NSW GOVERNMENT | Planning

MAJOR PROJECT ASSESSMENT: Cadia East Project (06_0295)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

December 2009

Cover Photograph: Cadia Open Pit with predicted Cadia East subsidence zone behind

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EXECUTIVE SUMMARY

Cadia Holdings Pty Limited (Cadia), a wholly owned subsidiary of Newcrest Mining Limited, owns and operates the Cadia Valley mining complex approximately 25 kilometres south-west of Orange, in the Central Tablelands of New South Wales (see Figure 1).

This mining complex comprises the Cadia open cut gold/copper mine and the Ridgeway underground gold/copper mine. Mining operations commenced in 1998 and currently-approved resources are expected to be exhausted by about 2017.

To boost resources, Cadia is proposing a major expansion to the complex through the development of a new underground mine, to the east of the existing Cadia Hill open cut. The project – known as the Cadia East Project – would extend the life of the complex by about 21 years, and would increase production at the complex from 24 million tonnes per year (Mtpa) of gold/copper ore to 27 Mtpa. The proposal would also consolidate all of the existing development consents for the mining complex into a single, contemporary approval.

The project has a capital investment value of approximately $2.2 billion and would generate up to 1,300 jobs during construction and an average of 880 direct jobs during operation.

The proposal is classified as a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act), as it is development for the purpose of mining with a capital investment value of over $30 million and employs more than 100 people, and consequently requires the Minister's approval.

The Department exhibited the environmental assessment (EA) of the project from 15 June 2009 to 24 July 2009 and received 87 submissions, including 9 from public authorities, 7 from special interest groups and 71 from the general public. Of the public submissions, 37 (48%) objected to the project, 19 (24%) supported the project and 22 (28%) did not object but raised concerns.

The key concern raised was the mine's impact on water resources, including impacts on surrounding bores and creeks due to groundwater drawdown, as well as the reduction in available water following the extraction of water from creeks and bores by the mine. Other concerns raised included noise and blasting, traffic, air quality, flora and fauna impacts, and visual amenity.

The Department has assessed the project application, the EA, submissions received following exhibition of the EA and Cadia's response to submissions, in accordance with the objects of the EP&A Act and the principles of ecologically sustainable development.

Based on this assessment, the Department acknowledges that the project would increase the demand for and impact on the finite water resources of the Central West region. However, the Department is satisfied that the project would not significantly affect regional water supplies, and that the project's localised impacts on water users and the environment can be effectively managed and compensated. In this regard, the Department has recommended a comprehensive suite of water management conditions, including conditions requiring Cadia to:

- compensate any landowner whose water entitlements are affected by the mining complex through provision of an equivalent long term water supply;
- acquire any property (at an independently verified price as if the property was unaffected by mining) where compensatory measures are unable to provide an acceptable long term water supply;
- offset the loss of baseflow (i.e. groundwater flow into local creeks) and ensure continuation of environmental flows to local creeks; and
- develop a comprehensive water management plan including measures to ensure advance warning of any water impacts.

The Department is satisfied that other impacts associated with the project can be effectively minimised, managed or compensated for, so as to ensure an acceptable level of environmental performance. The Department also notes that the project application has provided an opportunity to update and consolidate the existing development consents for the mining complex, to ensure that the complex operates in accordance with contemporary best-practice environmental standards.

The Department acknowledges that the project represents a logical extension of the existing mining complex, and would make use of existing facilities and equipment. The Department also recognises that the project would provide major economic and social benefits for NSW and the Central West region, including:

At the mine:

- a maximum of 1,300 direct jobs during Cadia East construction;
- an average of 880 direct jobs over the life of the project; and
- $2.2 billion in capital investment;

For the regional economy:

- 1,889 direct and indirect jobs averaged over the life of the project;
- $1,025 million in direct and indirect regional output or business turnover;
- $557 million in direct and indirect regional value-added; and
- $165 million in household income.

