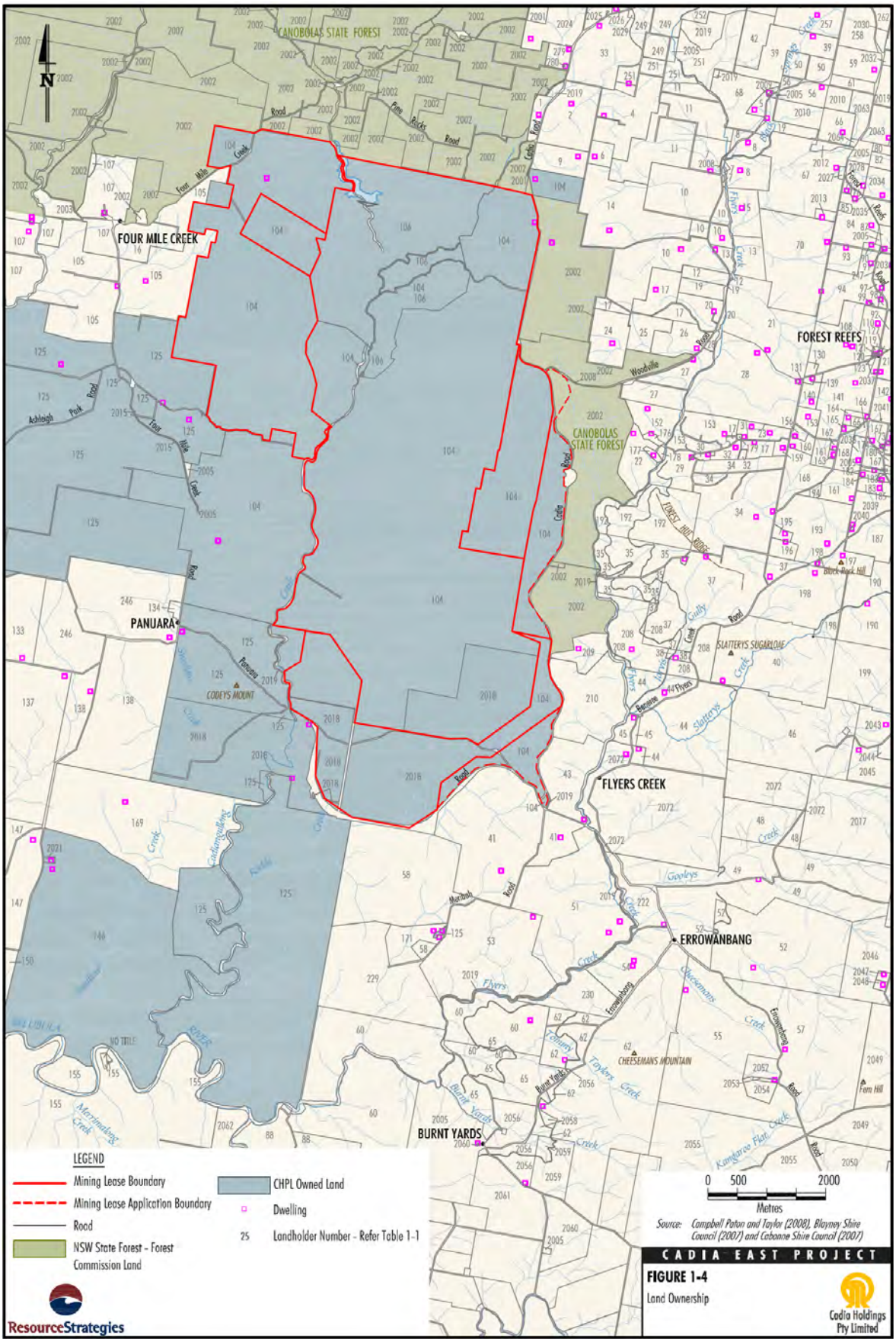
- Modification application DA 257-10-2004 MOD 1, and accompanying supporting documentation titled Ridgeway Project Modification – Environmental Review, dated March 2008;
- Modification application DA 257-10-2004 MOD 2, and accompanying supporting documentation titled Cadia Valley Operations Water Efficiency Modification – Environmental Review, dated September 2008;
- Modification application DA 257-10-2004 MOD 3, and accompanying supporting documentation titled Cadia Valley Operations Processing Rate Modification Environmental Review, dated October 2008;
- Modification application 257-10-2004 MOD 4, and accompanying supporting documentation titled Cadia Valley Operations High Grade Circuit Modification – Environmental Review, dated October 2009.

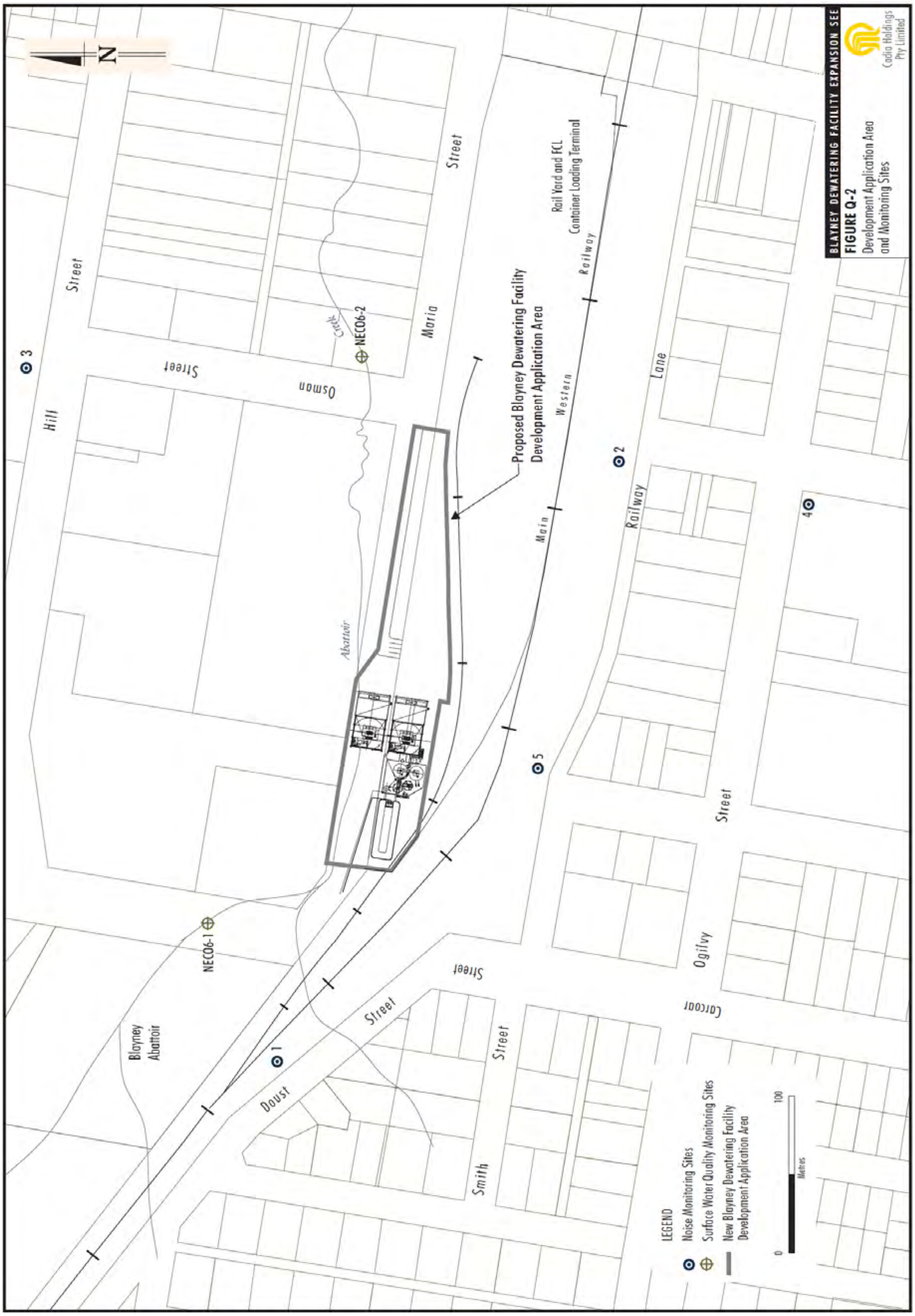
Blayney Dewatering Facility
Development Application No. 133-04-00 and Statement of Environmental Effects dated April, 2000, and prepared by Resource Strategies Pty Ltd, as amended by:

- All other relevant documentation including additional information provided to DUAP and the Commission of Inquiry including the Primary Submission and responses to questions;
- Application to modify a development consent numbered 133-04-00/m1, submitted to the Department of Urban Affairs and Planning on 1 May 2001, in accordance with Section 96(1A) of the Act, and supporting documentation produced by Resource Strategies Pty Limited, dated April 2001;
- Modification application MOD-Cadia-2004 and the accompanying Statement of Environmental Effects titled “Cadia Valley Operations – Concentrate Road Transport Modification SEE”, prepared by Cadia Holdings Pty Limited and Resource Strategies, dated March 2004;
- Modification application MOD-2-1-2005 and the accompanying Statement of Environmental Effects titled “Blayney Concentrate Dewatering and Loading Facility, Section 96(1A) Loading Modification, Supporting Information”, prepared by Cadia Holdings Pty Limited and Resource Strategies Pty Ltd, dated December 2004.

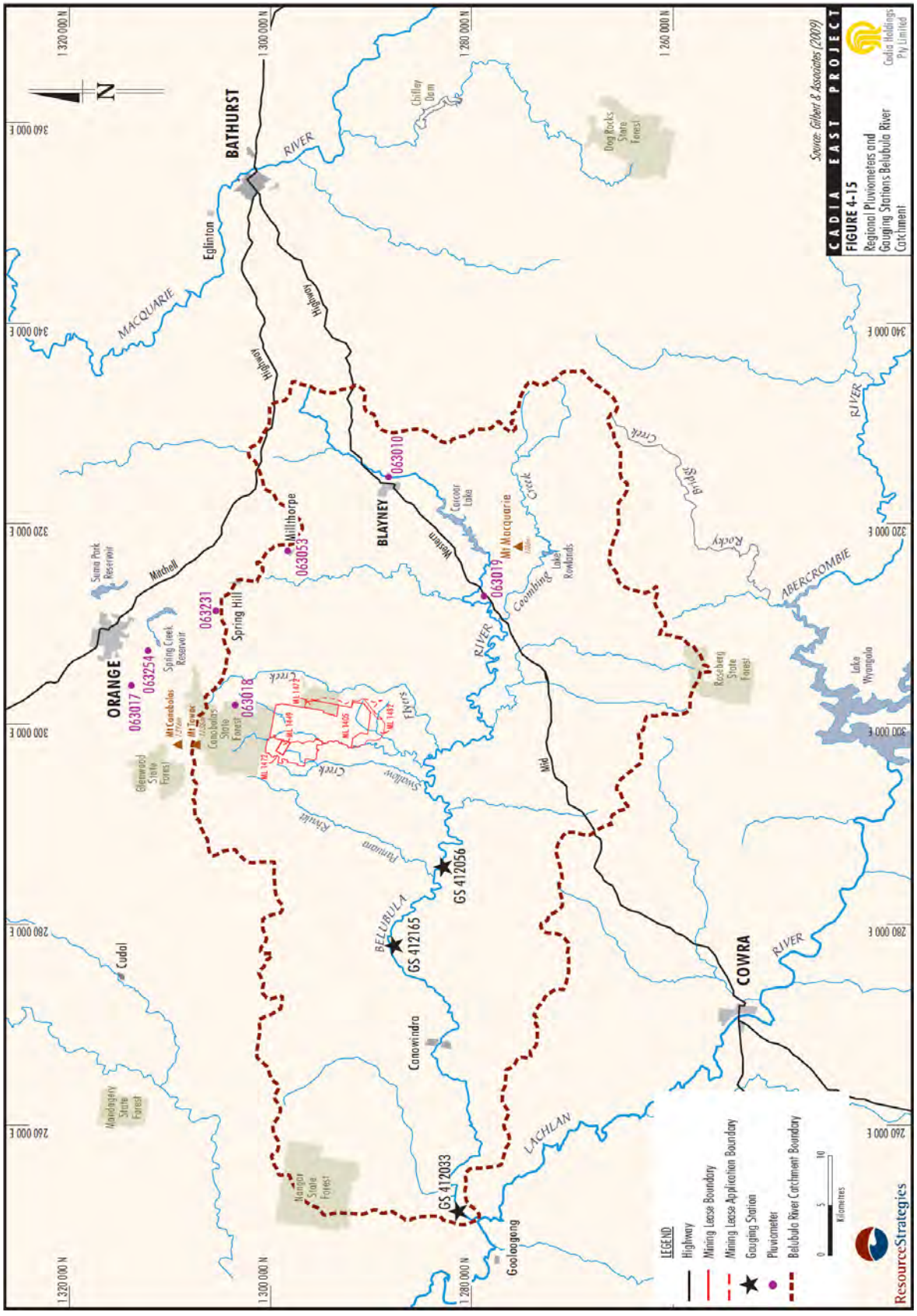
APPENDIX 4
RECEIVER LOCATION PLANS

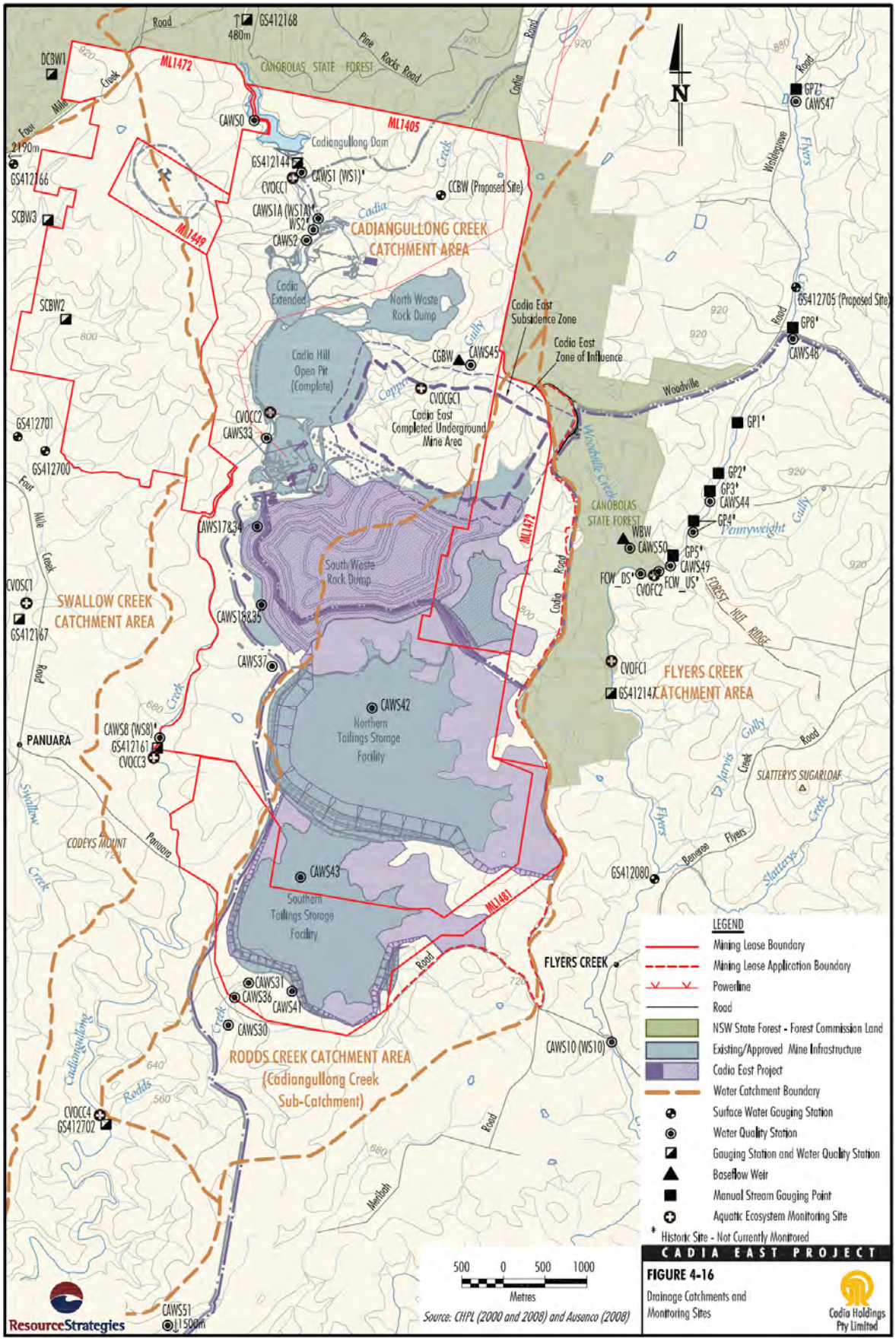
(Note: The receiver locations for the CVO Dewatering Facility are shown on the relevant plan in Appendix 2).

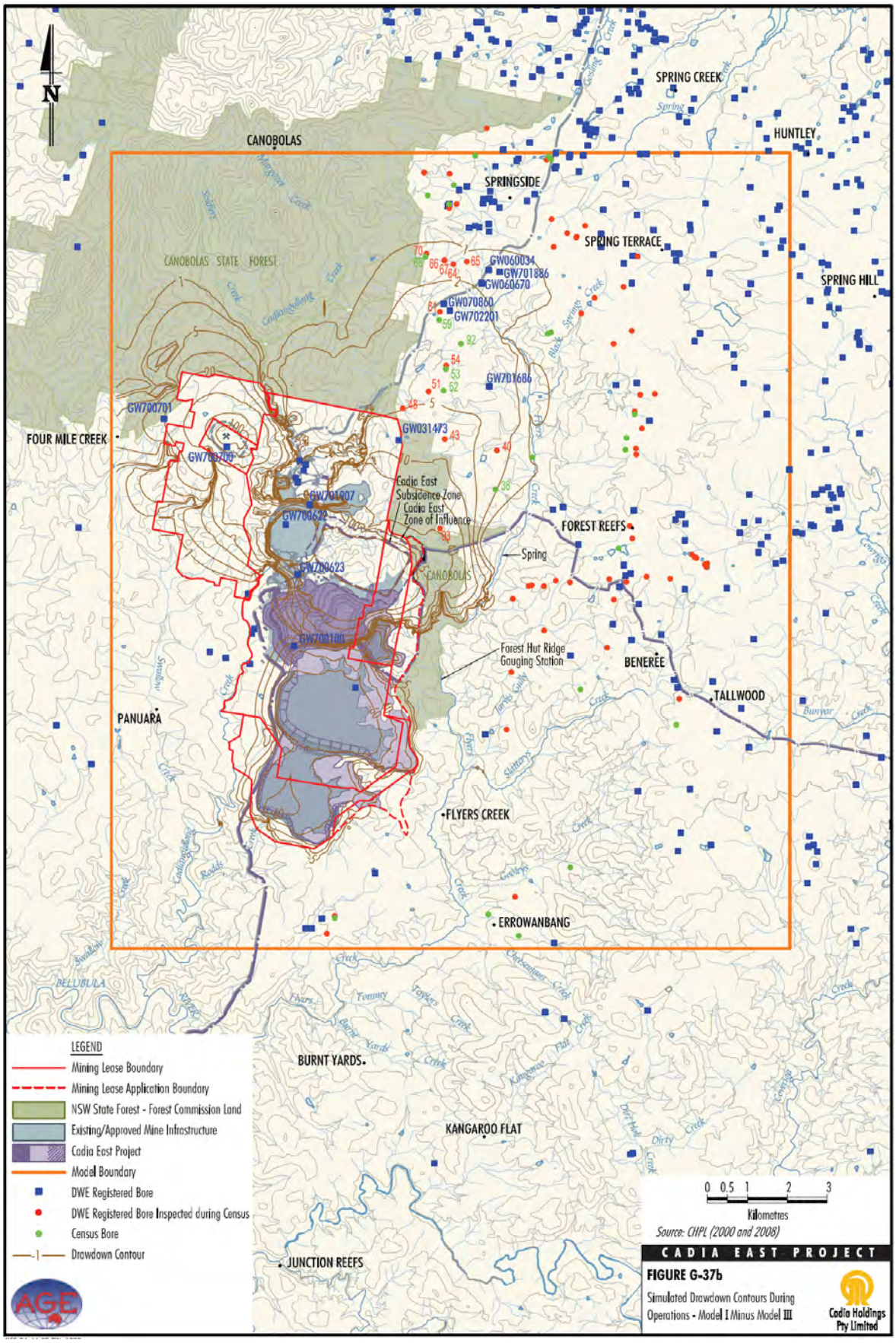



BLAYNEY DEWATERING FACILITY EXPANSION SEE
FIGURE Q-2
Development Application Area
and Monitoring Sites
Cadia Holdings
Pty Limited
N
Hill Street
Osman Street
Maria Street
Creek
Abattoir
NEC06-2
NEC06-1
Blayney
Abattoir
Rail Yard and FCL
Container Loading Terminal
Railway
Proposed Blayney Dewatering Facility
Development Application Area
Main Western Railway
Lane
Railway
Ogilvy Street
Carcoar Street
Doust Street
Smith Street
1
2
3
4
5
LEGEND
Noise Monitoring Sites
Surface Water Quality Monitoring Sites
New Blayney Dewatering Facility
Development Application Area
0
100
Metres

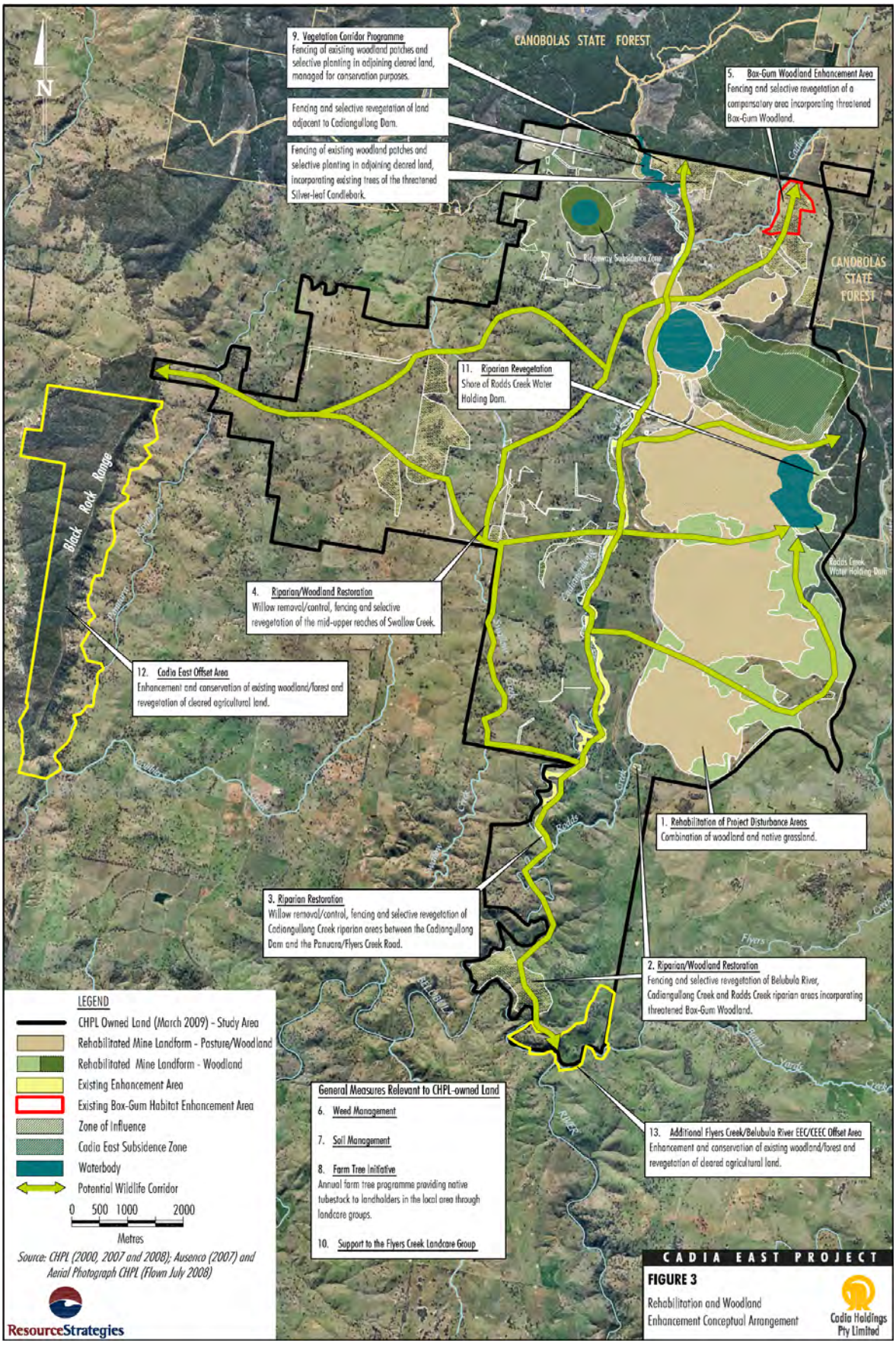
APPENDIX 5
WATER CATCHMENTS AND GROUNDWATER DRAWDOWN PLANS

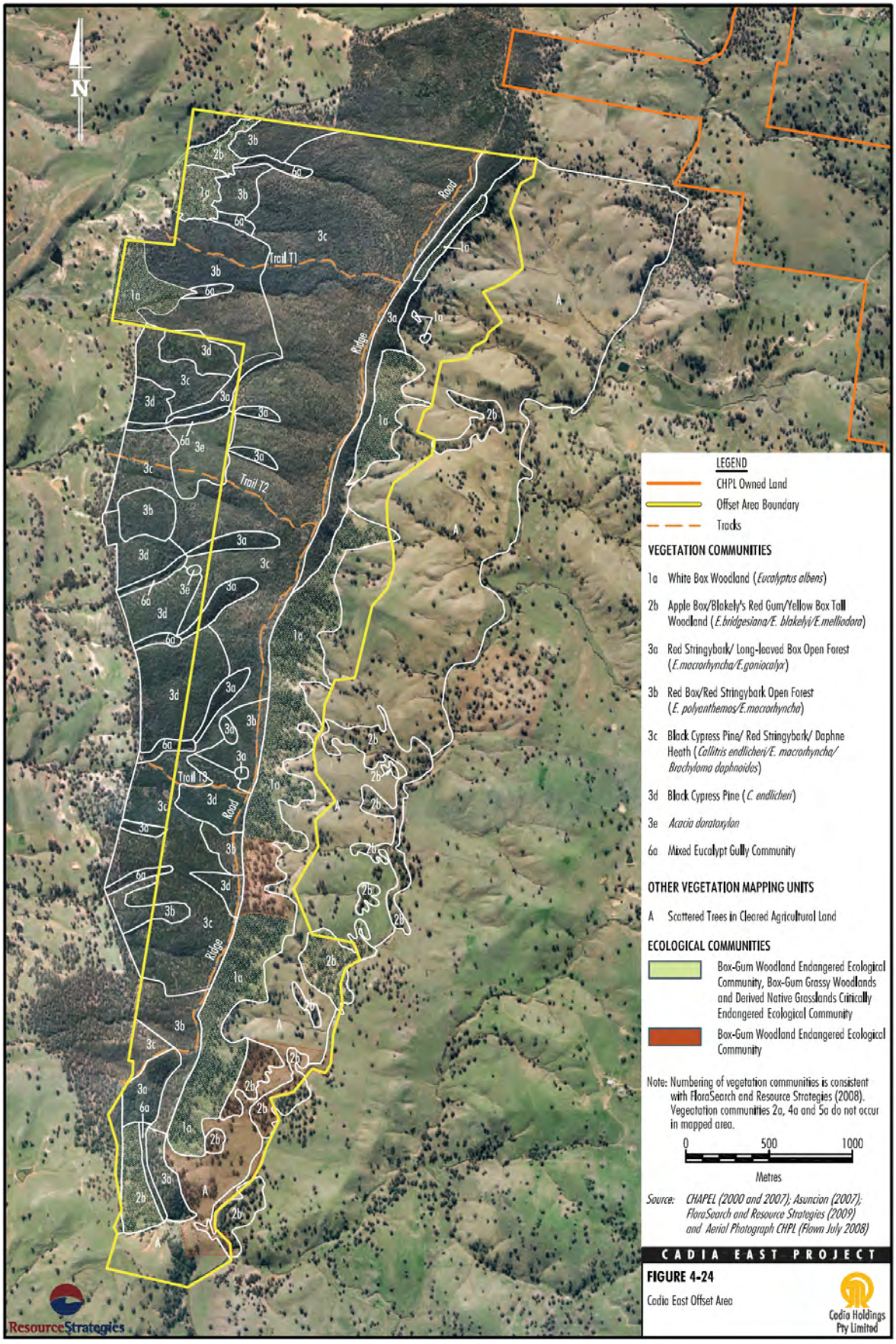


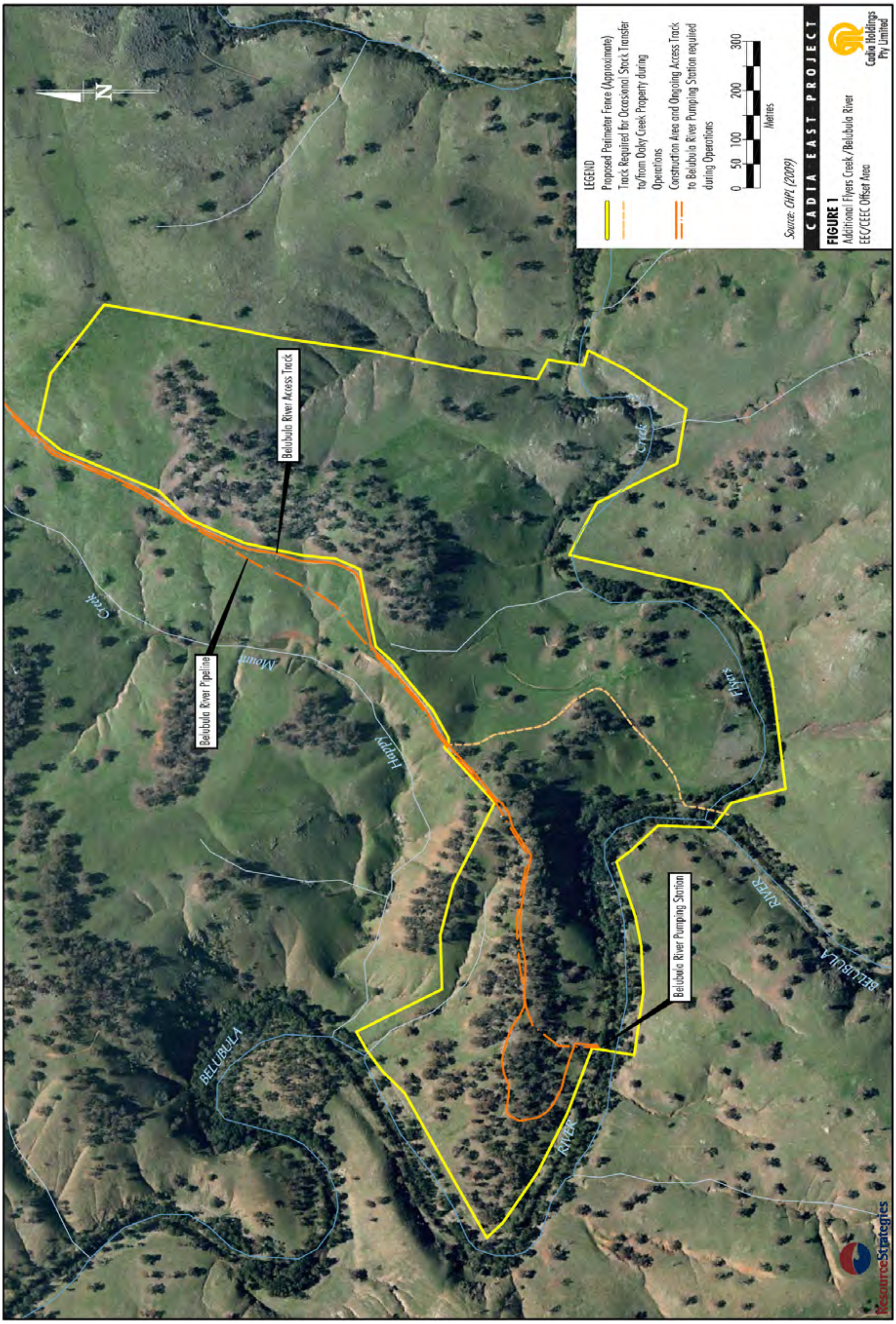

CADIANGULLONG CREEK CATCHMENT AREA
SWALLOW CREEK CATCHMENT AREA
RODDS CREEK CATCHMENT AREA (Cadiangullong Creek Sub-Catchment)
FLYERS CREEK CATCHMENT AREA
CANOBOLAS STATE FOREST
ML1472
ML1405
ML1449
ML1461
Cadia East Subsidence Zone
Cadia East Zone of Influence
Cadia East Completed Underground Mine Area
Cadia Hill Open Pit (Complete)
North Waste Rock Dump
South Waste Rock Dump
Northern Tailings Storage Facility
Southern Tailings Storage Facility
Cadiangullong Dam
CCBW (Proposed Site)
GS412705 (Proposed Site)
PANUARA
FLYERS CREEK
SLATTERYS SUGARLOAF
CODEYS MOUNT
LEGEND
Mining Lease Boundary
Mining Lease Application Boundary
Powerline
Road
NSW State Forest - Forest Commission Land
Existing/Approved Mine Infrastructure
Cadia East Project
Water Catchment Boundary
Surface Water Gauging Station
Water Quality Station
Gauging Station and Water Quality Station
Baseflow Weir
Manual Stream Gauging Point
Aquatic Ecosystem Monitoring Site
* Historic Site - Not Currently Monitored
500 0 500 1000
Metres
Source: CHPL (2000 and 2008) and Ausenco (2008)
CADIA EAST PROJECT
FIGURE 4-16
Drainage Catchments and Monitoring Sites
ResourceStrategies
Cadia Holdings Pty Limited


N
CANOBOLAS
SPRINGSIDE
SPRING CREEK
HUNTLEY
SPRING TERRACE
SPRING HILL
CANOBOLAS STATE FOREST
GW060034
GW701886
GW060670
GW070880
GW702201
GW701686
GW700701
GW700700
GW031473
FOUR MILE CREEK
Cadia East Subsidence Zone / Cadia East Zone of Influence
GW701907
GW700622
GW700623
GW700100
FOREST REEFS
Spring
CANOBOLAS
Forest Hut Ridge Gauging Station
BENEREE
TALLWOOD
PANUARA
FLYERS CREEK
ERROWANBANG
BELUBULA
BURNT YARDS
KANGAROO FLAT
JUNCTION REEFS
LEGEND
Mining Lease Boundary
Mining Lease Application Boundary
NSW State Forest - Forest Commission Land
Existing/Approved Mine Infrastructure
Cadia East Project
Model Boundary
DWE Registered Bore
DWE Registered Bore Inspected during Census
Census Bore
Drawdown Contour
AGE
0 0.5 1 2 3
Kilometres
Source: CHPL (2000 and 2008)
CADIA EAST PROJECT
FIGURE G-37b
Simulated Drawdown Contours During Operations - Model I Minus Model III
Cadia Holdings Pty Limited

APPENDIX 6
REHABILITATION PLAN AND OFFSET STRATEGY




N
Trail T1
Trail T2
Trail T3
Road
Ridge
LEGEND
CHPL Owned Land
Offset Area Boundary
Tracks
VEGETATION COMMUNITIES
1a White Box Woodland (Eucalyptus albens)
2b Apple Box/Blakely's Red Gum/Yellow Box Tall Woodland (E.bridgesiana/E. blakelyi/E.melliodora)
3a Red Stringybark/ Long-leaved Box Open Forest (E.macrorhyncha/E.goniocalyx)
3b Red Box/Red Stringybark Open Forest (E. polyanthemos/E.macrorhyncha)
3c Black Cypress Pine/ Red Stringybark/ Daphne Heath (Callitris endlicheri/E. macrorhyncha/ Brachyloma daphnoides)
3d Black Cypress Pine (C. endlicheri)
3e Acacia doratoxylon
6a Mixed Eucalypt Gully Community
OTHER VEGETATION MAPPING UNITS
A Scattered Trees in Cleared Agricultural Land
ECOLOGICAL COMMUNITIES
Box-Gum Woodland Endangered Ecological Community, Box-Gum Grassy Woodlands and Derived Native Grasslands Critically Endangered Ecological Community
Box-Gum Woodland Endangered Ecological Community
Note: Numbering of vegetation communities is consistent with FloraSearch and Resource Strategies (2008). Vegetation communities 2a, 4a and 5a do not occur in mapped area.
0 500 1000
Metres
Source: CHAPEL (2000 and 2007); Asuncion (2007); FloraSearch and Resource Strategies (2009) and Aerial Photograph CHPL (Flown July 2008)
CADIA EAST PROJECT
FIGURE 4-24
Cadia East Offset Area
ResourceStrategies
Cadia Holdings Pty Limited


N
LEGEND
Proposed Perimeter Fence (Approximate)
Track Required for Occasional Stock Transfer to/from Oaky Creek Property during Operations
Construction Area and Ongoing Access Track to Belubula River Pumping Station required during Operations
0 50 100 200 300
Metres
Source: CHPL (2009)
CADIA EAST PROJECT
FIGURE 1
Additional Flyers Creek/Belubula River EEC/CEEC Offset Area
Cadia Holdings Pty Limited
Belubula River Access Track
Belubula River Pipeline
Belubula River Pumping Station
Creek
Flyers
Happy
Mount
Creek
BELUBULA
RIVER
BELUBULA
RIVER
ResourceStrategies

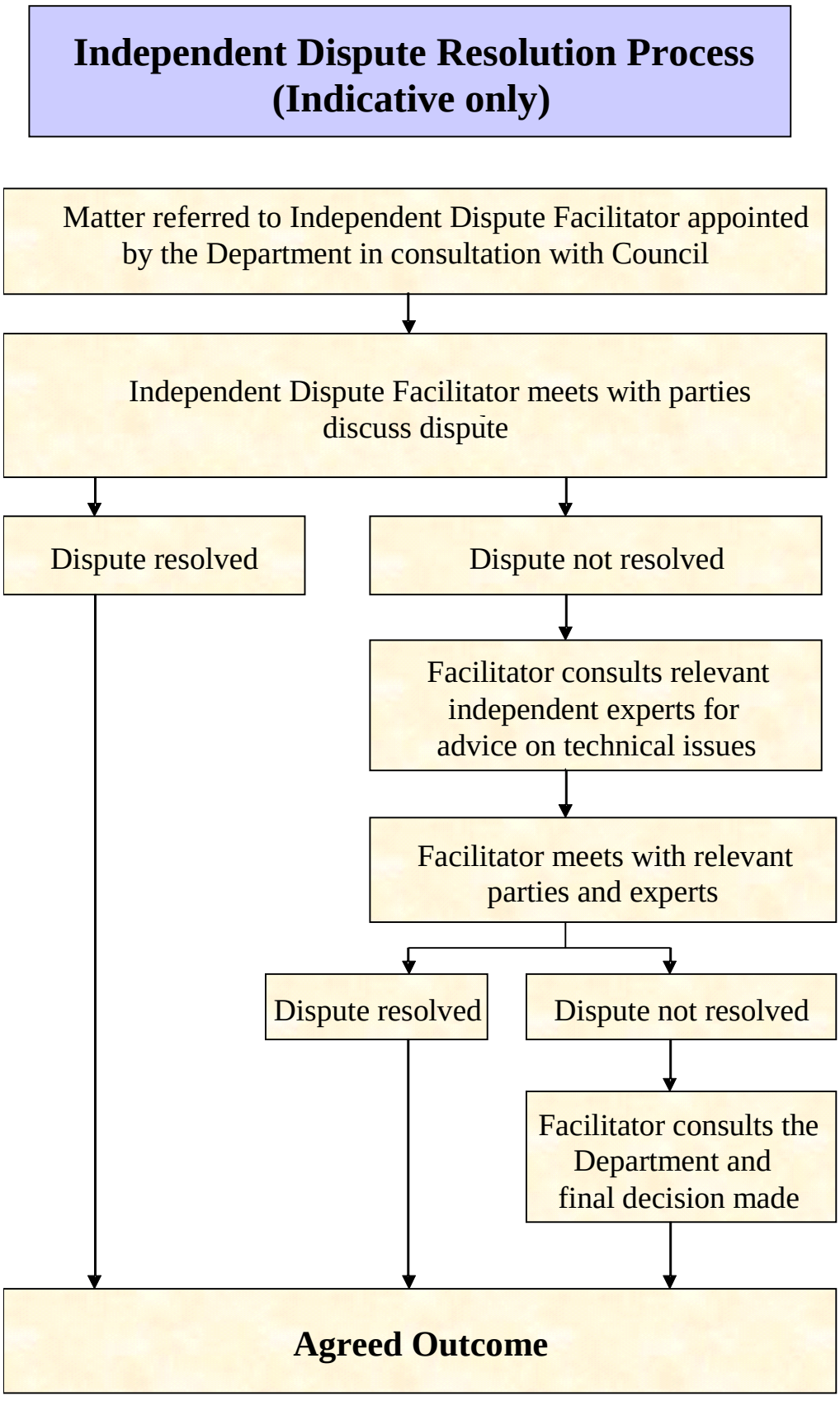
APPENDIX 7
GENERAL TERMS FOR THE PLANNING AGREEMENT

Contributions to the Councils up to a total of $8 million ($3 million upfront [within the first 3 years] and $238,000 each year for 21 years) for:

- upgrade of the Councils' road infrastructure affected by the project; and
- general community enhancement to address social amenity and community infrastructure requirements arising from the project.

Note: The road maintenance agreements will be determined upon completion of a road condition survey and assessment of future maintenance requirements, which will be facilitated by Orange City Council on behalf of the three Councils and the Proponent.

APPENDIX 8
INDEPENDENT DISPUTE RESOLUTION PROCESS



Appendix A

Noise Assessment

ACOUSTICS AND AIR

CADIA VALLEY OPERATIONS

PROCESSING RATE MODIFICATION NOISE ASSESSMENT

REPORT NO. 06325-M
VERSION C

MARCH 2015

PREPARED FOR

CADIA HOLDINGS PTY LIMITED
C/- RESOURCE STRATEGIES PTY LIMITED
SUITE 2, LEVEL 3, 24 MCDOUGALL STREET
MILTON QLD 4064

WILKINSON MURRAY

DOCUMENT CONTROL

Version	Status	Date	Prepared By	Reviewed By
A	Draft	19 February 2015	Roman Haverkamp	Neil Gross
B	Draft	10 March 2015	Roman Haverkamp	Neil Gross
C	Final	16 March 2015	Roman Haverkamp	Neil Gross

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We are committed to and have implemented AS/NZS ISO 9001:2008 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

AAAC

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

Celebrating 50 Years in 2012

Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. 2010 saw the introduction of our Queensland office and 2011 the introduction of our Orange office to service a growing client base in these regions. From these offices, Wilkinson Murray services the entire Asia-Pacific region.

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Figure 5-2 Year 4 Operations Night Time Noise Contours (EA)
Figure 5-3 Year 17 Operations Night Time Noise Contours (EA)
Figure 5-4 Year 17 Operations with Modification Night Time Noise Contours

GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies, largely as a result of road traffic. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. These descriptors, which are demonstrated in the graph below, are here defined.

Maximum Noise Level (L_{Amax}) – The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} – The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} – The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time. The L_{A10} is a common noise descriptor for environmental noise and road traffic noise.

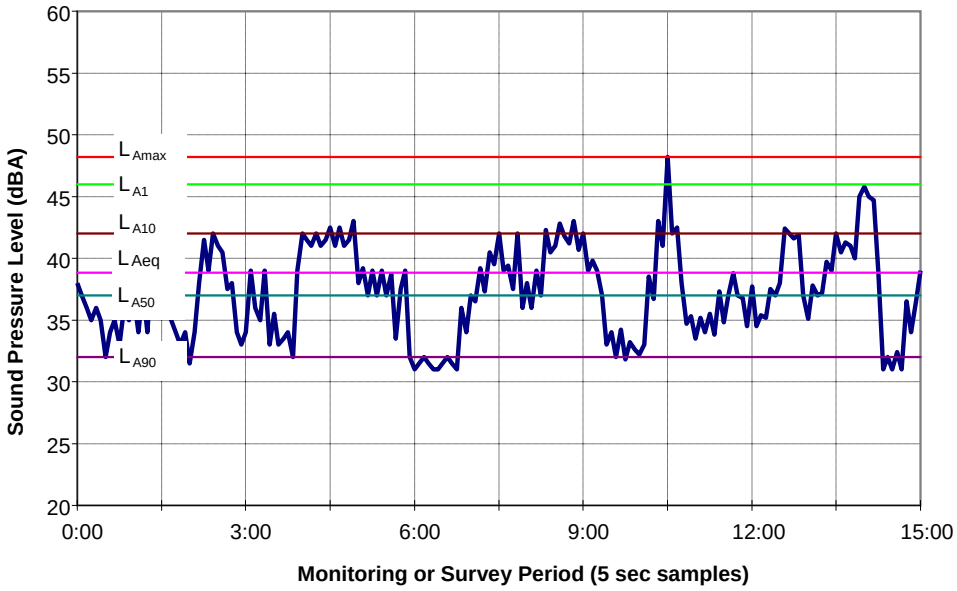
L_{A90} – The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} – The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This measure is also a common measure of environmental noise and road traffic noise.

ABL – The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day. It is determined by calculating the 10th percentile (lowest 10th percent) background level (L_{A90}) for each period.

RBL – The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

Typical Graph of Sound Pressure Level vs Time



1 INTRODUCTION

The Cadia Valley Operations (CVO) are located approximately 25 kilometres (km) south-west of Orange, in the Central Tablelands of New South Wales (NSW) (Figure 1-1). Cadia Holdings Pty Limited (CHPL) is the owner and operator of the CVO and is a wholly owned subsidiary of Newcrest Mining Limited.

The Cadia Hill open pit, Ridgeway underground mine and Cadia East underground mine are located in the Cadia Valley within Mining Lease (ML) 1405, ML 1472, ML 1481 and ML 1449 (Figure 1-1). The Concentrate Dewatering Facility is located approximately 25 km to the east of the Cadia Valley in the town of Blayney (Figure 1-1).

CHPL is proposing to modify the ore processing rate of the CVO. The Processing Rate Modification would include changes to the ore processing facilities to facilitate an increase in the approved ore processing rate at the CVO from 27 million tonnes per annum (Mtpa) to 32 Mtpa.

The Modification would include changes to the ore processing facilities such as additional crushing, grinding and flotation capacity.

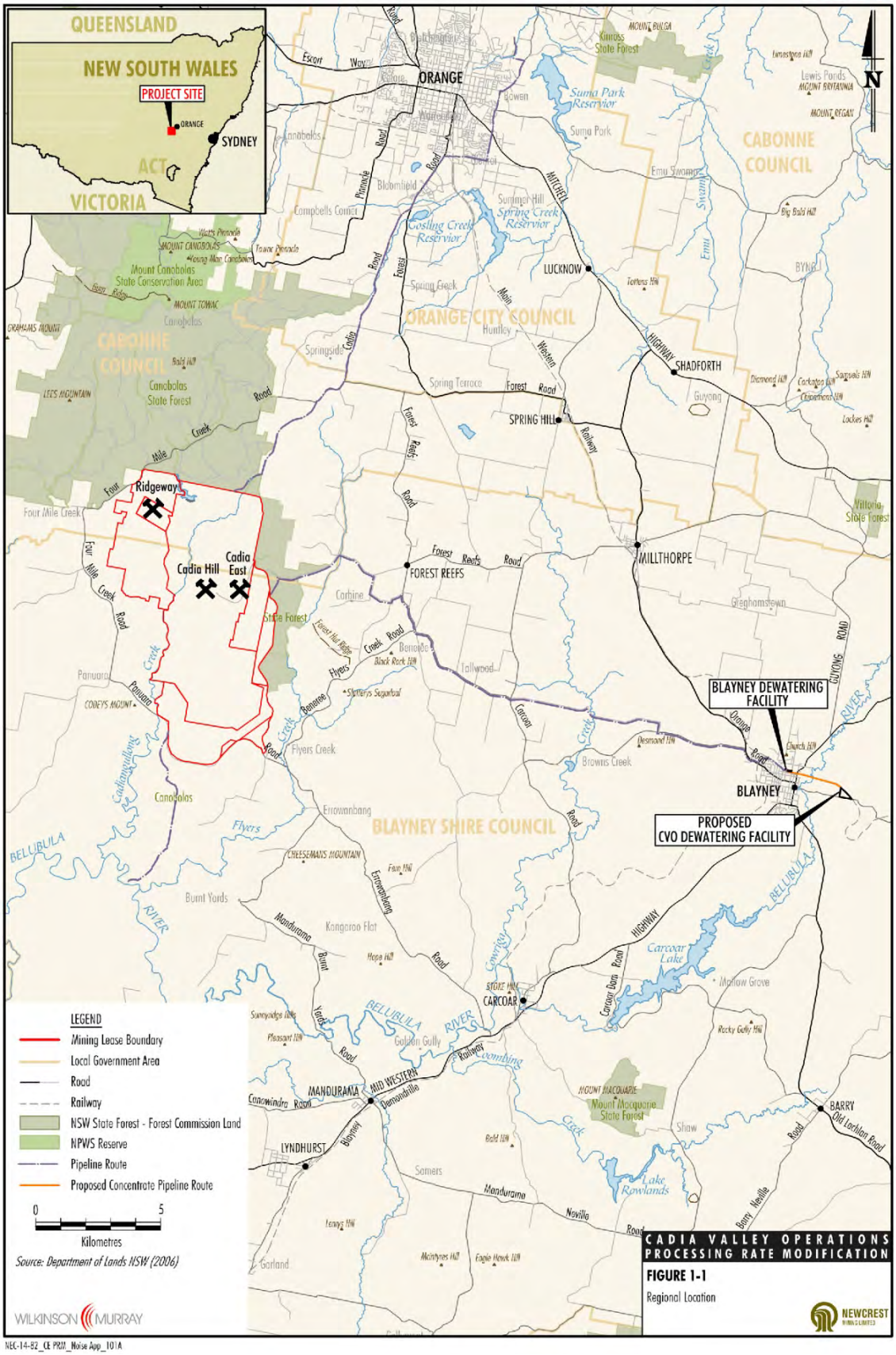
The proposed changes to the ore processing facilities have been designed to minimise disruption to operations. As such, transitional arrangements involving a mobile crusher and haul trucks would be temporarily used during the construction period to ensure a constant product material throughput.

Wilkinson Murray Pty Limited (WMPL) was commissioned by CHPL to prepare a noise assessment for the proposed modification and the transitional arrangements during the construction period.

The assessment is based on the following NSW noise policies and guidelines:

- NSW *Industrial Noise Policy* (INP) (Environment Protection Authority [EPA], 2000).
- *Rail Infrastructure Noise Guideline* (RING) (EPA, 2013).

Figure 1-1 Regional Location



2 DESCRIPTION OF MODIFICATION

The Processing Rate Modification would include:

- an increase in the approved ore production and processing rate at the CVO from 27 Mtpa to 32 Mtpa;
- additional secondary crushing circuits at Concentrators 1 and 2;
- an upgrade of the existing regrind Vertimill at Concentrator 2;
- installation of three additional regrind Vertimills at Concentrator 1;
- installation of additional flotation cells at Concentrator 1;
- de-bottlenecking initiatives at the ore processing facilities and underground ore crushing and transport infrastructure; and
- temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are in place.

No upgrades to the CVO Dewatering Facility or the concentrate and return water pipelines would be required for the Modification.

Given the additional mineral concentrate production, the capacity of product concentrate trains would be increased from approximately 68 to 106 containers. There would be no change in the number of product concentrate trains (i.e. approximately six trains per week).

Potential noise impacts associated with the Modification would include:

- an increase in noise associated with the ore processing facilities due to two additional (secondary) crushers, six additional conveyors, three additional Vertimills and 15 additional flotation cells;
- an increase in noise at the CVO Dewatering Facility; and
- an increase in rail passby noise along the Main Western Railway.

It should be noted that two possible locations have been considered for the additional crusher at Concentrator 2. Due to the relatively close proximity of the two possible locations in relation to the distance separating the ore processing facilities and the closest noise sensitive receivers, noise predictions associated with the Project are not expected to change with the two possible crusher locations.

The construction of the additional crushing circuits and upgrade of the ore regrind circuit is expected to take approximately 12 months and has been planned to minimise disruption to operations. During that period the following plant would be temporarily used to allow the use of Concentrator 2 for Cadia East ore processing:

- one additional temporary mobile crusher located near Concentrator 1 coarse ore stockpile;
- two 45 tonne (t) excavators operating near the mobile crusher; and
- three CAT777 haul trucks transporting ore material from Concentrator 1 coarse ore stockpile to Concentrator 2 coarse ore stockpile.