On balance, the Department believes that the project's benefits substantially outweigh its residual costs, and that it is therefore in the public interest and should be approved, subject to strict conditions.

1. BACKGROUND

Cadia Holdings Pty Limited (Cadia), a wholly owned subsidiary of Newcrest Mining Limited, owns and operates the Cadia Valley mining complex approximately 25 kilometres (km) south-west of Orange, in the Central Tablelands of New South Wales (Figure 1).

Figure 1: *Regional Context*

The mining complex, also known as the Cadia Valley Operations (or CVO), comprises the:

- Cadia Hill open cut gold/copper mine, which operates under a Ministerial development consent granted on 6 September 1996 following a Commission of Inquiry. Operations commenced in 1998, and Cadia expects mining to cease in 2013; and
- Ridgeway underground gold/copper mine, which operates under two ministerial development consents, the first granted on 3 October 2000, also following a Commission of Inquiry, and the second an extension of the mine (known as Ridgeway Deeps) granted on 30 March 2005 (see Figure 2). Ridgeway commenced operations in 2003 and is expected to close in 2017.

Essentially, gold/copper ore is extracted from the Cadia and Ridgeway mines, processed on site, and then sent as a slurry by pipeline to the Blayney Dewatering Facility, approximately 25 km to the east (see Figure 1), where it is dewatered and finally railed to Port Kembla for export.

Together the two mines are allowed to produce up to 24 million tonnes per year (Mtpa) of gold/copper ore, and currently employ approximately 1,100 people from the local region.

Figure 2: *General Layout of the Existing Cadia-Ridgeway Mining Complex*

2. PROPOSED PROJECT

2.1 Project Description

Cadia proposes a major expansion to the mining complex through the development of a new underground mine to the east of the Cadia Hill open cut pit, known as 'Cadia East.' The key components of the proposal are summarised in Table 1, and depicted in Figures 3-5. The proposal is described in full in the Environmental Assessment (EA – see Appendix H).