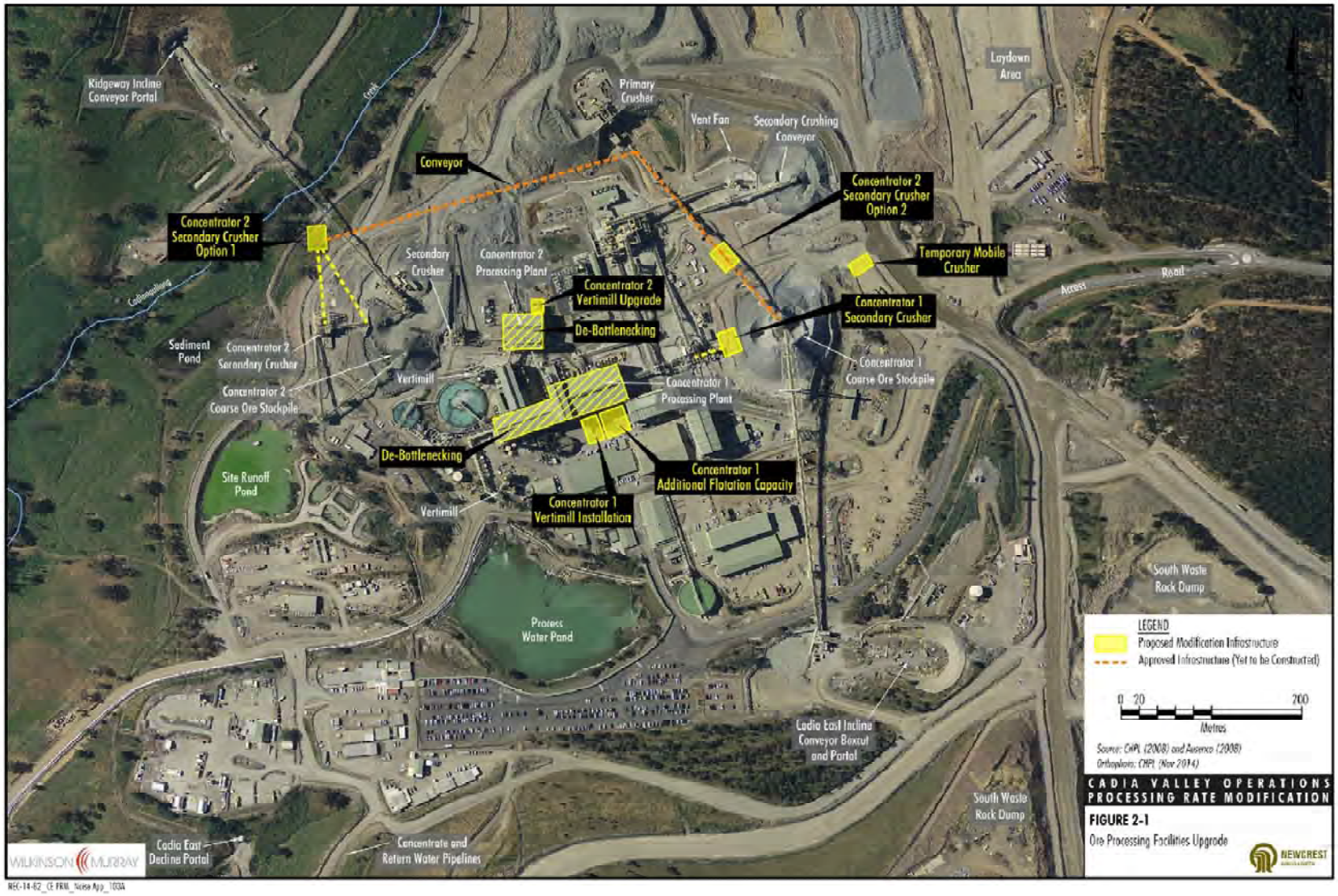
Potential noise impacts associated with the transitional arrangements are considered in this assessment.

The construction of the additional infrastructure would mostly involve cranes and installation works. Given the nature of this equipment and nature of use (i.e. machinery would be used sporadically rather than consistently); noise associated with construction works is considered to be negligible in comparison with overall mine site noise. Therefore, only the transitional ore processing arrangements used to maintain constant throughput is considered to be material from a noise perspective for the construction phase.

The additional infrastructure associated with the Modification and the transitional arrangements would be operated on a 24-hour basis.

Figure 2-1 shows the additional infrastructure items associated with the ore processing facilities upgrade (including both possible crusher locations) and the temporary mobile crusher used during the transitional arrangements.

Figure 2-1 Ore Processing Facilities Upgrade



3 NOISE MANAGEMENT AT THE CVO

Noise monitoring undertaken at the CVO includes routine attended and unattended noise monitoring conducted as per the Noise Monitoring Program (CHPL, 2014a).

Previous noise monitoring results which describe the existing noise environment have been reported in the 2013/2014 Annual Environmental Management Report (the AEMR) (CHPL, 2014b).

Noise monitoring undertaken from July 2012 to June 2014 indicated that operational noise complied with the relevant Project Approval criteria at privately-owned residences (CHPL, 2013, 2014b). Consistent with the predictions of the Cadia East Noise Impact Assessment, a reduction in noise levels has been experienced following the completion of Cadia East construction and Cadia Hill open pit operations (CHPL, 2014b):

> *Reductions in Cadia East surface construction and overall surface material movements have contributed towards improved noise performance of CVO.*
>
> *...*
>
> *This fall in noise levels is due to the large decrease in surface activity (e.g. ceasing surface material rehandling & crushing, and placing the open pit into care and maintenance) as well as the decrease in Cadia East construction.*

A community hotline is maintained by CHPL in order to receive community feedback, including complaints. Review of complaints received over the AEMR reporting periods for 2012/13 and 2013/14 indicated that approximately one operational noise complaint per year was received by CHPL over those reporting periods. These noise complaints, along with an indication of the CHPL response in relation to the complaints received are described in Table 3-1 below.

Table 3-1 Noise Complaints (2012/13 & 2013/14)

Date	Description of Complaint	CHPL Action
24-June-13	Report of haul truck noise during night and in the morning.	Haul to the South Waste Rock Dump identified as a potential problem and eliminated after 10pm.
14-Jul-13	Report of operational noise coming from the southern side of the mine.	793C and 777 haul trucks were working on the South Waste Rock Dump rehabilitation. The 793C trucks working on the southern end of the dump were discontinued and the landowner confirmed the noise subsequently ceased.

Source: CHPL (2013, 2014b).

4 NOISE SENSITIVE RECEIVERS

Figure 4-1 and Table 4-1 identify the nearest potentially affected sensitive receivers to the CVO mine site. Land tenure in the vicinity of the CVO Dewatering Facility is shown on Figure 4-2.

Figure 4-1 Noise Sensitive Receivers – CVO Mine Site

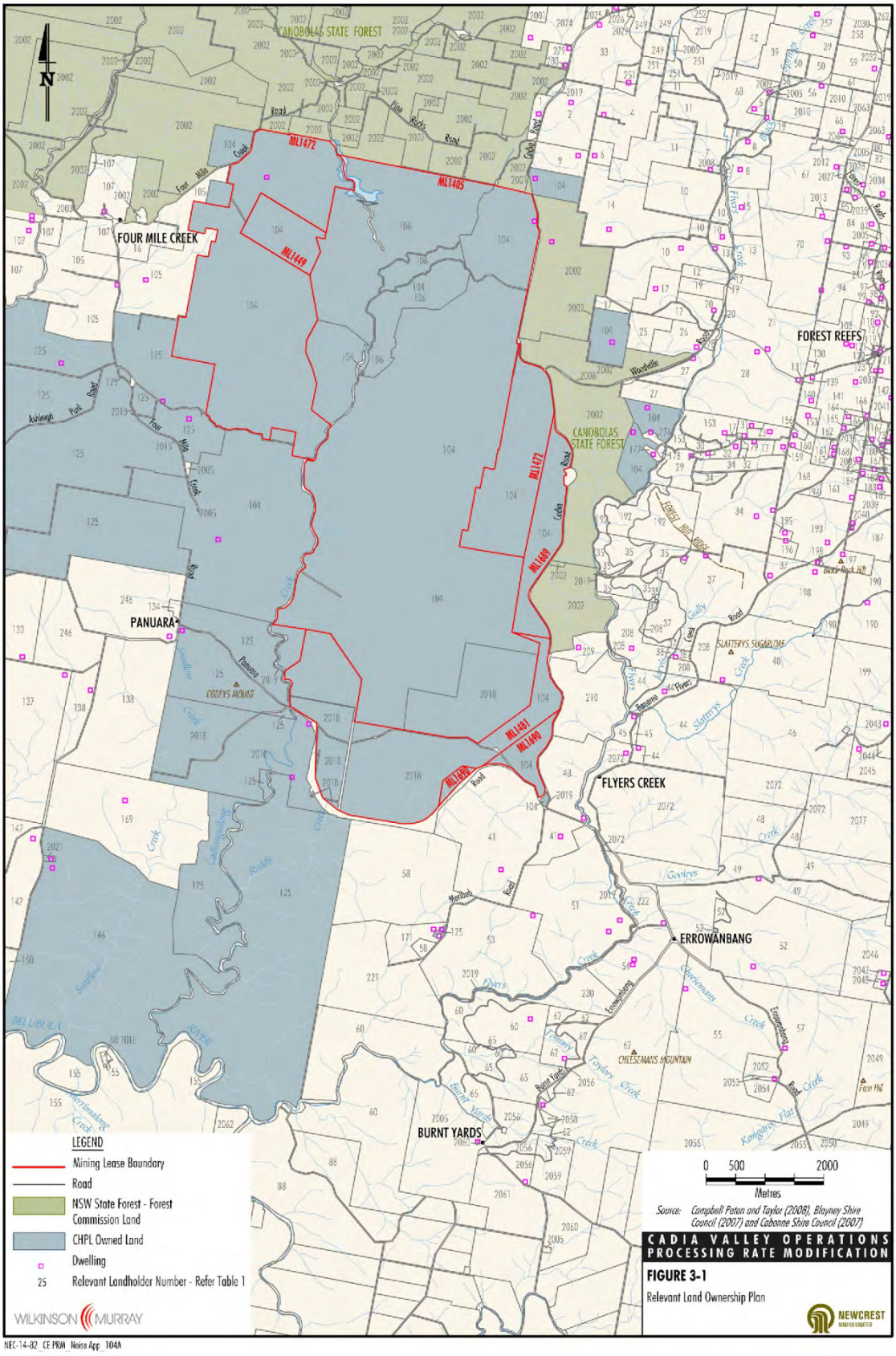


Table 4-1 Relevant Land Ownership List – CVO Mine Site

1	GT & JA Christou	48	M & G Logan	120	PR Masters
2	ER Nock	49	AG Roweth	121	MR Gersbach
4	DGT & ER Nock	50	CT Nixon	123	ME Harris
5	EW Pilcher	51	J Harries	125	Contango Agricultural Company Pty Limited
6	GJ Barnes	52	GW Nixon	127	EJ & JA Hay
7	AP & SJ Kennedy	53	CW & HE Knox	130	LV Shea
8	JE & HD Windberg	54	LB Gerathy	131	KJ Alexander & JM Wyse
9	JP & JA Cane	55	SJ Green	133	LC & LR Baker
10	A Wong	56	Est Late GP Reynolds	134	No title issued
11	JA & JS Wannan	57	AK Roweth	135	GJ Williamson
12	LJ Horton	58	AA Knox Pastoral Co Pty Ltd	137	MP & LA Ellis
13	PE & VJ Tilston	59	WA Trimmer	138	AC & A Bailey
14	DJ & CM Taylor	60	DA Paine	139	SC Pay
15	GH & EM Wolf	61	JE Rayner	140	DE Carson
16	M & LJC Croyston	62	DJ Green	141	RR Nydegger
17	P Hicks	65	TM Harris SG Barry	142	GM & LN Dickerson
19	RE & J Newton	66	TC & LC Ritchie	146	Cadia Holdings Pty Limited
20	AJ & DJ Penson	67	CJ & EM Coleman Pty Limited	147	JC & V Hamilton
21	ME MacKenzie Tudor	68	JE, JR & HD Windberg	150	Angullong Pty Limited
22	Cadia Holdings Pty Limited	70	HCM & EF Streatfeild	152	Cadia Holdings Pty Limited
23	TI & HE Smith	72	JR & SR Masters	153	WW Jones
24	Cadia Holdings Pty Limited	76	DI & KL Webb	155	M & F Retallack
25	RJ Hicks	80	TJM Hone & MJ Treanor	156	RJ & MP Burton
26	T & E Sharp	82	JP & CV Derrig	159	RW & EJ McNab
27	Contago Agricultural Company	84	CJ & DJ Stansfield	160	PE Schneider
28	AE & N Carson	85	Laurellen Pty Limited	161	RW & VR May
29	BD Worland	87	GM & NE Pinkerton	162	MR, PJ & LA Wyner, MC Gallogly, JM Davis & RI Cashman
30	DL & MS Pepper-Edwards	88	LF & AW Baker	163	JE & TA Keene
31	JH Cowper	90	AJ & BJ Wicks	164	Unknown
32	AM & C Colson	91	GM Pinkerton	165	DS & SA Cresswell
33	KJ & SL Gardiner	92	Mayville Pty Limited	166	TL Dickerson
34	AC Watterson	93	JP Corcoran	167	GG May
35	L Waterson	94	JI & KM Streatfeild	168	RW May
37	JM Cantrill	97	BW & DRC Jones	169	D & K Stone
38	JA & JL O'Connor	98	CF & JK Jones	171	GA Knox
39	GB & CM Hunt	99	HCM Streatfeild	173	The Uniting Church in Australia Property Trust (NSW)
40	J F McBeth Pty Limited	104	Cadia Holdings Pty Limited	174	JB Lewis & DJ Turk
41	CW Knox	105	KA Hughes	176	CL Suttie
42	IR McTier	106	BHP Gold Mines Limited	177	SW & KA Munro
43	G Knox	107	KC Williams	178	DA Chilcott
44	AR Colman	108	PA & B Shea	179	NJ & TE Masters
45	J Patrech & E Cottage	110	BG Britton & LP Grant	182	BJ Beach
46	Roanny Pty Limited	119	LK & NT Thomas	183	JG Corrie

Table 4-1 Relevant Land Ownership List – CVO Mine Site (continued)

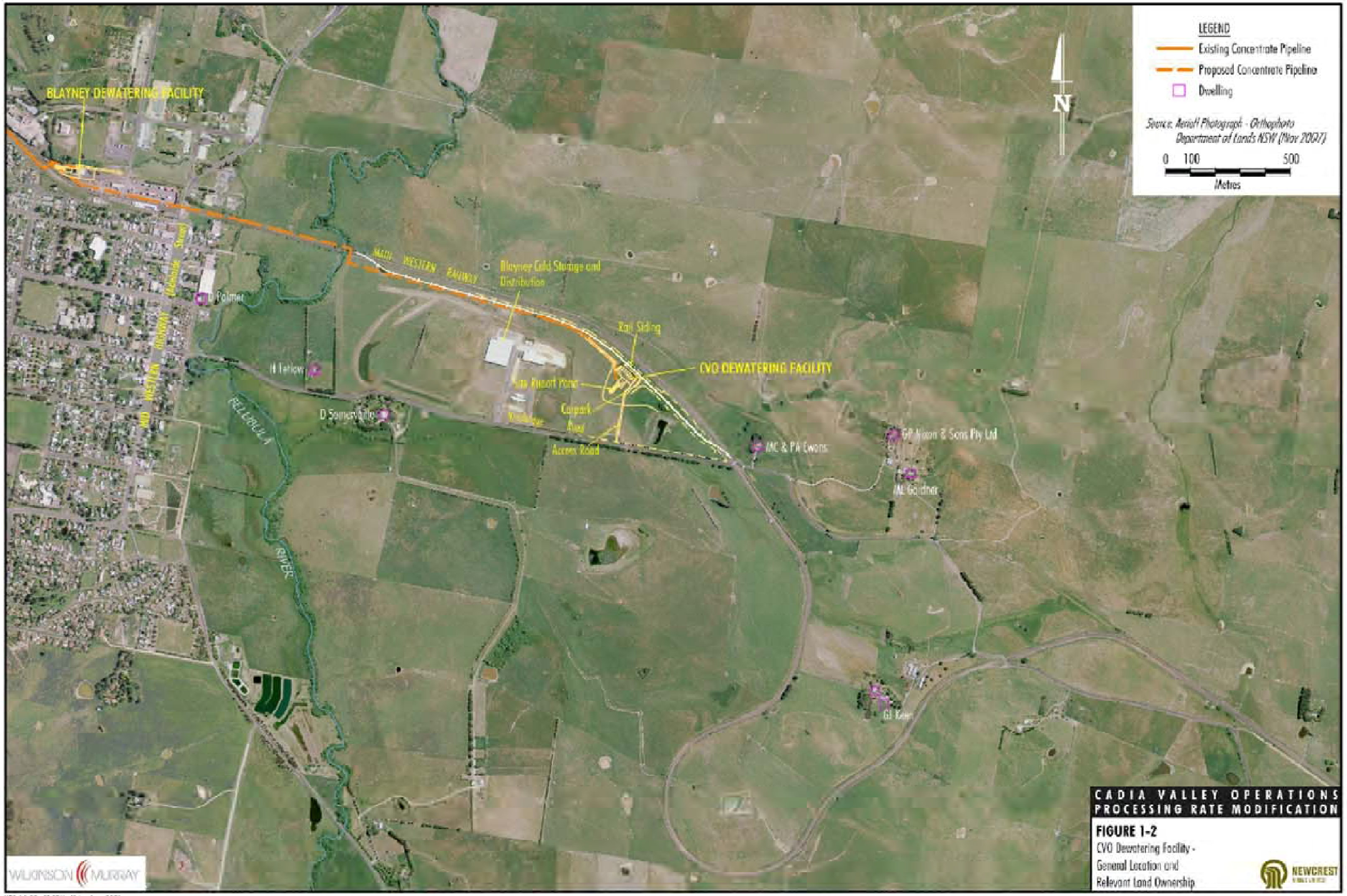
184	JA & S Grindley	2005	The State of New South Wales	2043	D Fernance
185	BG May	2008	Cabonne Shire Council	2044	DP Cameron & RD Gossip
187	TE Pascoe	2009	CL Gifford	2045	A & IT White
190	HG Pascoe	2010	BP Reynolds	2046	FC & HH MacKillop
192	AC & JK Watterson	2012	DIA & FG Coleman	2047	T Williams
193	KP & MJ Scott	2013	MC & ST Coleman	2048	JM & ST Parker
194	HJ Margetson	2015	The Council of the Shire of Lyndhurst[1]	2049	C & F Roweth
195	WE & MF Faulkner	2017	RJ Griffin	2050	L Lowe
196	JE Foster & M Campbell	2018	Cadia Holdings Pty Limited & Contango Agricultural Company Pty Limited	2051	SI Green
197	PD Southwell	2019	Title not available	2052	AT Bennett
198	EP, K & SR Masters	2021	Cadia Holdings Pty Limited	2053	B & B Pastoral Pty Limited
199	GR Oborn	2022	Tile not issued	2054	DJ Bennett & JA Bright
208	SJ & RTC Wilson	2023	CW & J Hooper	2055	GR Garlick
209	R & F Ovendon	2024	H & HM Taylor	2056	SG Grace TM Harris
210	BP Reynolds & BP Kilby	2025	Orange City Council	2058	GJ Grosvenor & JC Taylor
222	KF Harries	2026	Unknown	2059	Healy Springs Pty Limited
229	HE Knox & AA Knox Pastoral Co Pty Limited	2027	CJ & EM Coleman	2060	EL Harris
230	Braeburn Grazing Company Pty Limited	2028	BS & KF Miller	2061	RJ Harris
246	CK Channell & KP & DV Donlan	2029	KM & WA McDonald	2062	Wongalong Pty Limited
247	The Council of the Shire of Blayney	2030	M Fadaee & M, M, S, S, S & S Samimi	2063	JT & DD Moad
249	P Cooper	2031	SS Baydiyan & D, M, S & S Samimi	2064	LC & TC Ritchie
251	JF & AK Blackwood	2032	KW & ME Matthews	2065	BL & JP Middleton
252	PL Ward & JM Winters	2034	JA Coulson	2066	K Smith
257	Buncarwal Pty Limited	2035	JA Annetts	2067	H & HM Taylor
258	PJ Girle & IR McTier	2036	KL Cowan	2068	LC & LR Baker
262	R King & L & MJ Matilka	2037	EG & WA Gainsford	2069	BH & EW Fisher
279	Unknown	2038	BA & LM Taylor	2070	PS Munro
280	KA & WA Potts	2039	HC Milward	2071	PL Ward & JM Winters
2001	The Minister for Public Works	2040	M Smith	2072	MJ & RC McKenzie
2002	State Forest of NSW – Forests NSW	2041	AM & SM Devenish		
2003	Her Most Gracious Majesty Queen Elizabeth The Second	2042	BJ & JR Baldwin		

Source: Campbell Paton and Taylor (2009).

[1] Crown Land.

* Relevant land ownership is shown on Figure 4-1, except for Properties 2065 to 2071 which are located to the immediate north of Figure 4-1.

Figure 4-2 CVO Dewatering Facility – General Location and Relevant Land Ownership



5 CVO MINE SITE NOISE IMPACT ASSESSMENT

5.1 Project Approval Impact Assessment Criteria

The INP states that the intrusiveness and amenity criteria have been selected to protect at least 90 percent (%) of the population living in the vicinity of industrial noise sources from the adverse effects of noise for at least 90% of the time. Provided the criteria in the INP are achieved, then it is unlikely that most people would consider the resultant noise levels excessive.

The Project Approval (06_0295) sets noise criteria for the Project (Condition 2, Schedule 3) consistent with the INP. The criteria relevant to this assessment are reproduced in Table 5-1 and Table 5-2.

Table 5-1 Impact Assessment Criteria – $L_{Aeq,15min}$ (dBA)

Location	Day	Evening	Night	Night ($L_{A1(1min)}$)
Mining Operations				
41-CW Know ("Meribah'), 43-CJ Healey ('Triangle Park'), 138-AC & A Bailey ('Mayburies'), 4-CC Colman ('Mirrabooka'), 246-CK Channell and KP & DV Donlan ('Eastburn'), 209-JI McLennan ('Northwest'), 171-GA Knox ('Southlog').	43	38	38	45
1-GT & JA Christou ('Coorabin'), 137-MP & LA Ellis ('Argyle'), 169-RL & SL Chamberlain ('Weemalla').	43	38	37	45
44-AR Colman ('Triangle Flat'), 105-KA Hughes ('Barton Park'), 133-LC & LR Baker ('Bonnie Glen').	43	38	36	45
Other privately owned land.	43	38	35	45

Note: A-weighted decibels (dBA).

Table 5-2 Cumulative Noise Criteria – $L_{Aeq,period}$ (dBA)

Location	Day	Evening	Night
Mining Operations			
All privately-owned land	50	45	40

It is considered reasonable to assess the transitional arrangements (construction phase) as a phase of general operations since additional noise impacts potentially generated during that phase would be generated by transitional ore processing arrangements put in place to ensure a constant throughput during the construction period. As such, it is proposed that the Project Approval impact assessment criteria outlined in Table 5-1 (derived from the INP intrusiveness criteria) should also be used to assess the transitional arrangements.

The Project Approval (06_0295) also provided cumulative noise criteria (Condition 4, Schedule 3) consistent with the INP's amenity criteria.

The cumulative noise criteria are based on the energy average noise level over the entire day, evening or night period rather than the 15-minute interval that applies for the impact assessment criteria. As can be seen from the above, the criteria contained in Table 5-1 are lower (i.e. more stringent) than those in Table 5-2. Hence, compliance with the impact assessment criteria would indicate compliance with the cumulative noise criteria. Therefore, given that there are no other industrial noise sources in the area, the noise assessment for the Project with the Modification is presented in comparison with the impact assessment criteria (Table 5-1), rather than the cumulative noise criteria.

The Modification is not expected to result in any additional noise impact relating to sleep disturbance. Therefore, $L_{A1,1min}$ noise levels (see Table 5-1) are not considered as part of this assessment.

5.2 NSW Government Voluntary Noise Acquisition and Mitigation Policy

The NSW Government recently released the "Voluntary Land Acquisition and Mitigation Policy – SSD Mining" (NSW Government, 2014). This guideline provides some useful context in regard to characterising the practical implications of exceedances of the INP criteria (Table 5-3).

Table 5-3 – Characterisation of Noise Impacts & Potential Treatments

Residual Noise Exceeds INP Criteria By	Characterisation of Impacts	Potential Treatment
0-2dB(A) above the project-specific noise level (PSNL)	Impacts are considered to be **negligible**	The exceedances would not be discernible by the average listener and therefore would not warrant receiver based treatments or controls.
3-5dB(A) above the PSNL in the INP but the development would contribute less than 1dB to the total industrial noise level	Impacts are considered to be **marginal**	Provide mechanical ventilation/ comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
3-5dB(A) above the PSNL in the INP and the development would contribute more than 1dB to the total industrial noise level	Impacts are considered to be **moderate**	As for marginal impacts but also upgraded façade elements like windows, doors, roof insulation etc. to further increase the ability of the building façade to noise levels.
>5dB(A) above the PSNL in the INP	Impacts are considered to be **significant**	Provide mitigation as for moderate impacts and see voluntary land acquisition provisions below.

Source: NSW Government (2014)

5.3 Assessment Methodology

5.3.1 General Methodology

The existing noise model of the current operations was amended to include the additional infrastructure items. Noise levels were then predicted at the identified receivers and compared against the relevant noise criteria set in the Project Approval (Table 5-1) to determine whether the additional noise impact associated with the Modification would trigger any exceedances.

Three scenarios were modelled for the original Environmental Assessment (EA) (*Cadia East Project – Noise and Blasting Impact Assessment* [WMPL, 2009]), Year 1, Year 4 and Year 17. Years 1 and 4 included ongoing mining at the Cadia Hill open pit; whilst Year 1 also included Cadia East construction activities. As a consequence, the modelling results showed declining noise predictions at nearby receivers between Year 1 through to Year 17 due to the reduction of activity on the surface. This is illustrated with the night time noise contours generated as part of the original EA for Year 1 (Figure 5-1), Year 4 (Figure 5-2) and Year 17 (Figure 5-3).

It was found that the current operation is best represented in the Year 17 (2026) noise model generated for the noise assessment prepared as part of the original EA (WMPL, 2009). This is because the Year 17 scenario included underground mining only, whereas the Year 4 (2013) noise model included Cadia Hill open pit production which ceased during 2012.

The additional infrastructure and mobile plant associated with the Modification (including the transitional arrangements during the construction phase) would be operating on a 24-hour basis. Therefore, noise levels associated with the Modification were predicted for the day (7.00am-6.00pm), evening (6.00pm-10.00pm) and night (10.00pm-7.00am) assessment periods.

5.3.2 Noise Model Procedures

Operational noise levels at nearby receivers were calculated using the Environmental Noise Model (ENM) in the original EA noise assessment. This model has been endorsed by the EPA for environmental noise assessments. The ENM takes account of the location of nearby noise sensitive receivers and surrounding terrain. In addition, the model takes into account noise attenuation due to geometric spreading of sound over distance, atmospheric absorption, shielding and the effect of acoustically soft ground. It can also be used to predict noise levels under various meteorological conditions, defined by a combination of temperature gradient, wind speed and wind direction.

Noise levels associated with the Modification used the same noise modelling procedure as used by WMPL (2009).

5.3.3 Meteorological Conditions

The INP generally directs the use of a single set of adverse meteorological data to use in the assessment of noise impacts. However, for the original EA noise assessment (WMPL, 2009) adopted a more rigorous approach where noise levels at sensitive receivers are calculated under a varied set of existing meteorological conditions (wind speed and direction and temperature inversion strength), using meteorological data obtained from the Ridgeway station. Measured statistical occurrences of these conditions over a discrete period are then applied to the results, and a 10^{th} percentile exceedance level calculated (i.e. the level that is exceeded 10% of the time), which is then compared with relevant criteria.

The noise assessment for the Modification used the 10^{th} percentile exceedance approach based on the same set of existing meteorological conditions for consistency with the original EA. For further detail, please refer to WMPL (2009).

Figure 5-1 Year 1 Operations Night Time Noise Contours (EA)

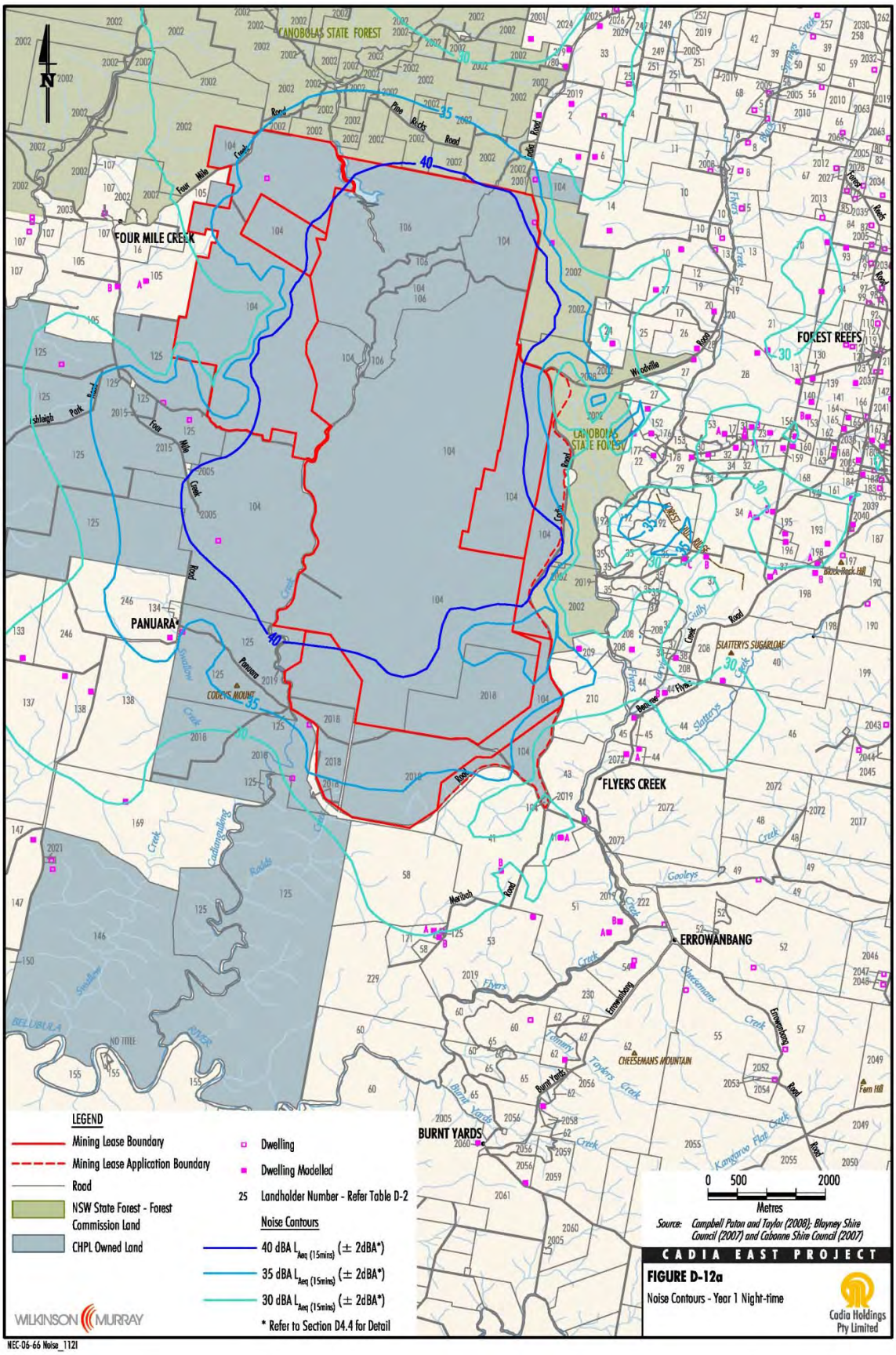


Figure 5-2 Year 4 Operations Night Time Noise Contours (EA)

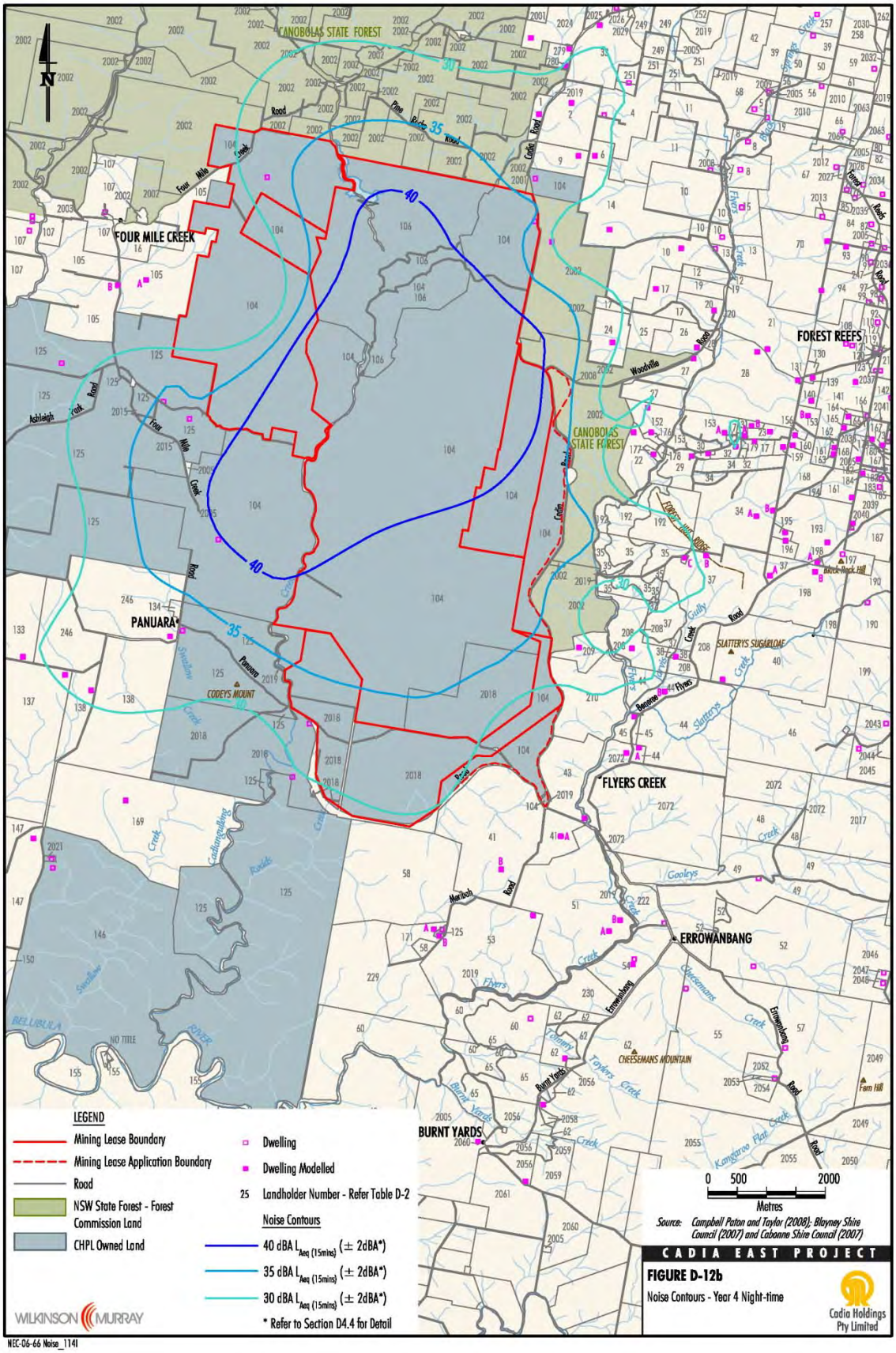
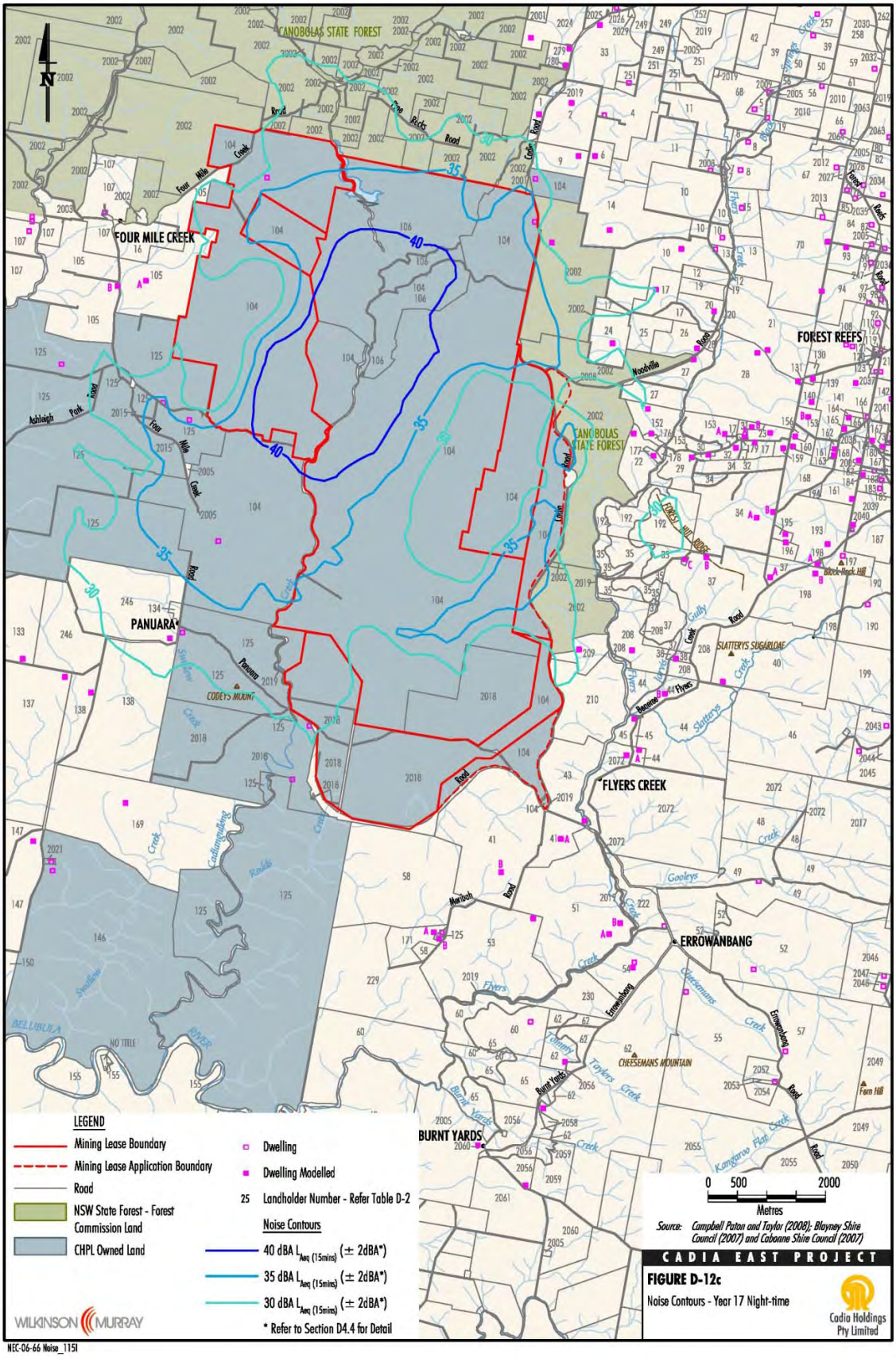


Figure 5-3 Year 17 Operations Night Time Noise Contours (EA)



5.3.4 Noise Sources Associated with Modification Operations and Transitional Arrangements

Operational noise associated with the Modification was calculated based on the sound power levels (SWLs) summarised in Table 5-4. Those SWLs are consistent with that of similar infrastructure items used in past assessments for the Cadia East Project and similar projects.

Table 5-4 Sound Power Levels and Number of Additional Plant Items

Item	Sound Power Level (dBA)	No. of Items Mod Transitional Arrangements	No. of Items Modification Operations
Secondary Crusher / Temporary Mobile Crusher	119 per item	1	2
Vertimills	109 per item	-	3
Flotation Cell	95 per item	-	15
Conveyors	82 per metre	-	6
CAT777 Haul Truck	116 per item	3	-
45 t Excavator	108 per item	2	-

The SWLs presented in Table 5-4 assume low noise conveyor idlers are implemented, and that the flotation cells are located in an enclosed area.

5.4 Noise Assessment

The cumulative 10th percentile $L_{Aeq,15min}$ intrusive noise levels for the day, evening and night time assessment periods were calculated using the ENM for each of the identified 93 sensitive receivers surrounding the Project.

5.4.1 Noise Assessment – Transitional Arrangements

Table 5-5 presents the combined predicted levels at nearby privately-owned receivers generated at the CVO with the transitional arrangements. Noise levels presented are rounded to the nearest dB.

Table 5-5 Predicted Noise Levels – Transitional Arrangements

Receiver ID	Original EA (Year 17) $L_{Aeq,15min}$ Noise Levels (dBA)			Original EA (Year 17) + Transitional Arrangements $L_{Aeq,15min}$ Noise Levels (dBA)			Impact Assessment Criteria $L_{Aeq,15min}$ Noise Levels (dBA)		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
1	29	29	30	31	31	32	43	38	37
2	29	29	29	30	30	30	43	38	35
6	28	27	29	30	29	31	43	38	35
9	27	27	28	28	28	30	43	38	35
10	27	27	27	28	28	28	43	38	35
14	20	17	19	23	21	23	43	38	35
17	30	29	30	31	30	31	43	38	35
20	20	18	20	21	20	22	43	38	35
21	25	25	27	27	27	29	43	38	35
23	24	22	24	25	23	26	43	38	35
26	19	14	15	20	16	17	43	38	35
27	19	14	16	20	16	17	43	38	35
28	25	25	26	26	26	28	43	38	35
29	24	22	25	25	24	27	43	38	35
30	24	22	25	26	24	27	43	38	35
31a	27	27	27	28	28	29	43	38	35
31b	27	27	27	30	30	30	43	38	35
32	28	28	29	30	30	31	43	38	35
33	27	27	28	29	29	30	43	38	35
34a	21	20	22	23	23	25	43	38	35
34b	26	26	27	29	29	30	43	38	35
37a	25	25	26	26	26	27	43	38	35
37b	22	18	20	24	22	24	43	38	35
37c	29	29	30	31	31	32	43	38	35
38	23	14	18	23	16	21	43	38	35
40	26	25	26	28	28	29	43	38	35
41a	30	25	26	31	28	29	43	38	38
41b	32	24	25	32	27	28	43	38	38
43	28	12	23	28	16	26	43	38	38
44	28	27	27	30	30	30	43	38	36
45	25	16	25	25	18	27	43	38	38
51a	24	9	11	24	12	15	43	38	35
51b	25	20	21	25	23	25	43	38	35
53	29	23	24	30	25	26	43	38	35
54	24	19	20	25	23	24	43	38	35

Receiver ID	Original EA (Year 17) $L_{Aeq,15min}$ Noise Levels (dBA)			Original EA (Year 17) + Transitional Arrangements $L_{Aeq,15min}$ Noise Levels (dBA)			Impact Assessment Criteria $L_{Aeq,15min}$ Noise Levels (dBA)		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
62	24	19	20	25	22	23	43	38	35
70	25	25	25	28	28	28	43	38	35
93	25	24	24	28	27	27	43	38	35
94	25	25	25	28	28	28	43	38	35
105a	20	16	18	21	18	20	43	38	36
105b	21	17	21	22	19	22	43	38	36
123a	24	24	24	27	27	27	43	38	35
123b	24	24	24	27	27	27	43	38	35
131	25	25	26	28	28	29	43	38	35
133	28	26	27	30	29	30	43	38	36
134	34	33	34	34	34	35	43	38	35
137	30	28	29	31	30	31	43	38	37
138	30	29	29	31	31	31	43	38	38
139	25	25	26	28	28	29	43	38	35
140	25	24	25	27	26	28	43	38	35
141	25	25	25	28	28	28	43	38	35
147	27	24	24	27	25	25	43	38	35
153a	29	29	29	31	31	32	43	38	35
153b	26	25	26	29	28	29	43	38	35
156	27	26	26	28	28	28	43	38	35
159	28	28	28	30	30	30	43	38	35
160	27	27	27	29	29	30	43	38	35
161	25	25	25	28	28	28	43	38	35
162	20	19	20	22	21	22	43	38	35
163	19	17	18	19	18	19	43	38	35
165	25	25	25	28	28	28	43	38	35
166	25	25	25	28	28	28	43	38	35
167	25	24	24	27	27	27	43	38	35
169	31	26	27	31	27	29	43	38	37
171a	33	23	23	33	26	26	43	38	38
171b	33	22	23	33	25	26	43	38	38
173	24	24	24	27	27	27	43	38	35
176	22	18	18	23	20	20	43	38	35
177	21	17	18	22	19	20	43	38	35
179	22	21	21	25	24	25	43	38	35
184	25	24	24	26	25	25	43	38	35
193	25	25	25	26	26	26	43	38	35

Receiver ID	Original EA (Year 17) $L_{Aeq,15min}$ Noise Levels (dBA)			Original EA (Year 17) + Transitional Arrangements $L_{Aeq,15min}$ Noise Levels (dBA)			Impact Assessment Criteria $L_{Aeq,15min}$ Noise Levels (dBA)		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
195	27	26	26	29	29	29	43	38	35
196	26	26	26	29	29	29	43	38	35
198a	26	25	25	28	28	28	43	38	35
198b	26	25	25	28	28	28	43	38	35
208	29	29	29	31	31	32	43	38	35
209	27	18	29	27	21	31	43	38	38
246	32	32	33	33	33	34	43	38	38
279	25	25	25	28	28	28	43	38	35
280	27	27	28	29	29	30	43	38	35
2002a	25	17	25	25	19	28	43	38	35
2002b	26	14	25	26	17	28	43	38	35
2002c	24	23	24	24	24	25	43	38	35
2024	18	17	19	19	19	20	43	38	35
2038	25	25	25	28	28	28	43	38	35
2039	24	23	24	24	24	25	43	38	35
2056	22	17	17	23	20	21	43	38	35
2058	23	18	19	24	21	22	43	38	35
2060	23	18	19	24	21	22	43	38	35

A review of Table 5-5 shows that no exceedances of the impact assessment criteria are predicted and the resultant noise levels with the transitional arrangements have increased by 1 to 4 dBA when compared with the predicted levels from the original EA assessment.

In view of the above, the transitional arrangements are not expected to impact on the acoustic amenity of receivers in the vicinity of the CVO.

5.4.2 Noise Assessment – Modification Operations

Table 5-6 presents the combined predicted levels generated at the CVO with the Modification. The predicted levels without the Modification and the impact assessment criteria are also included. Noise levels are presented rounded to the nearest dB.

Table 5-6 Predicted Noise Levels - Modification

Receiver ID	Original EA (Year 17) $L_{Aeq,15min}$ Noise Levels (dBA)			Original EA (Year 17) + Modification $L_{Aeq,15min}$ Noise Levels (dBA)			Impact Assessment Criteria $L_{Aeq,15min}$ Noise Levels (dBA)		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
1	29	29	30	31	31	31	43	38	37
2	29	29	29	30	30	30	43	38	35
6	28	27	29	28	27	29	43	38	35
9	27	27	28	28	27	28	43	38	35
10	27	27	27	28	28	28	43	38	35
14	20	17	19	21	19	22	43	38	35
17	30	29	30	30	30	30	43	38	35
20	20	18	20	21	20	22	43	38	35
21	25	25	27	26	26	28	43	38	35
23	24	22	24	26	24	26	43	38	35
26	19	14	15	19	15	16	43	38	35
27	19	14	16	19	15	17	43	38	35
28	25	25	26	26	26	27	43	38	35
29	24	22	25	25	23	26	43	38	35
30	24	22	25	26	25	27	43	38	35
31a	27	27	27	28	28	28	43	38	35
31b	27	27	27	28	28	28	43	38	35
32	28	28	29	29	29	30	43	38	35
33	27	27	28	28	28	29	43	38	35
34a	21	20	22	21	21	22	43	38	35
34b	26	26	27	27	27	28	43	38	35
37a	25	25	26	25	26	28	43	38	35
37b	22	18	20	25	21	23	43	38	35
37c	29	29	30	30	30	31	43	38	35
38	23	14	18	23	16	21	43	38	35
40	26	25	26	27	27	28	43	38	35
41a	30	25	26	30	27	28	43	38	38
41b	32	24	25	32	26	27	43	38	38
43	28	12	23	28	14	25	43	38	38
44	28	27	27	29	29	29	43	38	36
45	25	16	25	25	17	26	43	38	38
51a	24	9	11	24	11	13	43	38	35
51b	25	20	21	25	22	23	43	38	35
53	29	23	24	29	24	25	43	38	35
54	24	19	20	24	21	22	43	38	35

Receiver ID	Original EA (Year 17) $L_{Aeq,15min}$ Noise Levels (dBA)			Original EA (Year 17) + Modification $L_{Aeq,15min}$ Noise Levels (dBA)			Impact Assessment Criteria $L_{Aeq,15min}$ Noise Levels (dBA)		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
62	24	19	20	25	21	22	43	38	35
70	25	25	25	26	26	26	43	38	35
93	25	24	24	26	25	25	43	38	35
94	25	25	25	26	26	26	43	38	35
105a	20	16	18	21	17	19	43	38	36
105b	21	17	21	22	19	23	43	38	36
123a	24	24	24	25	25	25	43	38	35
123b	24	24	24	25	25	25	43	38	35
131	25	25	26	26	26	27	43	38	35
133	28	26	27	29	28	29	43	38	36
134	34	33	34	36	35	35	43	38	35
137	30	28	29	31	30	31	43	38	37
138	30	29	29	31	31	31	43	38	38
139	25	25	26	26	26	27	43	38	35
140	25	24	25	26	25	26	43	38	35
141	25	25	25	26	26	26	43	38	35
147	27	24	24	28	26	26	43	38	35
153a	29	29	29	30	30	30	43	38	35
153b	26	25	26	27	26	27	43	38	35
156	27	26	26	28	27	27	43	38	35
159	28	28	28	29	29	29	43	38	35
160	27	27	27	28	28	28	43	38	35
161	25	25	25	26	26	26	43	38	35
162	20	19	20	21	21	22	43	38	35
163	19	17	18	19	17	19	43	38	35
165	25	25	25	26	26	26	43	38	35
166	25	25	25	26	26	26	43	38	35
167	25	24	24	26	25	25	43	38	35
169	31	26	27	31	28	29	43	38	37
171a	33	23	23	33	25	25	43	38	38
171b	33	22	23	33	24	25	43	38	38
173	24	24	24	25	25	25	43	38	35
176	22	18	18	22	19	19	43	38	35
177	21	17	18	21	18	19	43	38	35
179	22	21	21	24	24	24	43	38	35
184	25	24	24	25	24	24	43	38	35
193	25	25	25	25	25	25	43	38	35

Receiver ID	Original EA (Year 17) $L_{Aeq,15min}$ Noise Levels (dBA)			Original EA (Year 17) + Modification $L_{Aeq,15min}$ Noise Levels (dBA)			Impact Assessment Criteria $L_{Aeq,15min}$ Noise Levels (dBA)		
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night
195	27	26	26	28	27	27	43	38	35
196	26	26	26	28	28	28	43	38	35
198a	26	25	25	27	27	27	43	38	35
198b	26	25	25	27	26	27	43	38	35
208	29	29	29	30	31	31	43	38	35
209	27	18	29	27	19	30	43	38	38
246	32	32	33	34	34	35	43	38	38
279	25	25	25	27	27	27	43	38	35
280	27	27	28	29	29	29	43	38	35
2002a	25	17	25	25	18	27	43	38	35
2002b	26	14	25	26	15	27	43	38	35
2002c	24	23	24	24	23	25	43	38	35
2024	18	17	19	21	20	22	43	38	35
2038	25	25	25	26	26	26	43	38	35
2039	24	23	24	24	23	24	43	38	35
2056	22	17	17	23	19	19	43	38	35
2058	23	18	19	24	20	21	43	38	35
2060	23	18	19	24	20	21	43	38	35

A review of Table 5-6 shows that no exceedances of the impact assessment criteria are predicted and the resultant noise levels with the Modification operations have generally increased by 1 to 2 dBA at the identified receivers and up to 3 dBA at a limited number of receivers when compared with the predicted levels from the original EA assessment.

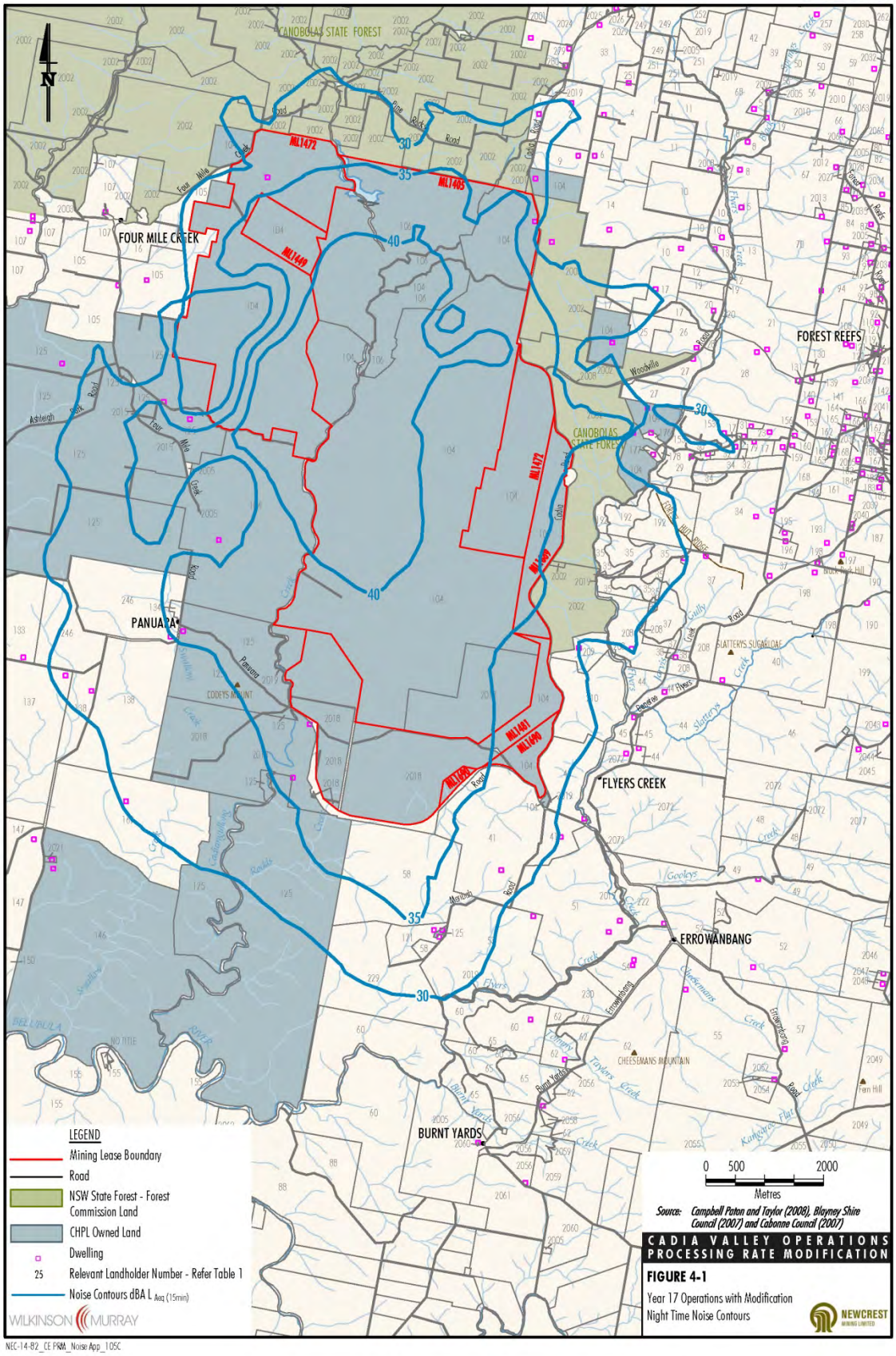
A noise level increase of 1-2 dBA is considered to be negligible with reference to NSW Government (2014). In view of the above, the Modification is not expected to impact on the acoustic amenity of receivers in the vicinity of the CVO.