Figure 3: *Cadia East Project Site Layout – Aerial Photograph*

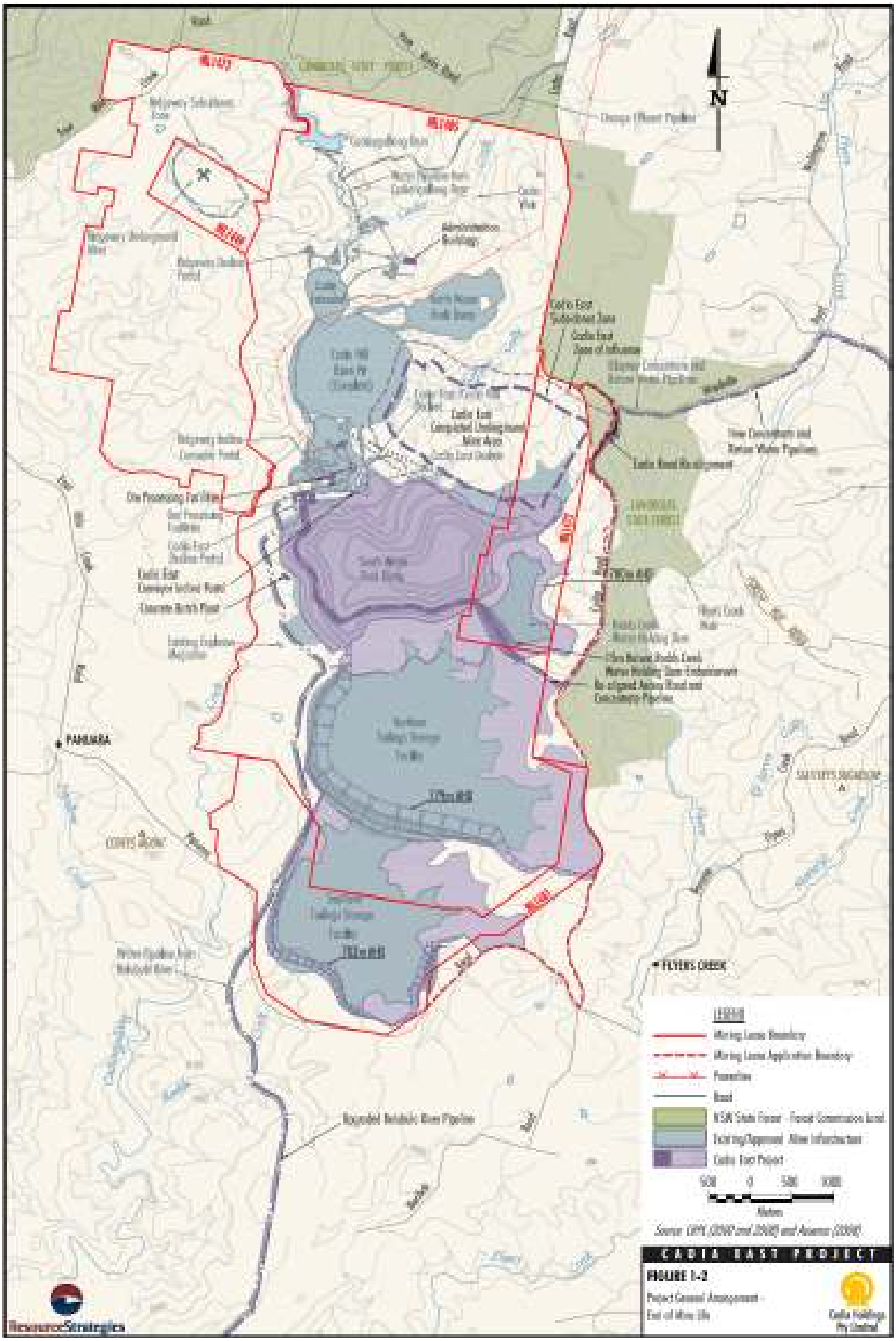

Figure 4: *Cadia East Project Site Layout – Final Arrangement*

Figure 5: *Proposed New CVO Dewatering Facility in Blayney*

***Table 1**: Key Components of the Cadia East Project*

Aspect	*Description*
Project Summary	• **Construction and operation of a new underground gold and copper mine;** • **increasing ore extraction at the mining complex to 27 Mtpa for processing and supply to markets;** • **construction of a new dewatering facility to the east of Blayney;** • **operation of existing and additional mine surface facilities; and** • **consolidation of all existing development consents for the mining complex.**
Mining and Reserves	Extraction of ore from the Cadia East deposit, using a panel caving method. Mineable reserve of approximately 828 Mt.
Ore Production	Up to 27 Mtpa (across the mining complex)
Ore Processing	Underground crushing and conveyor system to transport crushed ore to the existing above ground processing facilities, which would be upgraded as part of the Project.
Water Demand and Supply	The Project would increase water demand at the complex by 5.9 million litres per day (ML/d). The existing water management/supply system would be upgraded through: • increasing on-site water storage capacity; • constructing a transfer pipeline between Cadiangullong and Rodds Creek dams with a capacity of 20 ML/d; • upgrading the Belubula River pump station and increased pumping from the river; • duplicating the pipeline between the pump station and the mine; • extraction from on-site bores; and • dewatering of the mine void.
Construction	Establishment of additional mine infrastructure would involve the construction of: • underground crushing, handling and incline conveyor systems; • multiple ventilation shafts, personnel and equipment access systems; • a molybdenum recovery plant with a capacity of up to 460,000 tonnes per annum and trucking of molybdenum products off-site; • a new dewatering facility to the east of Blayney (to be known as the CVO Dewatering Facility) and a 1.7 km rail spur from the Main Western Railway to the new facility; • maintaining the existing Blayney Dewatering Facility; • a concentrate pipeline and return water pipeline between the mine and the new CVO Dewatering Facility; and • a re-aligned 1.1 km section of Cadia Road.
Project Life	Expected project life of up to 21 years, predicted to be the end of 2030.
Tailings Management	The existing Northern Tailings Storage Facility (NTSF) and Southern Tailings Storage Facility (STSF) embankments would be raised to accommodate an additional 450 Mt of tailings.
Waste Rock Management	Placement of approximately 11.4 Mt of waste rock in the existing South Waste Rock Dump.
Mine Subsidence	The underground mine would cause surface subsidence due to the gradual cracking and collapse of rock above the mine, creating a dish-shaped depression with steep sides. The subsidence zone is predicted to disturb an area of 255 hectares (ha) and have a depth of between 100 and 320 metres (m) as shown in Figure 4.
Employment	Peak construction workforce of 1,300 and an operational workforce of 880.
Hours of Operation	Operations would take place 24 hours a day, 7 days per week.
Construction Hours	Construction of the surface facilities would be undertaken Monday to Friday between 7.00 am and 10.00 pm. Construction of the CVO Dewatering Facility would be undertaken between 7.00 am and 6.00 pm Monday to Friday and 8.00 am to 1.00 pm on Saturdays.
Product Transport	Gold/copper ore concentrate would be loaded onto trains at the Dewatering Facility for transport to Port Kembla. Molybdenum products would be transported by truck (approximately 6 trucks per week) to Sydney.