5.5 Noise Contours

Night time noise contours for the Project including the Modification were developed and shown on Figure 5-4 to contextualise the noise profile.

With regard to noise contours the calculation involves numerical interpolation of a noise level grid; subject to topography within the grid this can lead to a graphical accuracy of up to approximately 1-2 dB.

Figure 5-4 Year 17 Operations with Modification Night Time Noise Contours



5.6 Recommendations

Although continued compliance with key noise criteria is predicted for the Modification, CHPL would investigate incorporating the following mitigation measures at the design phase of the Modification infrastructure:

- Selection of key infrastructure such as crushers, electric motors and conveyor gearboxes to consider SWLs.
- Full or partial enclosure/shrouding of key noise sources such as gear boxes, electric motors and crushers.
- Sheds and buildings to be enclosed with acoustic lining considered.

It is recommended that noise monitoring continues to be conducted in accordance with the Noise Monitoring Program (CHPL, 2014a) to confirm the modelling results. It is recommended that a description of noise monitoring results and comparison with the Modification modelling predictions be presented in the relevant AEMR.

6 CVO DEWATERING FACILITY NOISE IMPACT ASSESSMENT

The Modification also requires some changes at the CVO Dewatering Facility. This section discusses the implications of the proposed changes in a qualitative way. There are typically four to five rail arrivals and departures per week, i.e. never more than one arrival and departure per day.

Train load-out activities are restricted to daytime hours only (i.e. between the hours of 7.00am and 6.00pm) and currently last approximately 6 hours, generally between 7.00am and 1.00pm.

Given the capacity of product concentrate trains would be increased from approximately 68 to 106 containers, it is reasonable to assume that the time taken to load would increase proportionally, therefore taking up to 9.5 hours (generally between 7.00am to 4.30pm). This is estimated to result in a 2 dB increase in $L_{Aeq,day}$ noise levels.

6.1 INP Intrusiveness Assessment

The operational noise changes at the CVO Dewatering Facility primarily relate to the duration of noise generation over a daytime period rather than an increase in noise levels during a 15 minute period. The procedure and equipment used for loading trains would not change.

Therefore, even though trains would be longer and the total duration to load them would be longer, the changes are considered insignificant in an INP intrusiveness assessment sense which focuses on a 15-minute period (i.e. noise levels over a 15 minute period would remain unchanged).

6.2 INP Amenity Assessment

Given the increase in time taken to load concentrate trains (i.e. from approximately 6 to 9.5 hours), additional noise over the daytime period (7.00am to 6.00pm) has been estimated.

Table 6-1 summarises the predicted $L_{Aeq,day}$ noise levels before and after the Modification and presents the relevant INP amenity criteria.

A review of Table 6-1 shows that the resultant noise levels with the longer trains would continue to comply with the relevant INP amenity criteria.

Table 6-1 INP Amenity Assessment

Property Owner	Predicted $L_{Aeq,day}$ noise level without Modification (dBA)	Predicted $L_{Aeq,day}$ noise level with Modification (dBA)	Daytime Amenity $L_{Aeq,day}$ Noise Criterion (dBA)
MC & PA Ewens	47	49	50
D Somervaille	32	34	50
H Tetlaw	28	30	50
D Palmer	25	27	55
GP Nixon & Sons Pty Ltd	40	42	50
ML Gardener	37	39	50
GJ Keen	34	36	50

7 RAIL NOISE IMPACT ASSESSMENT

7.1 Noise Trigger Levels

Since the preparation of the original EA, a new rail noise policy (*Rail Infrastructure Noise Guideline* or RING) has been adopted, replacing the *Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects* policy.

Table 7-1 summarises the relevant noise trigger levels from the RING.

Table 7-1 Noise Trigger Levels (dBA)

Type of Development	Noise Trigger Levels dB(A) (External)	
	Day (7am-10pm)	Night (10pm-7am)
Rail Traffic – Generating Developments	65 $L_{Aeq(15hr)}$ or 85 L_A (95th percentile)	60 $L_{Aeq(9hr)}$ or 85 L_{AFmax} (95th percentile)

7.2 Qualitative Assessment

The noise assessment prepared as part of the original EA considers that as there was only up to one rail arrival and departure in a typical day that rail noise impacts are considered negligible and no further detailed assessment is required (WMPL, 2009):

> *Given that typical operations would involve only one Project train movement, there would be a negligible increase in daily rail noise along the Main Western Railway compared with noise from existing rail movements.*

For the Modification, the Project train lengths would increase, resulting in slightly higher passby noise of a single train. Notwithstanding, as the proposed Modification would not change the number of Project rail movements in a typical day, rail noise associated with the Project is still considered negligible and no further detailed assessment is required.

8 CONCLUSION

CHPL is proposing to modify the ore production and processing rate of the Cadia East Project. The Processing Rate Modification would include:

- an increase in the approved ore production and processing rate at the CVO from 27 Mtpa to 32 Mtpa;
- additional secondary crushing circuits at Concentrators 1 and 2;
- an upgrade of the existing regrind Vertimill at Concentrator 2;
- installation of three additional regrind Vertimills at Concentrator 1;
- installation of additional flotation cells at Concentrator 1;
- de-bottlenecking initiatives at the ore processing facilities and underground ore crushing and transport infrastructure; and
- temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are in place.

No upgrades to the CVO Dewatering Facility or the concentrate and return water pipelines would be required for the Modification.

Given the additional mineral concentrate production, the capacity of product concentrate trains would be increased from approximately 68 to 106 containers. There would be no change in the number of trains on a weekly basis (i.e. approximately six trains per week or a maximum of one arrival and departure per day).

Potential noise impacts associated with the Modification would include:

- an increase in noise associated with the ore processing facilities due to two additional (secondary) crushers, six additional conveyors, three additional Vertimills and 15 additional flotation cells;
- an increase in noise associated with longer trains at the CVO Dewatering Facility; and
- an increase in rail passby noise along the Main Western Railway.

The construction of the additional crushing circuits and upgrade of the ore regrind circuit has been designed to minimise disruption to operations. During that period the following plant would be temporarily used:

- one additional temporary mobile crusher located near Concentrator 1 coarse ore stockpile;
- two 45 t excavators operating near the mobile crusher; and
- three CAT777 haul trucks transporting ore material from Concentrator 1 coarse ore stockpile to Concentrator 2 coarse ore stockpile.

Potential noise impacts associated with the transitional arrangements were also considered in this assessment.

8.1 CVO Mine Site

Noise at the CVO has recently decreased following the cessation of Cadia Hill open pit and completion of Cadia East surface construction activities. This is consistent with the findings of the Cadia East Noise Impact Assessment. The existing noise model of the current operations (represented by the Year 2017 noise model when open pit operations have ceased) was amended to include the additional infrastructure items associated with the Modification. Noise levels were then predicted at the identified receivers and compared against the relevant noise criteria set in the Project Approval to determine whether the additional noise impact associated with the Modification would trigger any exceedances.

For the transitional arrangements, which would take approximately 12 months to complete, no exceedances of the impact assessment criteria are predicted and the resultant noise levels with the transitional arrangements have increased by 1 to 4 dBA when compared with the predicted levels from the original EA assessment. Such increases are considered negligible/marginal with reference to the NSW Government noise acquisition guideline (NSW Government, 2014).

For the Modification operations, no exceedances of the impact assessment criteria are predicted and the resultant noise levels with the Modification operations have generally increased by 1 to 2 dBA at the identified receivers and up to 3 dBA at a limited number of receivers when compared with the predicted levels from the original EA assessment. These increases are generally considered negligible – not noticeable by most people with reference to the NSW Government noise acquisition guideline (NSW Government, 2014).

Although continued compliance with key noise criteria is predicted for the Modification, CHPL would investigate incorporation of mitigation measures as part of the design phase of the Modification infrastructure. It is recommended that noise monitoring continues to be conducted in accordance with the Noise Monitoring Program (CHPL, 2014a) to confirm the modelling results. It is recommended that a description of noise monitoring results and comparison with the Modification modelling predictions be presented in the relevant AEMR.

In view of the above, both the transitional arrangements and Modification operations are not expected to impact on the acoustic amenity of receivers in the vicinity of the CVO.

8.2 CVO Dewatering Facility

The operational noise changes at the CVO Dewatering Facility primarily relate to the duration of noise generation over a daytime period rather than an increase in noise levels. The procedure and equipment used for loading trains would not change. Therefore, even though trains would be longer and the total duration to load them would be longer, the changes are considered insignificant in an INP intrusiveness assessment sense which focuses on a 15 minute period (i.e. noise levels over a 15 minute period would remain unchanged).

Train load-out activities are restricted to daytime hours only and currently last approximately 6 hours. Given the capacity of product concentrate trains would be increased from approximately 68 to 106 containers, the time taken to load would increase proportionally, therefore taking up to 9.5 hours. This would result in a 2 dB increase in $L_{Aeq,day}$ noise levels. However, the predicted $L_{Aeq,day}$ noise levels with the Modification are still expected to comply with the relevant INP amenity criteria.

8.3 Rail Noise

As the proposed Modification would not change the number of Project rail movements in a typical day (i.e. it would remain as up to one arrival and departure per day), potential rail noise impact is considered negligible. This outcome is considered to remain unchanged even if Project trains are now longer.

9 REFERENCES

Cadia Holdings Pty Limited (2013) *Cadia Valley Operations Annual Environmental Management Report 2012/13*.

Cadia Holdings Pty Limited (2014a) *Noise Monitoring Program.*

Cadia Holdings Pty Limited (2014b) *Cadia Valley Operations Annual Environmental Management Report 2013/14.*

Environment Protection Authority (2000) *NSW Industrial Noise Policy* (INP).

Environment Protection Authority (2013) *Rail Infrastructure Noise Guideline* (RING).

NSW Government (2014) *Voluntary Land Acquisition and Mitigation Policy –SSD Mining.*

Wilkinson Murray Pty Limited (2009) *Cadia East Project Noise and Blasting Impact Assessment.*

Appendix B

Air Quality Assessment

5 March 2015 Our Ref: AS121788

Via email

Andrew Wannan
Approvals Manager
Cadia Holdings Pty Limited
Private Mail Bag
South Orange PO NSW 2800

Dear Andrew

Re: CADIA VALLEY OPERATIONS – PROCESSING RATE MODIFICATION

1 Introduction

1.1 Overview of Modification

Cadia Holdings Pty Limited (CHPL), a wholly owned subsidiary of Newcrest Mining Limited (Newcrest), is seeking a Modification to the Cadia East Project Approval (Project Approval 06_0295).

The Modification includes:

- an increase in the approved ore production and processing rate at the Cadia Valley Operations (CVO) from 27 million tonnes per annum (Mtpa) to 32 Mtpa;
- additional secondary crushing circuits at Concentrators 1 and 2;
- an upgrade of the existing regrind Vertimill at Concentrator 2;
- installation of three additional regrind Vertimills at Concentrator 1;
- installation of additional flotation cells at Concentrator 1;
- de-bottlenecking at the ore processing facilities and underground ore crushing and transport infrastructure; and
- transitional arrangements including use of mobile crusher and temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are place.

The Modification does not seek to change underground mining methods, surface disturbance areas and would result in negligible changes to the life of mine ore and tailings production.

1.2 Transitional Arrangements

The upgrades to the Concentrator 1 and Concentrator 2 circuits are designed to minimise disruption to operations and would take approximately 12 months. During this transitional arrangement, it is proposed to operate a mobile crusher adjacent to the Concentrator 1 Coarse Ore stockpile, to provide additional crushing capacity. This would also include the use of two 45 tonne excavators as feed units and three CAT 777 haul trucks to transfer ore from the Concentrator 1 coarse ore stockpile to the Concentrator 2 coarse ore stockpile for processing in Concentrator 2. An overview of the Modification is provided in **Appendix A**.

1.3 Scope and Objectives

ENVIRON Australia Pty Limited (ENVIRON) have been commissioned by Resource Strategies Pty Ltd, on behalf of CHPL, to prepare an air quality review for the Modification. The objective of the air quality review is to provide an assessment of the potential air quality impacts associated with the Modification, including:

- Review of air quality monitoring data and assessment of the impact of existing operations.
- Identification of new sources of dust associated with the Modification and presentation of emission estimates.
- Comparison of the increase in emissions associated with the Modification against emission inventories for existing operations, presented in the Cadia East Air Quality Impact Assessment (AQIA) (Holmes Air Sciences **[HAS], 2009**).
- Assessment of impact by comparing the percentage increase in emissions against the existing monitoring data and modelling predictions presented in the AQIA.
- Review of greenhouse gas emissions (GHG) associated with the Modification.

2 Overview of Existing Operations

The CVO is located approximately 25 kilometres (km) southwest of Orange, in the Central Tablelands of New South Wales (NSW). CVO currently includes two underground mining operations, known as Ridgeway and Cadia East, ore processing facilities and other supporting infrastructure.

CHPL commenced mining in the Cadia Hill Mine (open pit) in 1998, which ceased operating and entered a care and maintenance phase in July 2012. The Ridgeway underground mine commenced production in 2002 and is scheduled to continue until 2017. The Cadia East underground commenced production in 2013 and has approval to operate until 2031. Current production is approved at 27 Mtpa.

The existing CVO ore processing facilities use flotation cells to produce a gold/copper concentrate slurry. The gold/copper concentrate is then thickened and pumped via a buried concentrate pipeline to Blayney to be dewatered.

Since open cut operations ceased in July 2012, with production shifting to the Cadia East underground, dust emissions generated at the site have decreased. For example, based on the emission scenarios presented in **HAS** (**2009**), total CVO estimated dust emissions were reduced by 20 percent (%) with the transition from open pit/underground to underground operations only.

2.1 Project Approval

Project Approval (06_0295) for the Cadia East Project was granted in January 2010, for a maximum production rate of 27 Mtpa. Conditions of approval specific to air quality include impact assessment criteria, operating conditions and monitoring requirements.

Condition 17, Schedule 3 of the Project Approval requires that CHPL ensure that the Project causes no additional exceedances of the impact assessment criteria, at any residence on privately owned land or on more than 25% of any privately owned land.

The impact assessment criteria are given in **Table 1**, **Table 2** and **Table 3** and are consistent with impact assessment criteria specified in the Approved Methods for Modelling and Assessment of Air Pollutants in NSW (**NSW EPA, 2005**).

Table 1: Long term impact assessment criteria for particulate matter		
Pollutant	**Averaging Period**	**Criterion**
TSP	Annual	90 µg/m³
PM_{10}	Annual	30 µg/m³

Table 2: Short term impact assessment criteria for particulate matter		
Pollutant	**Averaging Period**	**Criterion**
PM_{10}	24 hours	50 µg/m³

Table 3: Long term impact assessment criteria for deposited dust			
Pollutant	**Averaging Period**	**Maximum increase**	**Maximum total**
Deposited Dust	Annual	2 g/m^2/month	4 g/m^2/month

CHPL are also required to comply with Land Acquisition Criteria (Condition 18, Schedule 3). If the acquisition criteria are exceeded and CHPL receive a written request from the landowner, they are required to acquire the land. The long term acquisition criteria are identical to the impact assessment criteria; however the short term land acquisition criteria differ and are shown in **Table 4**.

Table 4: Short term land acquisition criteria for particulate matter				
Pollutant	**Averaging Period**	**Criterion**	**Percentile[1]**	**Basis**
PM_{10}	24 hours	150 µg/m³	99[2]	Total[3]
	24 hours	50 µg/m³	98.6	Increment[4]

1 Based on the number of block 24 hour averages in an annual period.

2 Excludes extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities or any other activity agreed by the Secretary in consultation with EPA.

3 Background PM10 concentrations due to all other sources plus the incremental increase in PM10 concentrations due to the mine alone.

4 Incremental increase in PM10 concentrations due to the mine alone.

3 Existing Environment

To assess compliance with impact assessment criteria, CHPL have implemented an Air Quality Monitoring Program (**CVO, 2014**). The monitoring program has established eight (8) dust deposition gauges locations[1], four (4) tapered element oscillating microbalance (TEOM) analysers locations (for particulate matter 10 microns or less in diameter [PM_{10}]) and two (2) meteorological monitoring stations. The air quality monitoring locations are shown in **Appendix A**.

CHPL prepares Annual Environmental Management Reports (AEMRs) (**CHPL, 2013**) in accordance with their Project Approval (06_0295). Monthly air quality monitoring reports are also prepared for CHPL which provide a summary of the air quality monitoring data collected for the period and provide review and investigation into any elevated air quality monitoring results (**Advitech, 2014a**).

1 Plus another three locations for the CVO Dewatering Facility near Blayney.

3.1 PM_{10} Concentration

Continuous PM_{10} monitoring is conducted using four (4) TEOMs in the vicinity of the CVO, shown in **Appendix A**.

The 24-hour average PM_{10} concentrations, for the period April 2011 to January 2015, recorded at the four TEOMs are presented in **Figure 1**. With the exception of some isolated days, the 24-hour PM_{10} concentrations generally remain below the impact assessment criteria. Seasonal patterns are evident with higher concentrations recorded in summer and lower concentrations recorded in winter.

Since the commencement of production at Cadia East in January 2013, there have been 22 days where the 24-hour PM_{10} was above 50 µg/m³ across all monitoring stations. Investigations into these elevated records indicate that generally; non-mining sources have contributed most to elevated PM_{10} concentrations.

The dates of the 22 elevated daily PM_{10} concentrations are presented in **Table 5**. Investigations into these exceedances are provided in the Advitech monthly monitoring reports and the AEMRs. A summary of these investigations is also provided in **Table 5**.

PM_{10} concentrations above the impact assessment criteria are most common at D1 (Bundarra). The majority of the elevated concentrations recorded at this site have been attributed to sheep being stored in an adjacent yard prior to shearing (**Advitech, 2014a; 2014b; 2014c**).

When elevated PM_{10} concentrations are recorded across all the sites, these are generally attributed to regional sources such as bushfire smoke. For example, in October 2013, extensive bushfire activity in the Blue Mountains contributed to elevated PM_{10} concentration at all locations and also at the Office of Environment and Heritage (OEH) monitoring site at Bathurst.

Only one of the 22 days with elevated PM_{10} concentrations has been attributed (in part) to CVO, occurring on the 8 November 2013 (**Adivech, 2014d**). However, further analysis presented in the 2013/2014 AEMR (**CHPL, 2014**) indicates that CVO contributed only a relatively small amount (~11 µg/m³) to the elevated PM_{10} concentration recorded on this day.

In reality, CVO will contribute, in varying amounts, to the ambient PM_{10} concentrations recorded at all sites, however on days when the PM_{10} concentrations are above the impact assessment criteria, these exceedances are strongly influenced by other sources, including regional sources such as bushfire smoke and localised sources such as livestock movements in sale yards.

When external events are not contributing significantly to ambient PM_{10} concentrations, the monitoring locations are generally below the impact assessment criteria.

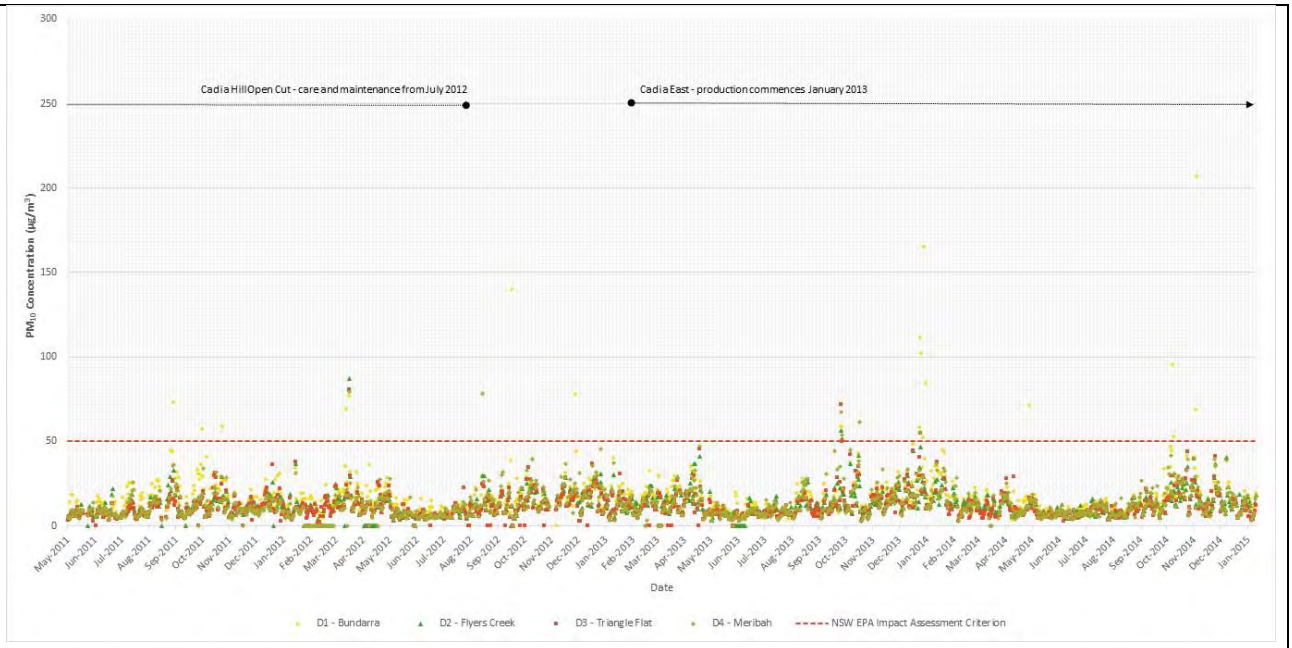


Figure 1: 24-hr average PM_{10} concentration - May 2011 to January 2015

Table 5: Exceedances of 24-hour average PM_{10} since January 2013

Date	Monitoring site (value)	Explanation of exceedance
18/10/2013	D1 – Bundarra (58.7 µg/m³)	On 18 and 19 October 2013, bushfires spread across much of the eastern seaboard of NSW, including significant bushfires in the Greater Blue Mountains Area. Elevated PM_{10} concentrations were recorded at all monitoring locations surrounding the site on these days which indicates a regional source of PM_{10} (i.e. regional bushfire smoke). This conclusion is supported by the elevated concentrations also recorded at the Bathurst OEH monitoring locations on both the 18th and 19th (145 µg/m³ and 63.2 µg/m³). The Advitech Air Quality Monitoring Report for October 2013 identified "exceedances" on the 18th at D1, D2 and D4, and attributes these to bushfire smoke and strong southeast winds.[2] The Adivech report did not report the elevated PM_{10} on the 19th, however it is likely that bushfire smoke also caused these elevated PM_{10} concentrations. PM_{10} remained elevated in Bathurst on the 19th.[3]
	D2 – Flyers Creek (56.6 µg/m³)	
	D3 – Triangle Flat (71.8 µg/m³)	
	D4 - Meribah (67.4 µg/m³)	
19/10/2013	D1 – Bundarra (58.6 µg/m³)	
	D2 – Flyers Creek (51.5 µg/m³)	
	D3 – Triangle Flat (50.1 µg/m³)	
	D4 - Meribah (53.6 µg/m³)	

[2] It is noted that the values reported by Advitech differ from the data provided by CVO (D1 – 68.2 µg/m³, D2 63.6 µg/m³, D4 - 76.9 µg/m³).

[3] The Advitech report also reports an instrument failure for D3 – Triangle Flat, however data supplied by CVO indicates that elevated PM_{10} was also recorded at this site on this day.

Date	Monitoring site (value)	Explanation of exceedance
8/11/2013	D4 - Meribah (61.4 µg/m³)	The Advitech Air Quality Monitoring Report for November 2013 reports that this elevated PM_{10} concentration was a result of a combination of mining and other sources. A different value of 56.8 µg/m³ was reported by Advitech. Peak hourly concentrations occurred under northwest winds that would have transported dust from CVO. In the 2013/2014 AEMR, the contribution from CVO is reported to be approximately 11.6 µg/m³ based on modelling undertaken by Advitech, with the remainder coming from other sources.
15/01/2014	D1 – Bundarra (58.2 µg/m³)	The Advitech Air Quality Monitoring Report for January 2014 attributes these exceedances to a combination of sheep storage in a yard adjacent to D1 and bushfires in the Wollemi National Park and near Four Mile Creek Road. It is noted that the values and days reported in the Advitech report differ to the spreadsheet provided by CVO. For example, the elevated PM_{10} shown here on the 16th is reported in the Advitech report as the 17th and he values themselves differ slightly (Bundarra reported as 110.8 µg/m³, Meribah reported as 52.5 µg/m³). Regardless, the conclusion remains the same. That is, the elevated PM_{10} at Bundarra on all days is caused primarily by the sheep stored in an adjacent yard while the elevated concentrations at all sites on the 16th were contributed to significantly by bushfire smoke.
16/01/2014	D1 – Bundarra (114.4 µg/m³)	
	D3 – Triangle Flat (54.8 µg/m³)	
	D4 - Meribah (55.2 µg/m³)	
17/01/2014	D1 – Bundarra (102.3 µg/m³)	
19/01/2014	D1 – Bundarra (51.9 µg/m³)	
20/01/2014	D1 – Bundarra (164.9 µg/m³)	
22/01/2014	D1 – Bundarra (84.3 µg/m³)	
20/05/2014	D1 – Bundarra (71.4 µg/m³)	The Advitech Air Quality Monitoring Report for May 2014 reports that elevated PM_{10} occurred due to when winds were from the west and therefore is not attributed to CVO.[4]
30/10/2014	D1 – Bundarra (95.5 µg/m³)	The Advitech Air Quality Monitoring Report for October 2014 attributes the exceedance on the 30th to sheep storage in the yard adjacent to D1 – Bundarra.[5]
31/10/2014	D1 – Bundarra (52.6 µg/m³)	
25/11/2014	D1 – Bundarra (68.5 µg/m³)	The Advitech Air Quality Monitoring Report for November 2014 attributes these exceedances to sheep storage in the yard adjacent to D1 – Bundarra.
26/11/2014	D1 – Bundarra (206.9 µg/m³)	

Calendar year annual average PM_{10} concentrations for 2011 to 2014 are presented in **Figure 2**. Since 2011 the annual average PM_{10} concentrations have generally been less than 50% of the impact assessment criterion of 30 µg/m³.

Similar to daily averages, annual PM_{10} concentrations are generally higher at D1 (Bundarra). This annual average is influenced by the high daily concentrations recorded when sheep are stored in the adjacent yard. The median concentration for 2014 is 12.8 µg/m³ (compared to a mean of 16.9 µg/m³), showing the influence of these high daily concentrations.

While on certain days CVO will contribute to peak 24-hour average PM_{10} concentrations recorded at all sites, the annual average PM_{10} concentrations clearly demonstrate that CVO operations are not adversely contributing, in the longer term, to elevated PM_{10} concentrations.

[4] It is noted that the day reported in the Advitech report is the 21st of May whereas the data provided by CVO indicate that this elevated PM_{10} concentration occurred on the 20th May.

[5] The value presented for the 31st in the Advitech report is less than the value shown here and below 50 µg/m³. However is it likely that this elevated PM_{10} concentration is also a result of the livestock storage as all other sites were significantly lower.

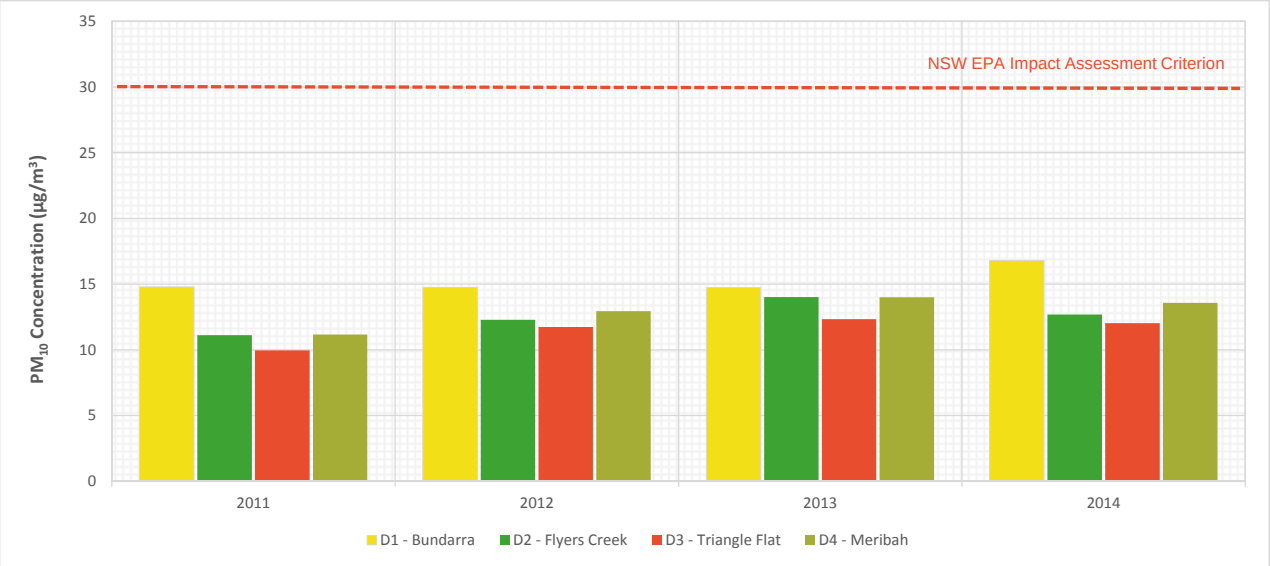


Figure 2: Annual Average PM_{10} concentration - 2011 to 2014

3.2 Dust Deposition

Annual average[6] dust deposition levels are presented in **Figure 3** for the period July 2010 to June 2014, based on information presented in the AEMRs. For the two most recent AEMR periods, dust levels above the long term impact assessment criteria of 4 g/m^2/month were recorded at DG5. There was also an elevated record (4.1 g/m^2/month) at DG29A during 2013-2014.

Based on a review conducted by Advitec, **CHPL (2013)** describes these elevated records as follows:

> *Having regard to predominant land uses surrounding monitoring locations, many of the DG results are not considered representative of the impact from the mine, as they would have likely been heavily influenced by nonmining related factors, such as agriculture.*

[6] AEMR period averages (i.e. July 2013 – June 2014).

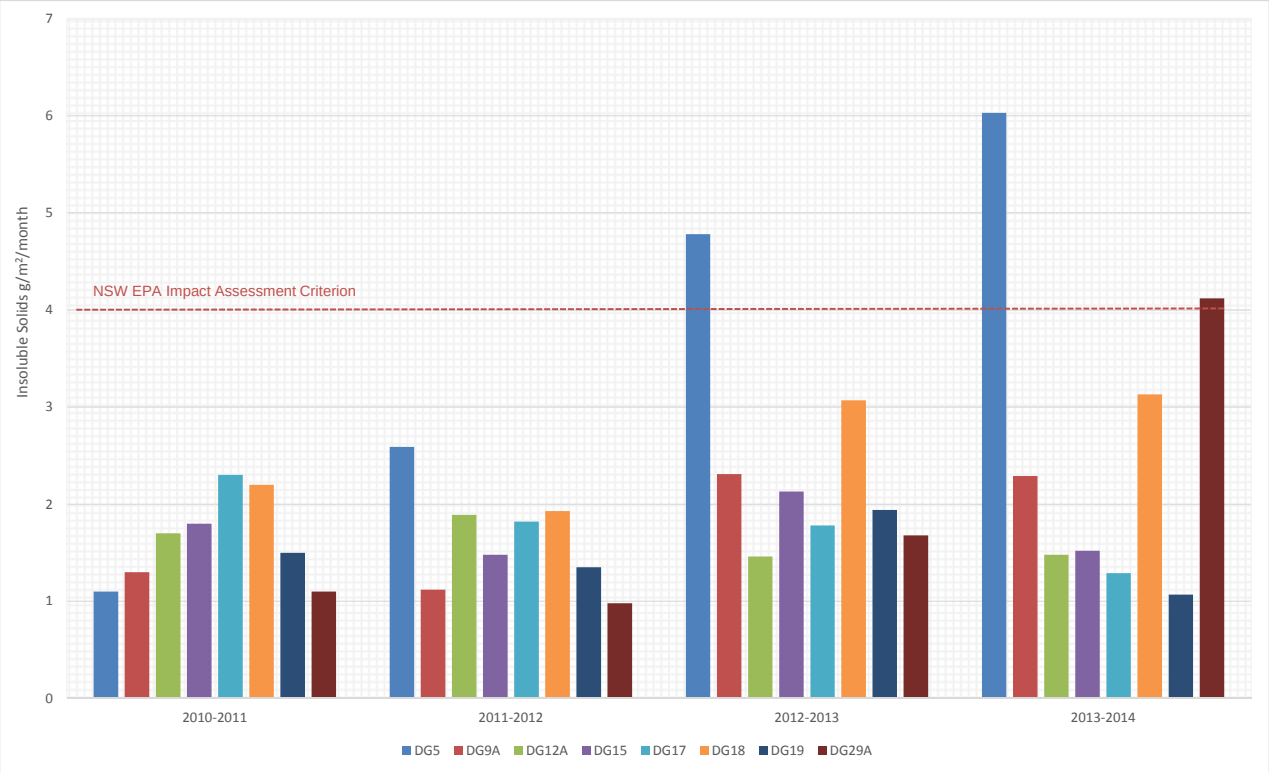


Figure 3: Annual Average dust deposition – July 2010 to June 2014

3.3 TSP Concentration

Total Suspended Particulate (TSP) concentrations are not directly measured at CVO. Compliance with the TSP assessment criteria is assessed by applying a scaling factor to the PM_{10} data, based on the assumption that 40% of the TSP is PM_{10}.

3.4 Complaints History

A community hotline is maintained by CHPL to receive community feedback, including complaints. A review of complaints received over the 2012/13 and 2013/14 AEMR periods indicated that a total of four dust related community complaints were received in each reporting periods (**CHPL, 2013; 2014**).

The dates of the complaints and CHPL response is described in **Table 6**. Also discussed are the resultant PM_{10} concentrations recorded on these days. Although dust emissions from the tailings storages are of most concern to complainants, only one of the complaint days (5/9/2011) recorded an elevated record relative to the air quality goals. CVO revisions to operating procedures and management measures appear to have resolved this.

Table 6: CVO complaints for last two AEMR periods

Date	Description of complaint	CHPL Action	Monitoring data
5-Sep-12	Report of excessive dust from work on the TSF wall.	TSF construction crew ceased work. Dust monitoring indicated dust exceedance at complainant's residence. Modelling commissioned to determine extent of exceedance on private property in district. CVO surface operations procedures and tailings deposition strategy revised to better manage dust.	Elevated PM_{10} was measured at D4 – Meribah on this day (78.3 µg/m³). CHPL has reported that this was caused by dust from the TSF. Since this event, CHPL revised the tailings deposition strategy to keep a larger proportion of the TSF wet, to decrease potential dust emissions. All other sites recorded 24-hour PM_{10} concentrations less than 30 µg/m³.
25-Oct-12	Excessive dust off TSF.	Construction work on the tailings dam ceased and the TSF spigots were moved onto dry areas.	No elevated 24-hour PM_{10} concentrations recorded at any site.
21-Mar-13	Excessive dust off TSFs.	CVO inspected the tailings dams and saw some dust lifting off the centre of the STSF. CVO contacted the complainant to clarify where the dust was coming from and he confirmed it was coming from the STSF. CVO and the complainant agreed that there was very little dust at that point in time and that a change in wind direction had resolved the problem.	No elevated 24-hour PM_{10} concentrations recorded at any site.
12-Apr-13	Report of dust off TSFs.	CVO moved the TSF spigots on the STSF to try to cover the dry areas. The wind dropped shortly afterwards and resolved the problem.	No elevated 24-hour PM_{10} concentrations recorded at any site.
26-Sep-13	Landowner reported dust to the south east of the mine.	Inspections identified the CVO plant area as the source of the dust. Additional water carts and sprays were used to control the dust.	No elevated 24-hour PM_{10} concentrations recorded at any site.
13-Oct-13	Landowner reported dust to the south east of the mine.	CVO identified the dust source as the plant area and increased water cart coverage and water sprays on the stockpiles.	No elevated 24-hour PM_{10} concentrations recorded at any site. D4 – Meribah was higher than other sites (33.7µg/m³).
24-Apr-14	Landowner reported dust coming from the NTSF.	CVO opened additional TSF spigots to cover the dry areas and activated water carts. The wind decreased later in the day and resolved the problem.	No elevated 24-hour PM_{10} concentrations recorded at any site.
6-May-14	Landowner concern over dust deposition impacting pasture growth.	Independent investigation to be arranged by landowner in consultation with CVO.	No elevated 24-hour PM_{10} concentrations recorded at any site.

4 Modification Emission Estimation

Emission factors developed by the US EPA[7], have been applied to estimate the amount of dust produced by the Modification, during both the transitional arrangements and for ongoing operations. The emissions estimates are presented for TSP, however the estimated relative change in emissions is directly applicable for each particle size metric (PM_{10} and $PM_{2.5}$).

These emission estimates are then compared with emissions estimated in the Cadia East AQIA in order to determine the significance of emissions associated with the Modifications.

4.1 Transitional Arrangements

During the transitional arrangements associated with the Modification, additional dust emissions would arise from the following sources:

- Excavators loading the mobile crusher from the Concentrator 1 coarse ore stockpile.
- Crushing of material at the mobile crusher.
- Loading trucks and hauling crushed ore between Concentrator 1 coarse ore stockpile to the Concentrator 2 coarse ore stockpile.
- Trucks unloading ore at the Concentrator 2 coarse ore stockpile.

An estimate of the potential increase in dust emissions during the transitional arrangements is derived based on the following assumptions:

- Approximately 5 Mtpa of material would be loaded, crushed, hauled and unloaded during a 12 month period.
- The return haul distance is approximately 2 km.
- Similar controls to existing operations would be deployed on the mobile crusher and haul roads (e.g. water sprays).

The estimated TSP emissions are provided in **Table 7** and are compared with the Year 17 emission inventory presented in the Cadia East AQIA (**HAS, 2009**). The Year 17 inventory (totalling 3,062,453 kg TSP) represents underground mining only and is therefore representative of existing approved operations at the site.

It is noted that wind-generated emissions from the tailings storage facilities (TSF) were estimated to represent over 50% of site emissions. There would be no increase in emissions from the TSF under the Modification and CHPL would continue to manage these dust emissions in accordance with their Air Quality Monitoring Program.

When compared to the Year 17 emission inventory, the transitional phase of the Modification is estimated to increase emissions by 4.3% for a 12 month period. Further discussion on the Year 17 emissions is provided in **Section 4.2** and the implications of the percentage increase is discussed in **Section 4.4**.

[7] United States Environmental Protection Agency (US EPA) AP-42 Compilation of Air Pollutant Emission Factors

Table 7: Calculated TSP emissions during the transitional arrangements of Modification	
Additional Emissions source	**Mod increase in emissions (kg/annum)**
Excavators loading mobile crusher	4,589
Ore crushing	15,103
Loading trucks with crushed ore	4,589
Hauling to Concentrator 2 coarse ore stockpile	102,256
Truck unloading	4,589
TOTAL	**131,127**

4.2 Modification Operations

Estimates of the potential increase in dust emissions as a result of ongoing operations are presented based on the following assumptions:

- An increase in ore production from 27 Mtpa to 32 Mtpa (~18.5% increase) would result in additional dust emissions associated with ore handling (i.e. conveyor transfer points, stockpiling, loading, crushing and screening).
- The two new secondary crushers would have an annual throughput of approximately 4 Mtpa each, resulting in an additional 8 Mtpa of secondary crushing capacity.
- It is assumed that an annual increase in waste rock handling would be proportional to the increase in ore production (i.e. ~18.5%).
- The additional three Vertimills and additional flotation capacity would not generate any additional dust as these are wet processes.
- Any increase in fugitive dust emissions associated with wind erosion from exposed areas (e.g. TSF, waste rock dumps) is assumed to be negligible. This is considered to be valid as waste rock quantities would be unchanged and the existing upstream lift methodology and overall TSF footprint would be unchanged due to the Modification.

A summary of the estimated TSP emissions for ongoing operations is provided in **Table 8** and is compared with the Year 17 emission inventory presented in the Cadia East AQIA (**HAS, 2009**).

The Year 17 inventory represents underground mining only and therefore representative of existing operations at the CVO. The Modification is estimated to result in an increase of 2.4% on emissions estimates for existing operations.

Table 8: Calculated TSP emissions for the Modification Operational Stage		
Emissions source	**Mod increase in emissions (kg/annum)**	**Year 17 emissions (kg/annum) as reported in the Cadia East AQIA**
ORE HANDLING		
Loading coarse ore to stockpile	4,558	Not included
Primary and Secondary ore crushing	54,000	81,000
Loading crushed Ore to stockpile	4,558	24,613
Conveyor transfer points	2,735	7,384
Ore processing in mill	None	123,066
WASTE		
Loading waste to trucks	169	912
Hauling waste to emplacement area	3,438	17,778
Unloading waste at dump	169	912
Dozer on waste	3,751	20,257
WIND EROSION		
Ore stockpiles and exposed ground	No increase	13,332
TSF	No increase	1,669,887
Waste rock dumps	No increase	105,588
Wind erosion - all pits	No increase	399,954
Wind erosion - subsidence zone	No increase	333,295
MISCELLANEOUS		
General construction work	No increase	40,880
Ventilation Shaft	No increase	205,131
Grader	No increase	18,464
TOTAL	**73,377**	**3,062,453**
Percentage Increase	***2.4%***	

4.3 Mitigation Measures

The Cadia East AQIA (**HAS, 2009**) describes air quality mitigation measures that relate to the existing CVO. The following mitigation measures have been assumed for the Modification:

- Watering of the haul road during trucking associated with the transitional arrangements.
- Regular maintenance of haul trucks.
- Fixed sprays on the top of coarse ore stockpiles.

4.4 Predicted Impact from Increase in Emissions

The predicted ground level concentrations presented in the Cadia East AQIA (**HAS, 2009**) for a number of receivers nearby to the CVO are shown in **Table 9**. Incremental predictions are presented for Year 17, corresponding to the emissions estimates presented in **Table 8**, to provide context for consideration of the increase in emissions from the Modification.

Assuming a direct correlation between emissions and ground level concentrations, the effect of adding a 4.3% increase during the transitional arrangements and an ongoing increase of 2.4% to the predictions presented in **Table 9** can be inferred. For example, the maximum predicted increment in 24-hour PM_{10} concentration at a private residences was 8.8 µg/m³. Assuming the direct correlation, this would result in a maximum increase of 0.4 µg/m³ (transitional arrangements) and 0.2 µg/m³ (ongoing) in 24-hour PM_{10} concentration at this residences. This increase would be largely indistinguishable from background and unlikely to result in additional exceedances of the ambient air quality goals. It is also noted that the 0.4 µg/m³ increase in emissions is only during the transitional arrangements and the ongoing increase from the Modification operations would be approximately half this amount.

In addition, CVO's Air Quality Monitoring Program (**CVO, 2014**) includes a trigger based alarm system, designed to alert key operational personnel to increasing short term PM_{10} concentrations, allowing them to identify and control visible dust and prevent exceedances.

Table 9: Predicted modelling results in the Cadia East AQIA – Year 17

Receptor Name	Maximum 24-hour PM_{10}	Annual average PM_{10}	Annual average TSP	Annual average dust deposition
NSW Forestry Owned	8.9	1.2	1.4	0.1
KA Hughes	3.1	0.1	0.1	0.0
CHPL Owned 'Bundella'	3.7	0.3	0.4	0.1
CHPL Owned 'Caringle'	5.2	0.6	0.8	0.2
CHPL Owned 'Stratton Vale'	15	2.3	3.5	1.2
GA Knox	8.8	1.1	1.4	0.3
CW Knox	5.8	0.9	1.1	0.2
Rob and Florence Ovenden (formerly JI McLennan)	7.6	1.2	1.6	0.3
CHPL Owned (formerly JL Gill and CA Jackson)	11	1.1	1.4	0.2

4.5 Assessment of Potential Worst-case Daily Emissions

The analysis presented in **Section 4.2** and **Section 4.4** is based on emission estimates derived from annual average throughput, for example a throughput of approximately 4 Mtpa for the secondary crushers. The maximum duty of the secondary crushers is 800 tonnes per hour (tph) and these crushers could theoretically operate at this maximum throughput in a 24-hour period. This is approximately double the processing rate allocated pro rata from the annual throughout of 4 Mtpa. This is considered to be highly conservative as it would represent the crushers operating at their maximum duty for a 24 hour period.

To estimate the potential short term impact of the Modification, an estimate of the potential worst case 24 hour dust emissions are presented based on the following assumptions:

- Three secondary crushers (1 existing and 2 new) would operate at 800 tph for a 24-hour period. Associated emissions sources (loading coarse ore stockpiles and conveyors) would operate at the same intensity level.

- Daily emissions for other sources are allocated pro rata from annual emissions, to compare directly with the emission estimates in the Cadia East AQIA.
- The annual emission total for all sources from the EA are divided by 365 to reflect what was used in the EA modelling to predict daily impacts. It is noted that for some sources (such as wind erosion) emissions in the EA modelling were not assigned pro rata from annual total, rather were adjusted according to the hourly wind speeds and normalised to the annual total. However for the purposes of this comparison, a simple pro rata adjustment provides sufficient accuracy.

For emission estimates during the transitional arrangements, a similar approach is undertaken whereby the mobile crusher is assumed to operate at 800 tph for a 24-hour period and the equivalent amount of crushed material is loaded, hauled and unloaded.

The emissions presented in **Table 10** indicate that on a highly conservative worst-case daily basis, the Modification could result in an increase of 6.0% during the transitional arrangements and 3.9% during ongoing operations. Again assuming a direct correlation between emissions and ground level concentrations, on a worst case day during transitional arrangements the modification may add 0.5 µg/m³ to the 24-hour PM_{10} concentrations at private residences. On a worst case day during ongoing operations the Modification may add 0.3 µg/m³ to the 24-hour PM_{10} concentrations at private residences.

This increase in unlikely to give rise to additional days over the impact assessment criteria. Firstly, this scenario is unlikely to occur, as it would require the crusher to operate at 800 tph for every hour of the day. In the event that the crusher did operate at this high rate, for an additional exceedance to occur it would also need to correspond to a day when background PM_{10} was elevated or dust emissions from other sources at CVO were also high. As described above, the trigger based alarm system is designed to prevent this happening and in the event of elevated PM_{10} concentrations occurring, CVO staff would cease or scale back certain operations, including crushing at this maximum rate.

Table 10: Estimated worst-case daily TSP emissions

Scenario	Emissions in kg/day	% increase from the Cadia East AQIA
EA (pro rata from annual)	8,390	N/A
Modification – transitional arrangements	500	6.0%
Modification – ongoing operations	331	3.9%

4.6 Greenhouse Gas Emissions

In addition to local air quality impacts, the Modification would result in a small increase in GHG emissions. Estimates of GHG emissions are presented for the anticipated diesel consumption during the transitional arrangements (Scope 1 emissions) and the increased power demand required for ongoing operations (Scope 2 emissions).

4.6.1 Emissions from Diesel Use During Transitional Arrangements

The additional Scope 1 GHG emissions for diesel consumption during the transitional arrangements are presented in **Table 11**. Emissions are calculated using equation 1, based on the following assumptions.

- Annual fuel consumption in kL (Q) for hauling is estimated based on a nominal fuel consumption of 65 L/hr for a Cat777D haul truck operating at medium load (i.e. average gross weight, not overloaded, on a good haul road)[8] for 70% of the year.
- Annual fuel consumption (Q) for an excavator is estimated based on a nominal fuel consumption of 50 L/hr for a Cat345D operating at high load (i.e. continuous truck loading) for 70% of the year.
- Annual fuel consumption (Q) for the mobile crusher is estimated based on a nominal fuel consumption of 22 L/hr for a Metso model mobile crusher[9] for 70% of the year.
- The energy content (EC) and emission factors (EF) for diesel is taken from the National Greenhouse Accounts (NGA) Factors workbook (**DoE, 2014**).

$$Emissions_{(t\ CO2-e)} = \frac{Q \times EC \times EF}{1000} \qquad \text{equation 1}$$

Table 11: Estimated additional Scope 1 GHG emissions during transitional arrangements

Source	Emissions (t CO_2-e/annum)
Excavator	1,069
Mobile crusher	823
Hauling	362
Total	**2,254**

4.6.2 Ongoing Emissions from Electricity Use

The Scope 2 GHG emissions for additional electricity consumption required as part of the modification are presented in **Table 12**. Emissions are calculated using equation 2, based on the following assumptions.

- The annual electricity consumption in kWh (Q) is estimated based on the modification resulting in an increase in peak demand from 160 to 164 MW. The kWh per annum is calculated from the increased peak demand (4 MW) and an assumed load factor of 90% (which is calculated from the kWh used in the EA).
- The EF for electricity consumed in NSW is taken from the NGA Factors workbook (**DoE, 2014**).

[8] https://www.holtcat.com/Documents/PDFs/2012PerformanceHandbook/Owning%20&%20Operating%20Costs%20-%20Sec%2020.pdf

[9] http://www.metso.com/miningandconstruction/MaTobox7.nsf/DocsByID/BB3A5829D48BE3CDC22579A300349CAB/$File/Lokotrack_LT106_eng.pdf

$$Emissions_{(t\ CO2-e)} = Q \times \frac{EF}{1000}$$ equation 2

Table 12: Estimated additional Scope 2 GHG emissions during ongoing operations	
Source	**Emissions (t CO_2-e/annum)**
Electricity demand	21,094

4.6.3 Summary

During the transitional arrangements, additional diesel consumption would result in an increase in Scope 1 emissions of approximately 5.6%, when compared against the estimated annual average Scope 1 emissions reported in the Cadia East AQIA. There are no additional Scope 1 emissions associated with the Modification operations. However the additional power demand required for the Modification operations would result in an increase in Scope 2 emissions of approximately 2.4%, when compared with the estimated annual average Scope 2 emissions reported in the Cadia East AQIA.

5 Conclusion

The ambient air quality in the vicinity of the CVO is generally good, with annual average PM_{10} approximately 50% of the impact assessment criteria. Occasional short-term exceedances of the impact assessment criteria are recorded; however these are generally attributed to non-mining sources.

CVO contributes, in varying amounts, to the ambient PM_{10} concentrations recorded at all sites, however on days when the PM_{10} concentrations are above the impact assessment criteria, these exceedances are strongly influenced by other sources, including regional sources such as bushfire smoke and localised sources such as livestock movements in sale yards.

Assuming a direct correlation between increase in emissions and ground level concentrations, the Modification is estimated to result in a maximum 24-hour PM_{10} concentration increase of 0.4 µg/m³ at private residences for transitional arrangements and 0.2 µg/m³ for ongoing operations. This increase is considered negligible and unlikely to give rise to additional days over the impact assessment criteria, including Condition 17, Schedule 3 of the Project Approval.

As part of the Modification, CHPL would investigate the following mitigation measures at the design phase of the Modification infrastructure:

- enclosure of the crusher and use of water sprays; and
- enclosure or wind shielding of conveyor transfer points plus use of water sprays.

CVO's trigger based alarm system would continue to operate to minimise potential exceedances of ambient air quality goals. Key operational personnel are alerted to increasing short term PM_{10} concentrations, allowing them to identify and control visible dust and prevent exceedances.

GHG emissions would increase slightly for the Modification. Annual Scope 1 emissions during the transitional arrangements would increase by approximately 5.6% (representing approximately 0.001% of NSW GHG inventory for 2012). The additional annual Scope 2 emissions for the Modification would increase by approximately 2.4% (representing approximately 0.018% of NSW GHG inventory for 2012).

Prepared by:
Name: Ronan Kellaghan
Title: Senior Manager – Air Quality
Phone: (02) 9954 8100
Email: rkellaghan@environcorp.com
Signature: Date: 5.02.15

Authorised by:
Name: Ronan Kellaghan
Title: Senior Manager – Air Quality
Phone: (02) 9954 8100
Email: rkellaghan@environcorp.com
Signature: Date: 5.02.15

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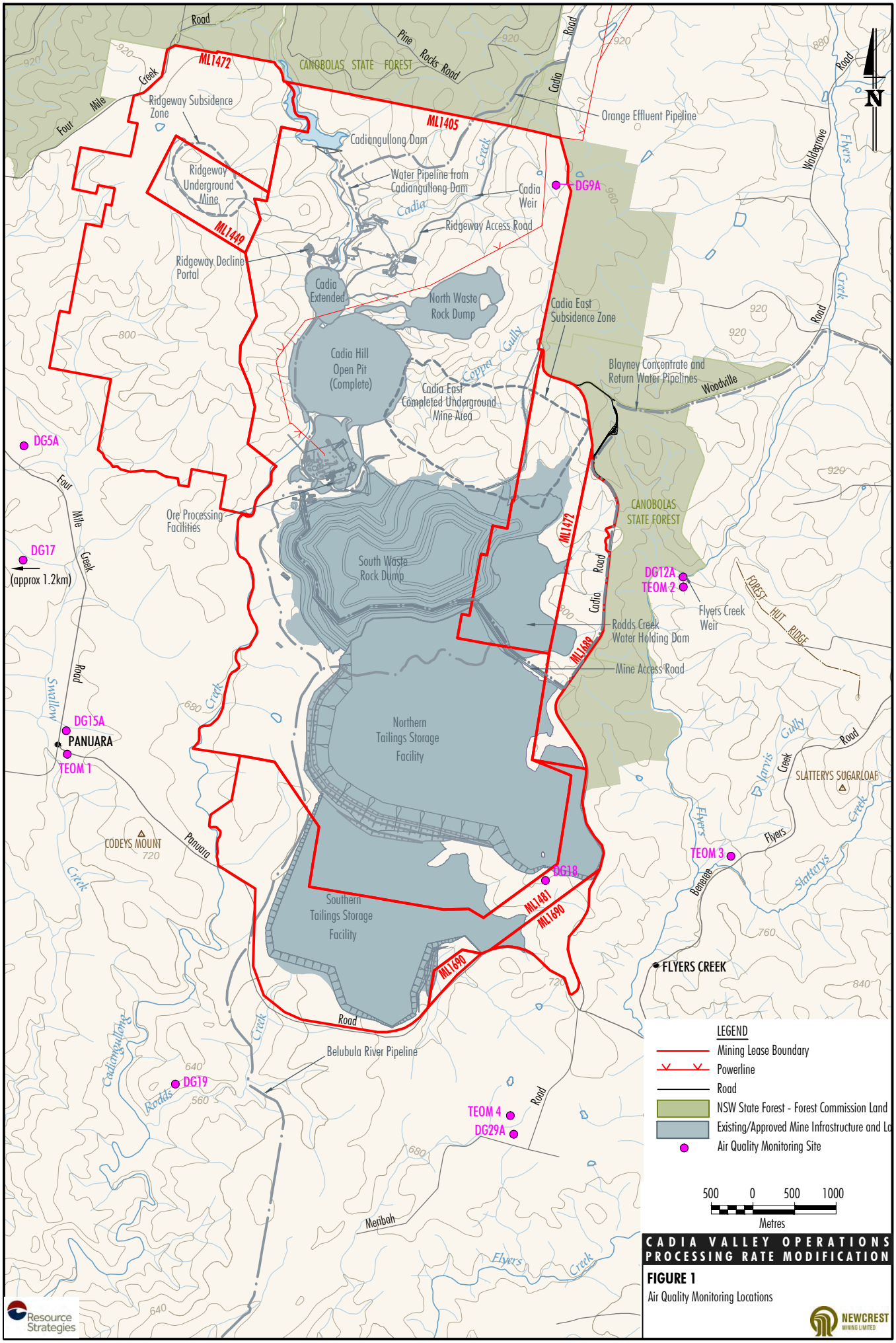
Appendix A

Air Quality Monitoring Locations



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Cadia Valley Operations

Appendix C

Site Water Balance

HYDROLOGY AND WATER MANAGEMENT CONSULTANTS

Gilbert & Associates Pty Ltd

REPORT

Cadia Valley Operations
Processing Rate Modification

Site Water Balance

Prepared for: **Cadia Valley Operations –**
Cadia Holdings Pty. Limited

13/03/2015
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PO Box 2143
Toowong, Qld. 4066

Tel: (07) 3367 2388

A.C.N 085 419 852
A B N 62 085 419 852

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1.0 INTRODUCTION

Cadia Holdings Pty Limited (CHPL) is seeking approval to modify its Project Approval (PA 06_0295) to enable an increase in the annual ore processing rate at the Cadia Valley Operations (CVO) (the Modification). This report has been prepared by Gilbert & Associates Pty Ltd (G&A) at the request of CHPL to document the implications the proposed increased ore processing rate would have on the site water balance and the performance of the CVO water management system.

G&A developed a site water balance model of the CVO in 2014 using the GoldSim® simulation package. The model is able to provide life-of-mine forecasting of water balance behaviour. This model has been used to assess the site water balance and changes to site water balance associated with the proposed Modification.

Changes to the site water balance are related to the predicted performance of the currently approved Cadia East Project as documented in the Cadia East Project Environmental Assessment (EA) and to the existing water management system on site which includes a number of upgrades undertaken since the Cadia East Project Approval (PA 06_0295).

The report is structured as follows:

- describes the proposed Modification – Section 2;
- summarises water balance results of the approved operations from the Cadia East Project EA (CHPL, 2009) – Section 3;
- describes updates and augmentations made to the water management system since the Cadia East Project EA (CHPL, 2009) – Section 4;
- describes the water balance model – Section 5;
- provides results of water balance model simulations – Section 6; and
- provides conclusions and recommendations – Section 7.

2.0 MODIFICATION DESCRIPTION

The approved ore production and processing rate at the CVO is 27 million tonnes per annum (Mtpa). The Modification would involve increasing the approved ore processing rate to 32 Mtpa.

In summary, the Processing Rate Modification would include:

- an increase in the approved ore production and processing rate at the CVO from 27 Mtpa to 32 Mtpa;
- additional secondary crushing circuits at Concentrators 1 and 2;
- installation of three additional regrind Vertimills at Concentrator 1;
- installation of additional flotation cells at Concentrator 1;
- an upgrade of the existing regrind Vertimill at Concentrator 2;
- de-bottlenecking initiatives at the ore processing facilities and underground ore crushing and transport infrastructure; and
- temporary trucking to allow the transfer of Cadia East ore from Concentrator 1 to Concentrator 2 until the relevant conveyors are in place.

The increased ore production rate would bring forward the Cadia East Project end date from approximately 2030 to approximately 2029.

3.0 WATER BALANCE OF THE APPROVED OPERATIONS

A schematic of the approved water management system is provided in Figure 1. The approved water management system allowed for mining in the Cadia Hill Open Cut, the Ridgeway Underground Mine and the Cadia East Underground Mine. Inflows to the water management system include rainfall runoff, groundwater and licensed extraction from surrounding creeks. Water within the water management system is used to supply the process plant, underground mining and haul road watering. Tailings from the process plant are deposited in the two tailings storage facilities (Northern Tailings Storage Facility [NTSF] and Southern Tailings Storage Facility [STSF]) from which water is reclaimed. A number of storages capture runoff from the infrastructure areas and mine waste rock emplacement which are pumped back to the water management system to supply demands.

Water balance modelling for the Cadia East EA commenced with estimated site water inventory as at 31 December 2008 (6,804 megalitres [ML]) and simulated the water balance over the then remaining 22 year mine life (until the end of 2030).

Results of the water balance modelling, which are summarised in the Cadia East EA (CHPL, 2009), indicated the following:

- The water management system performed within its design requirements over all conditions represented in the rainfall data set.
- The water supply scheme was able to supply water to the Project at a predicted supply reliability of between approximately 95% and 99%.
- Averaged over all climatic sequences modelled, Cadiangullong Dam would be effectively empty (i.e. when the storage level falls below the lower release point on the multi-level off-take in the dam) for 5.8% of the time.
- Averaged over all climatic sequences modelled, Cadiangullong Dam would spill for 53 days per year, with an average spill volume of 3,500 ML.

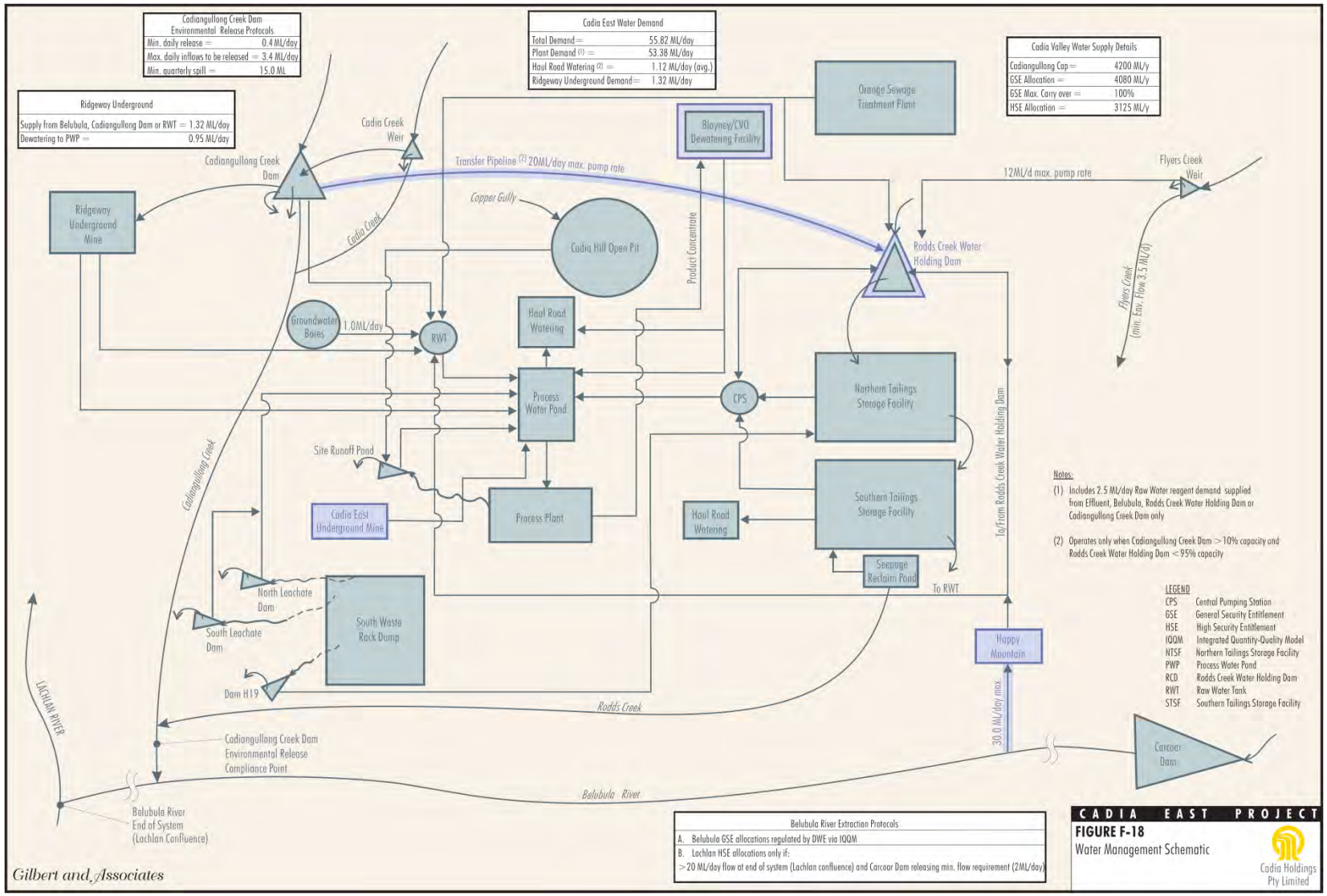

Figure 1 Cadia East EA Water Management System Schematic (Source: CHPL, 2009)

4.0 CHANGES TO WATER MANAGEMENT SYSTEM

Upgrades and augmentations made to the water management system since the Cadia East Project Approval (PA 06_0295) are summarised below. A schematic of the updated (current) water management system is provided in Figure 2. It is also noted that design requirements of some elements of the water management system have been updated in the CVO Environment Protection Licence (5590).

4.1 Contingency Pumping to Cadia Hill Open Cut

Active mining in the Cadia Hill Open Cut ceased in late June 2012. Since then the completed open cut has been available as a contingency storage for excess water on-site. Pumping from the NTSF and the STSF to the Cadia Hill Open Cut would be undertaken based on operational triggers (refer Section 4.3).

4.2 Implementation of the Belubula Water Sharing Plan

The Water Sharing Plan (WSP) for the Belubula Regulated River Water Source commenced on 4 October 2012 (New South Wales Office of Water [NOW], 2013) and covers the Belubula River from Carcoar Dam to the confluence with the regulated Lachlan River. The WSP for the Belubula Regulated River Water Source allows CVO to source water from the Belubula regulated river and associated unregulated tributaries up to the annual extraction limits.

4.3 Introduction of Trigger Action Response Plan

Trigger Action Response Plans (TARPs) have been introduced for most storages on site which provide guidance on various recommended responses for a range of water levels. The objectives of the TARPs as stated in the Water Management Plan (CHPL, 2014) are:

1. Decrease raw water use intensity.
2. Maintain adequate water supply.
3. Negligible impact on surface water quality.
4. Negligible impact on licensed surface water extraction.
5. Negligible impact on licensed groundwater extraction.

The current water system management TARPs are shown in Table 1 to Table 3.

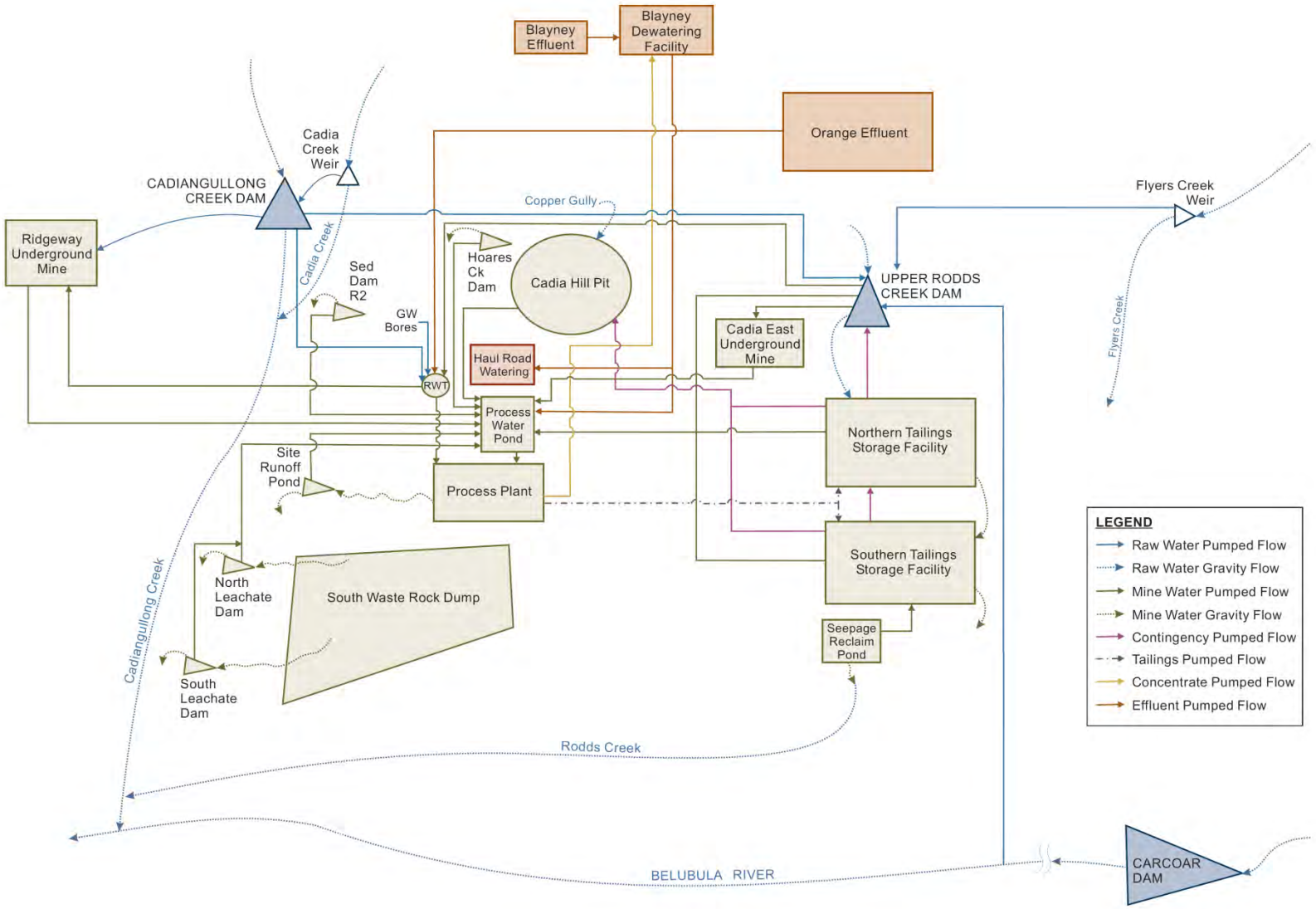

Figure 2 Updated Water Management System Schematic

Table 1 Cadiangullong Dam Triggers

RL (m)	Volume (ML)	Response
<5778.8	430	Stop extraction from Cadiangullong Dam
<5780.0	520	Stop use of Cadiangullong Dam water in processing
<5781.0	590	Stop transfer of Upper Rodds Creek Dam (URCD) (backbone)

Note: RL = reduced level; m = metres.

Table 2 Upper Rodds Creek Dam Storage Triggers

RL (m)	Volume (ML)	Response
>5768.0	5165.9	Stop transfer from Cadiangullong Dam (backbone)
>5768.2	5294.4	Stop transfer from Flyers Creek Weir
>5768.4	5423	Stop Belubula extraction
>5778.0	12511	Stop Orange Effluent transfer
>5779.5	13973	Stop NTSF transfer to URCD

Table 3 Tailings Storage Facility Flood Storage Triggers

Flood Storage Capacity* (ML)	URCD		
	RL (m)	Volume (ML)	Response
NTSF<3400	>5779.5	13973	Transfer from NTSF to Cadia Hill Open Cut
NTSF>3400 and STSF<3400	<5779.5	13973	Transfer from STSF to NTSF
NTSF<3400 and STSF<3400	-	-	Transfer from TSF with lowest flood storage capacity to Cadia Hill Open Cut

* Flood storage capacity is the amount of water that could be stored on the TSF between the current decant pool level and where the water would pool against the lowest point on the embankment.

5.0 SITE WATER BALANCE REVISIONS

5.1 Simulation Details

The water balance model has been set up to forecast the CVO water balance over the remaining 17 year project life using 118 “realizations” derived using the climatic record from 1895 to 2013. The first realization uses climatic data from 1895 to 1912, the second 1896 to 1913, the third 1897 to 1914 and so on. The results from all realizations are used to generate water balance statistics on the performance of the water management system. This method effectively includes all recorded historical climatic events in the water balance model, including high, low and median rainfall periods. The TARPs and their effect on the operation and performance of the water management system were incorporated into the water balance model.

The water balance model was linked to output from the Belubula River Integrated Quantity and Quality Model (IQQM). The IQQM is the model used by the NOW to set licence allocation levels in the Belubula Valley, in accordance with the WSP. The IQQM was run using climatic data from 1895 to 2013 to generate predictions of General Security Water Access Licence (WAL) available water determinations, as well as releases from Carcoar Dam and flows at the end of system (Helensholme) for simulation of available water for extraction against supplementary WALs. The IQQM has been recently updated by the NOW to include contemporary flow monitoring data and reflect the current WSP provisions – e.g. redefinition of the former “high security unregulated licence” as supplementary WAL and the establishment of water allocation accounts.

5.2 Assumptions

Water balance modelling for the updated operations water balance commenced with estimated site water inventory as at 15 February 2015 which totalled 14,900 ML.

Annual water extraction licences for the Belubula River are currently:

- 3,125 ML/year of supplementary licence; and
- 4,080 ML/year of general security licence.

It was assumed that pumping rates from the NTSF and STSF would be increased in line with the higher tailings production rate associated with the Modification.

6.0 COMPARISON OF WATER BALANCE RESULTS

A comparison of simulated water balance results for the updated water management system (i.e. 27 Mtpa ore production and processing rate) and the Modification (i.e. 32 Mtpa ore production and processing rate) is provided below.

6.1 Overall Water Balance

From the 118 climatic realizations modelled, detailed results for the following three realizations have been extracted:

- *Low Rainfall* – 10th percentile low mine life rainfall total (corresponding to a low total mine life rainfall, that is exceeded in 90% of realizations).
- *Median Rainfall* – Median mine life rainfall total (corresponding to a median total mine life rainfall, that is exceeded in 50% of realizations).
- *High Rainfall* – 90th percentile high mine life rainfall total (corresponding to a high total mine life rainfall, that is exceeded in 10% of realizations).

Figure 3 to Figure 5 show a comparison of water balance results for the updated water management system and the Modification water management system on the water management schematic for the low, median and high rainfall realizations.

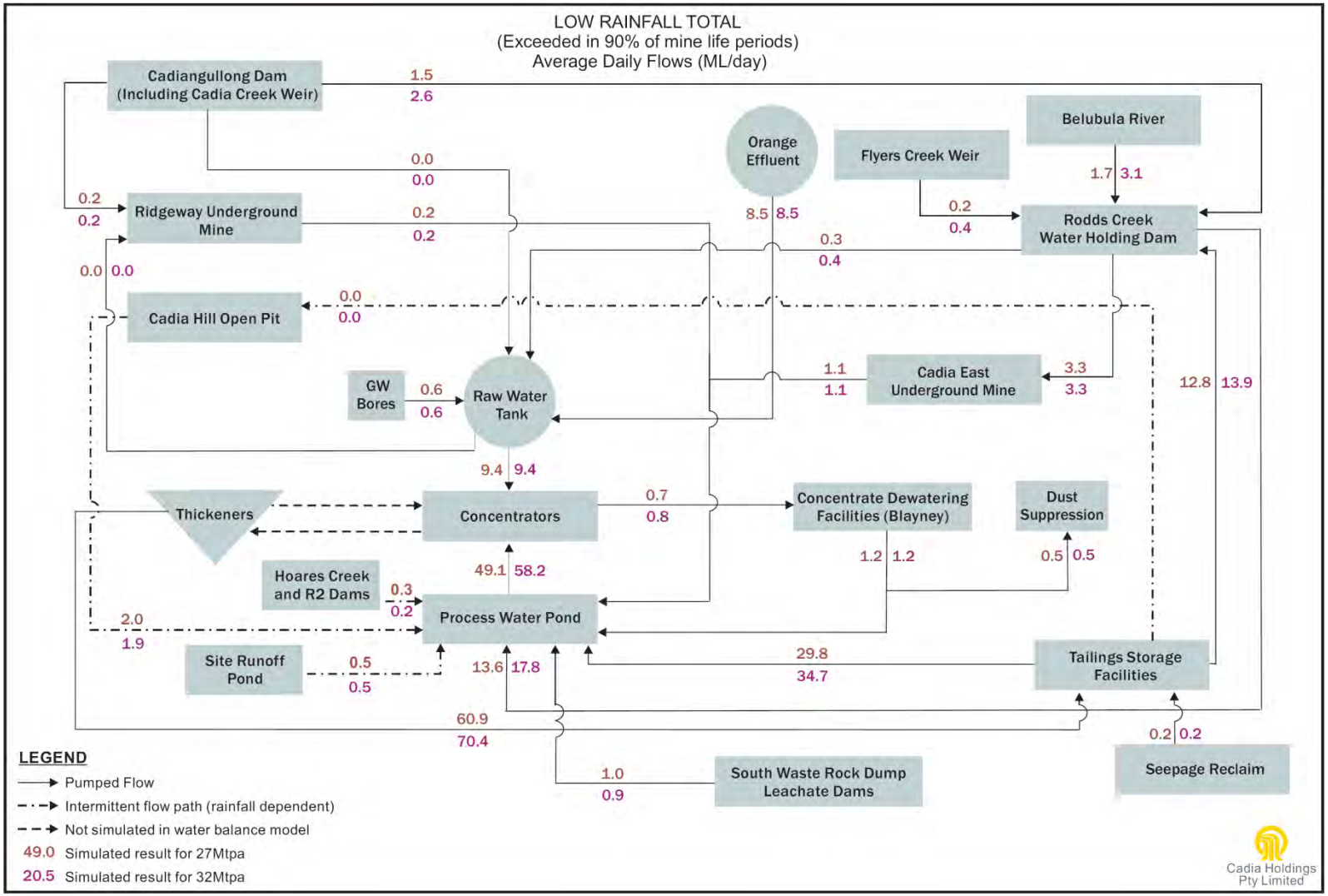

Figure 3 Comparison of Water Balance Results – Low Rainfall Realization

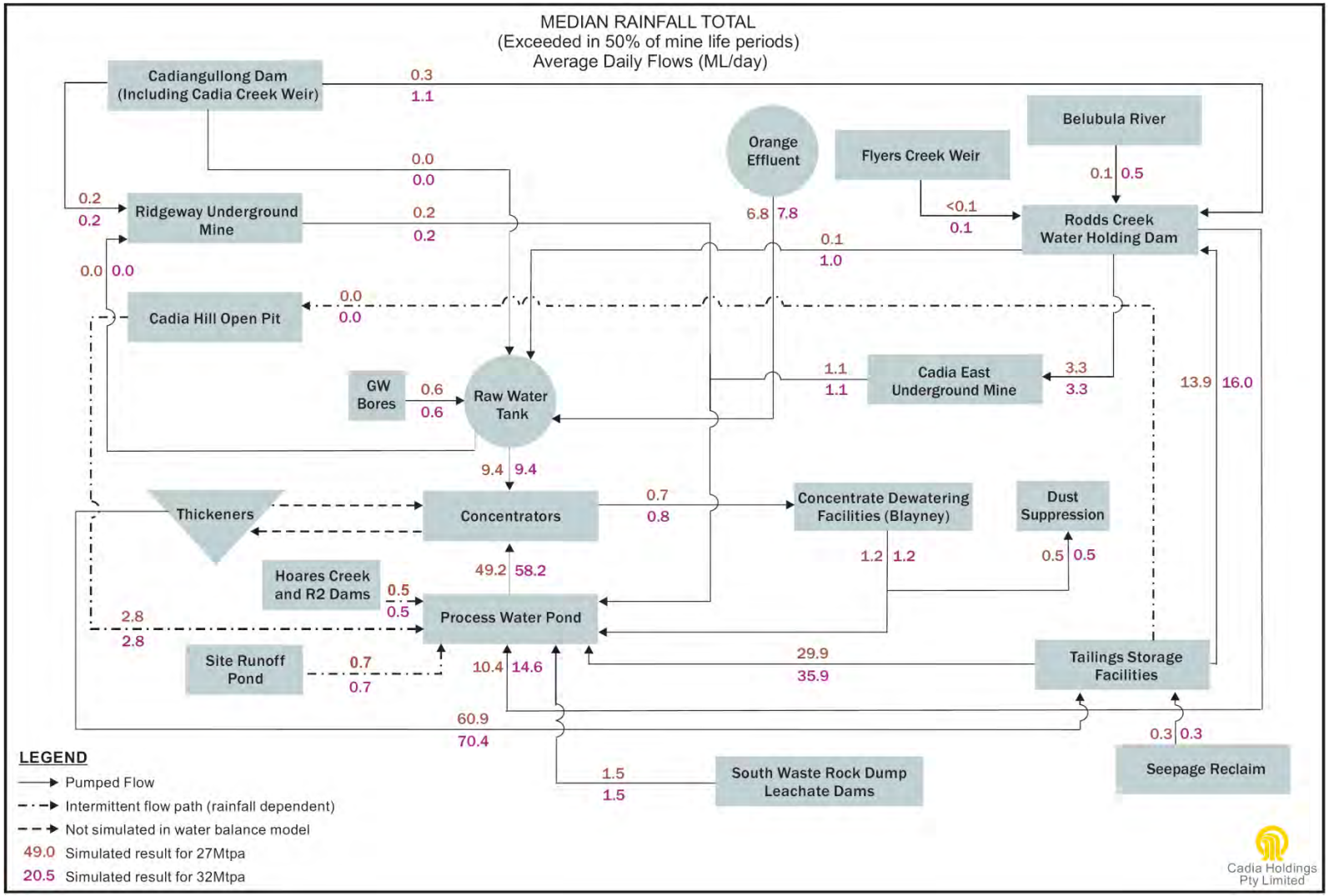

Figure 4 Comparison of Water Balance Results – Median Rainfall Realization

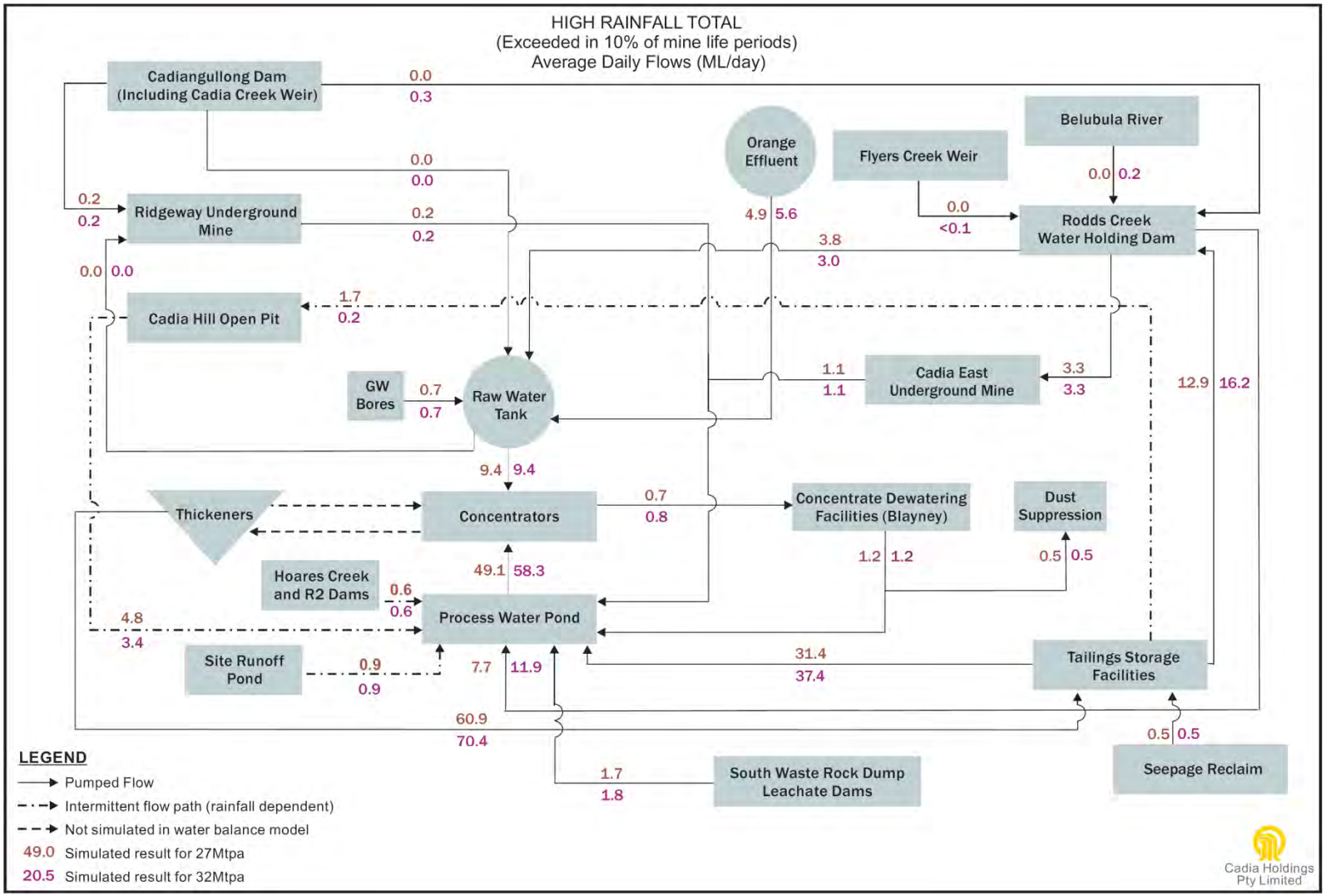

Figure 5 Comparison of Water Balance Results – High Rainfall Realization

6.2 Water Supply Reliability

Modelling of the updated water management system with and without the Modification does not result in any supply shortfalls mainly due to the high total stored water volume at the start of the simulation period (February 2015).

6.3 Cadiangullong Dam Performance

The simulated performance of Cadiangullong Dam for the updated water management system shows that, in all climatic sequences modelled, the storage did not empty (i.e. the storage level would not fall below the lower release point on the multi-level off-take in the dam) for simulations undertaken without the Modification. Simulating the water management system with the Modification, the storage was simulated to empty in 0.04% of days, averaged over all climatic realizations modelled. Results indicated that storage would not empty in 102 out of 118 realizations (86%). Averaged over all realizations modelled, the updated water management system predicts that Cadiangullong Dam would spill for 111 days per year, with an average annual spill volume of 7,056 ML. Simulation of the water management system with the Modification results in 103 days per year of predicted spill with an average annual spill volume of 6,632 ML.

6.4 Spills of Mine Water Dams

Simulated median total mine life spill for the updated water management system was 120 ML while for the Modification this totalled 90 ML. This spill was simulated to occur from the Site Runoff Pond and the Northern Leachate Dam only.

7.0 CONCLUSIONS AND RECOMMENDATIONS

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

There was however some spill simulated from the updated operations from the Site Runoff Pond and the Northern Leachate Dam. These spills were not associated with the Modification and it is recommended that the design storm criteria for these dams be reviewed and remedial measures such as catchment reduction or capacity enlargement be undertaken as required to ensure the water management system for the CVO meets the Environment Protection Licence (5590) design requirements.

8.0 REFERENCES

Cadia Holdings Pty Limited 2009, *Cadia East Project Surface Water Assessment*, prepared by Gilbert and Associates Pty Ltd for Cadia Holdings Pty Limited, April.

Cadia Holdings Pty Limited 2014, *CVO Water Management Plan*, Version 4.

New South Wales Office of Water 2013, *Belubula Regulated River*, viewed 7 November 2014, Department of Primary Industries. Website: http://www.water.nsw.gov.au/Water-management/Water-sharing-plans/Plans-commenced/Water-source/Belubula-Regulated-River.

Appendix D

Tailings Review

URS

Fax Transmittal

To:	Andrew Wannan	From:	Neil Mattes
Organisation:	Cadia Valley Operations	URS Project No:	43167960
Facsimile:	by email	Date:	27 February 2015
cc:	Peter Lord	Page 1 of:	5
Your Ref:			

Special Instructions: ☐ Confidential ☐ Urgent ☐ Please Reply ☐ For Your Information ☐ For Follow-up

If you do not receive all pages or transmission is illegible, please contact the originator to re-send. Should the facsimile be sent to the wrong fax number, would receiver please destroy this copy and notify URS immediately. Thank you.

Subject: Cadia Valley Operations – Processing Rate Modification

Message:

1. Introduction

An assessment has been made of the implications for tailings storage management at Cadia Valley Operations (CVO) of potential modification of the life-of-mine (LOM) ore processing/tailings production from that covered by the approved CVO , which was considered in the *Cadia East Tailings Storage Feasibility Study* (URS, 2008)[1] as part of the Cadia East Environmental Assessment (EA). In brief, the Feasibility Study (FS) was based on a tailings production of 27 Mtpa for the remaining life-of-mine from January 2013, whereas the proposed Modification involves the ramping-up of annual tailings production to 32 Mtpa by 2018[2].

2. Maximum Rate of Rise

From a regulatory viewpoint, the New South Wales Dams Safety Committee limits the maximum rate of rise for upstream-lifted tailings storages to 5 metres per year (m/year).

Based on previous experience, the FS adopted a maximum average rate of rise for each of the CVO storage facilities of 3m/year, and subsequent CVO experience has been that this assumption is reasonable. Consequently, the maximum 3m/year rate of rise limit has been retained for this Modification assessment.

3. Tailings Storage Implications of Increased Production Rates

The life of mine production plan in the FS starts from 2013, with the Northern Tailings Storage Facility (NTSF) having previously been filled to Stage 6 nominal crest of RL 732m and the Southern Tailings Storage Facility (STSF) filled to Stage 3 nominal crest RL 678.5m. The following assessment of implications of increased production rates uses those same start points for consistency.

At the start of 2013, the available remaining LOM tailings storage capacity was proportioned approximately 72 percent (%) NTSF and 28% STSF. This volumetric split is governed by the topography of the STSF site in particular. Simplistically, splitting tailings production at 32 million tonnes per annum (Mtpa) to achieve this volumetric distribution would require about 23 Mtpa to the NTSF and 9 Mtpa to the STSF, which is close to the planned split of tailings production through the Concentrator 1 (Con1) and Concentrator 2 (Con2) circuits of 24 Con1/8 Mtpa Con2. With provision already in place for Con1 tailings to be directed to the STSF via Wire Gully if required, achieving the required overall balance can be readily achieved without additional infrastructure.

[1] URS (2008) *Cadia East Tailings Storage Feasibility Study*.
[2] Calender years used in this report unless specified.

URS Australia Pty Ltd
Level 4, 407 Pacific Highway
Artarmon NSW 2064
Australia
T: 61 2 8925 5500
F: 61 2 8925 5555

To: Andrew Wannan
Cadia Valley Operations
27 February 2015
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The EA and Modification tailings production plans are listed in Table 1 below – for the modified profile **actual** production tonnages (rounded to nearest million tonnes) have been used for 2013 and 2014.

Table 1: EA and Modified Tailings Production Plans (from 2013)

	CVO EA		Modification -32 Mtpa	
Calendar year	(Mt)	cumulative (Mt)	(Mt)	cumulative (Mt)
2013	27	27	25	25
2014	27	54	20	45
2015	27	81	28	73
2016	27	108	30	103
2017	27	135	31	134
2018	27	162	32	166
2019	27	189	32	198
2020	27	216	32	230
2021	27	243	32	262
2022	27	270	32	294
2023	27	297	32	326
2024	27	324	32	358
2025	27	351	32	390
2026	27	378	32	422
2027	27	405	32	454
2028	27	432	30	484
2029	27	459	13	497
2030	27	486	0	497

These plans are plotted as cumulative tonnage from 2013 in Figure 1 below, which shows that until about 2018 the 32 Mtpa plan is still “behind” the original EA plan in terms of total disposal (a consequence of the lower tailings production rates for 2013-2014).

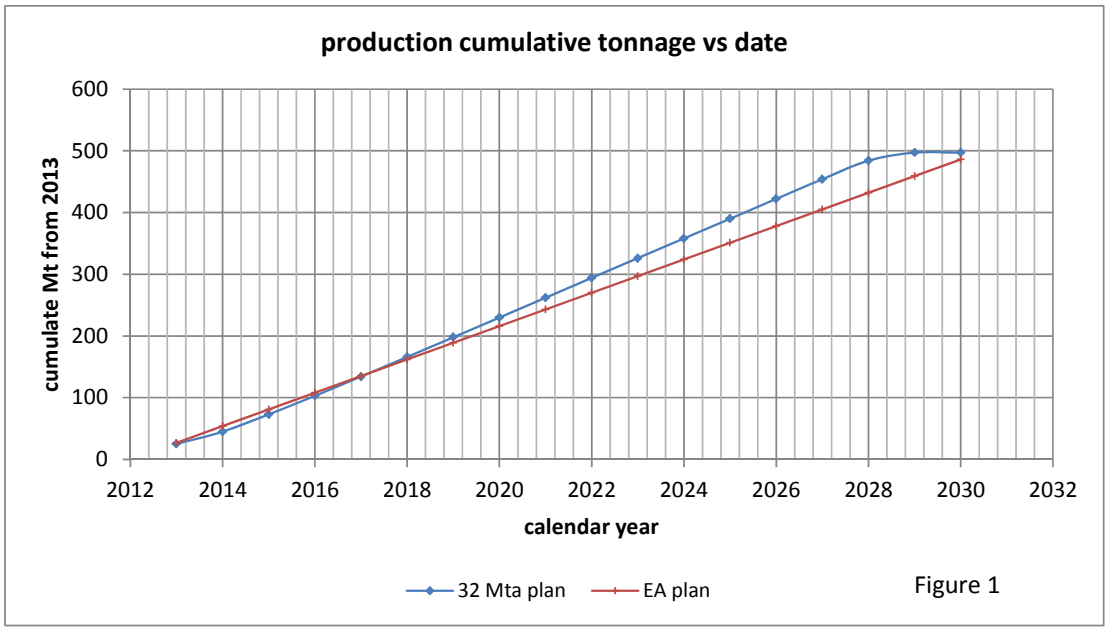

Figure 1

Over the EA plan, from 2013 the NTSF crest level will rise by about 43m, and the STSF crest level will rise by about 20m. Consequently, the rate of rise of the NTSF will be the potentially controlling factor, being about twice that for the STSF.

There are some minor differences between the tailings storage facility (TSF) stage/volume relationships used in the original FS studies and the TSF metrics subsequently developed by CVO, mainly due to differences in allowance for the effects of beach slope on incremental storage volumes, with the CVO volumes being typically 8-10% higher. For the current assessment the CVO metrics have been adopted for storage volume/crest elevation calculation and the more conservative FS figures have been used for effective beach area in assessing rate of rise.

On this basis, the annual tonnage rates of disposal into the NTSF corresponding to a 3m per year rate of rise in that storage have been calculated, and are plotted against crest level in Figure 2 below:

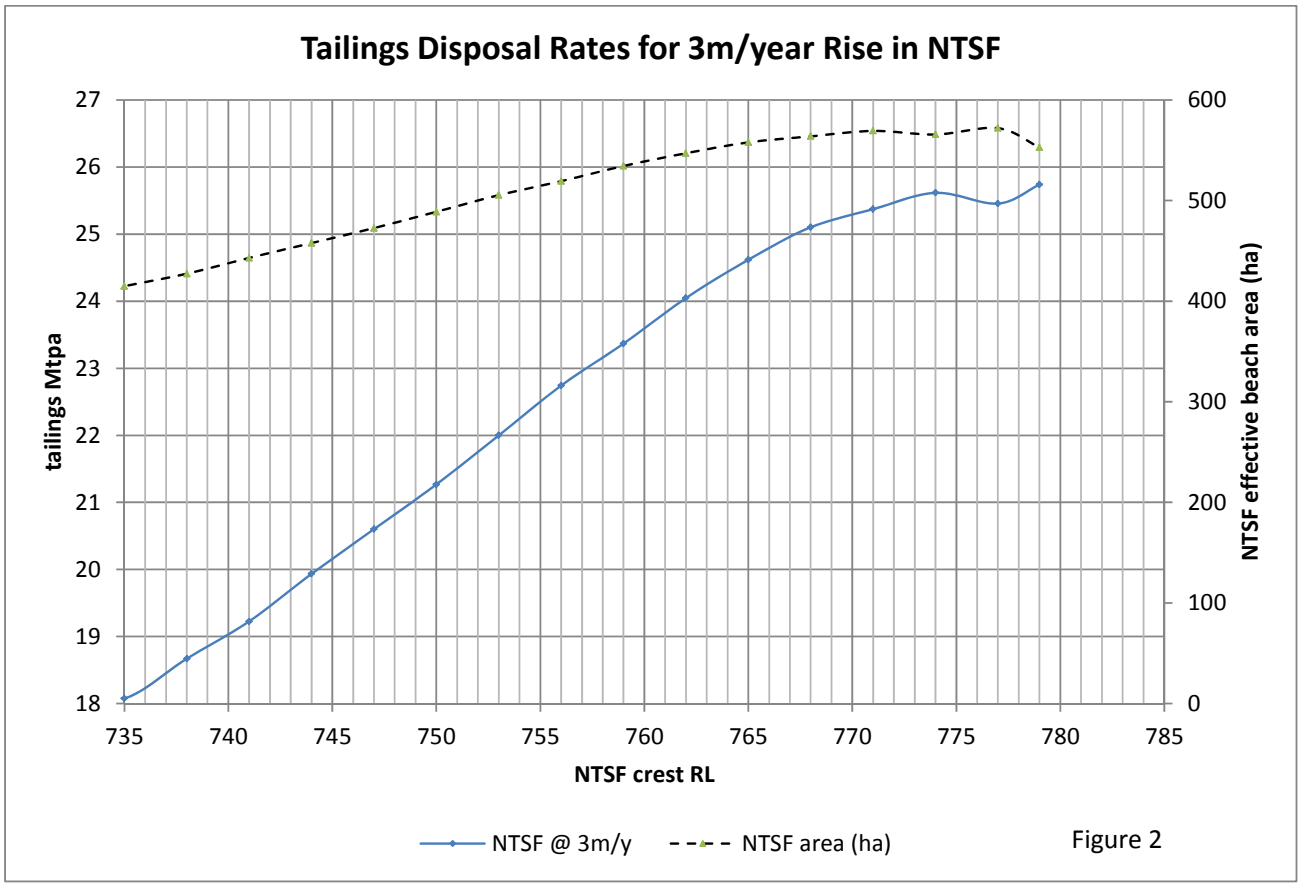

Figure 2

Using the latest CVO TSF metrics for stage level/volume, the Stage/capacity/time relationships for the NTSF and STSF are listed in Table 2 below, and in Figure 3 are plotted as filling curves vs. time, together with the corresponding curves using the data in the 2008 FS report for comparison. It can be seen that the overall effects on TSF filling rates of increasing the processing rate to 32 Mtpa by 2018 are very small.

Table 2: Modified Tailings Filling Plan – by Stages

Stage	Crest RL (m)	Tailings (Mt)	Filled by
NTSF 8	738	20.8	2015
NTSF 9	741	21.6	2016
NTSF 10	744	22.3	2017
NTSF 11	747	23.0	2018
NTSF 12	750	23.8	2019
NTSF 13	753	24.6	2020
NTSF 14	756	25.3	2021
NTSF 15	759	26.0	2022
NTSF 16	762	26.6	2023
NTSF 17	765	27.1	2024
NTSF 18	768	27.4	2025
NTSF 19	771	27.7	2026
NTSF 20	774	27.5	2027
NTSF 21	777	27.8	2028
NTSF 22	779	17.9	2029

Stage	Crest RL (m)	Tailings (Mt)	Filled by
STSF 5	684.5	17.0	2016
STSF 6	687.5	17.5	2017
STSF 7	690.5	18.0	2019
STSF 8	693.5	18.3	2020
STSF 9	696.5	18.5	2022
STSF 10	699.5	18.7	2025
STSF 11	702.0	15.1	2028

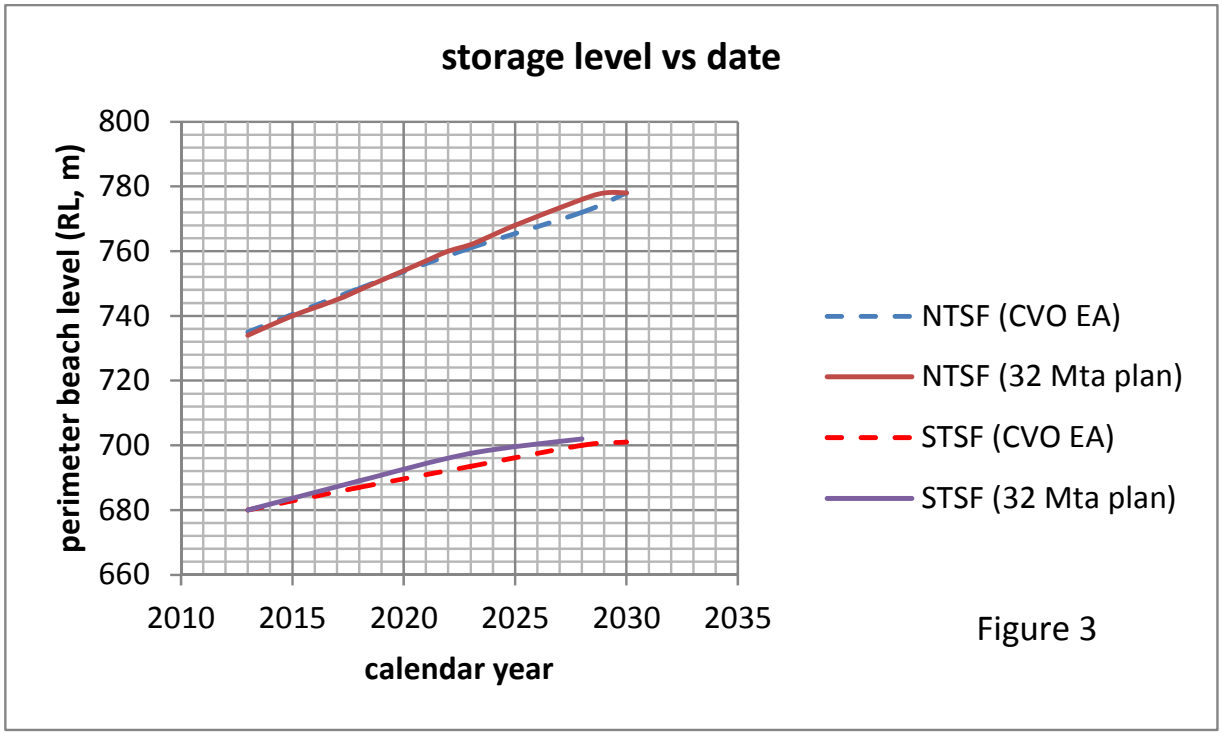

Figure 3

As shown in Figure 2, until the beach level in the NTSF reaches about RL 757m the rate of deposition into that storage for a 3m/year rate of rise is less than the 23 Mtpa required to provide the volumetric balance for a 32 Mtpa production rate. Consequently, as shown in Figure 4 below, for about the first eight years of operation of the modified production plan, to keep the NTSF beach rise rate below 3m/year the quantity reporting to the STSF will be greater than the 9 Mtpa average required for LOM volumetric balance, with the overall LOM balance being restored later in the program by a compensatory increase in the proportion of tailings reporting to the NTSF.

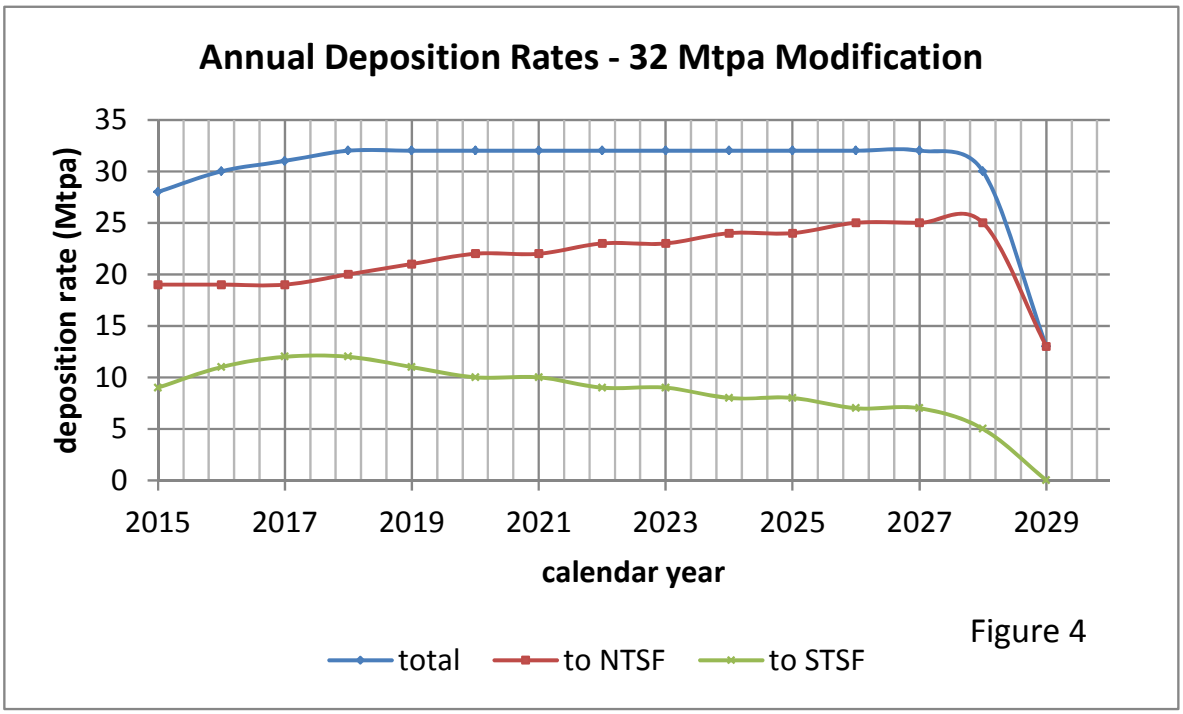

Figure 4

As of December 2014, average beach levels, the NTSF and STSF could accept deposition at rates of approximately 18 Mtpa and 14 Mtpa respectively while keeping within the 3m/year rate-of-rise criterion, and these maximum potential deposition rates will increase in the future as the storage levels and hence beach areas increase. Therefore there is adequate capacity for the CVO tailings storages in combination to accommodate tailings deposition at the proposed 32 Mtpa maximum annual rate.

4. Implications for Seepage Management and Closure/Rehabilitation

As discussed above and illustrated in Figures 1 and 3, the modification of the processing plan to ramp up the long term tailings production rate to 32 Mtpa, compared with the final rate of 27 Mtpa used for the EA, has only a marginal effect on TSF filling rates, with the life-of-mine deposition being completed about one year earlier than detailed in the FS (i.e. nominally 2029 rather than 2030).

From the viewpoint of TSF operation this change is minimal, and consequently the strategies for seepage management and closure/rehabilitation presented in the FS are still applicable. Seepage management concepts from the FS are restated below:

> *Seepage from the NTSF would report to the STSF storage and decant pool, while seepage from the STSF would report to Rodds Creek downstream from its retention embankment, as is currently the case. Below the main section of the STSF embankment on Rodds Creek there is a seepage collection pond, with a float-controlled electric pump which returns the collected seepage flows to the STSF storage area. This system would be retained for the Project. There is also some water flow occurring from the valley slopes and floor downstream of the section of the STSF on the saddle immediately to the east of the main Rodds Creek valley section, which currently reports to Rodds Creek a short distance downstream of the main seepage collection pond. If necessary, this water flow would be directed to a new collection pond either immediately downstream of the saddle dam, or on Rodds Creek downstream of the existing collection pond.*

In 2011 the new seepage collection pond foreshadowed in the FS was constructed on Rodds Creek downstream of where the saddle dam seepage enters Rodds Creek, and the float controlled return water pump was relocated to the new pond.