Aspect	Description
Biodiversity Offset	The project would disturb up to 238 ha of remnant vegetation (including 23.5 ha of Box-Gum Woodland endangered ecological community or EEC). The disturbance would be offset by the conservation and enhancement of 938 ha of land at both Black Rock Range and the junction of Flyers Creek and the Belubula River (including 154 ha of EEC).
Rehabilitation and Final Landform	The voids at the mining complex created by the open pit and subsidence zones would be effectively sterilised and would be bunded and fenced to prevent access. Other parts of the mining complex (including waste dumps and tailings storage facilities) would be progressively rehabilitated with the aim of returning the land to woodland and/or agriculture (mainly grazing).

2.2 Changes from Currently Approved Operations

As part of the project, Cadia proposes to consolidate its existing consents for the mining complex into a single project approval, to cover all existing and proposed operations at the mine including Cadia East. A comparison of currently approved operations with proposed operations is provided in Table 2.

Table 2: *Comparison of the Cadia East Project with Current Approved CVO*

Aspect	Current Approved CVO		Total incl. Cadia East Proposal	
Approximate Site Area (disturbance footprint)	Cadia Hill Open Pit	150 ha	Cadia Hill Open Pit	150 ha
	Subsidence zone (Ridgeway only)	70 ha	Subsidence zone & Zone of influence	325 ha
	Processing area & associated facilities	130 ha	Processing area & associated facilities	150 ha
	Waste Rock Dumps	560 ha	Waste Rock Dumps	560 ha
	Tailings Storage Facilities	835 ha	Tailings Storage Facilities	1,228 ha
	Rodds Creek Water Storage	130 ha	Rodds Creek Water Storage	305 ha
	Total	1,875 ha	Total	2,718 ha*
Waste Rock Management	Approximately 431.7 Mt of waste rock deposited in the North and South Waste Rock Dumps and mined-out void of the Cadia Extended open pit		Approximately 443.1 Mt total waste rock (additional 11.4 Mt to be deposited in the South Waste Rock Dump)	
			No change to the maximum approved height of the South Waste Rock Dump	
Ore Processing	Up to 24 Mtpa of gold and copper ore		Up to 27 Mtpa of gold and copper ore	
	Ore processed in the low grade and high grade processing plants		Upgrades to the existing ore processing facilities and associated stockpiles and materials handling equipment	
Tailings Management	Deposition of 339 Mt of tailings in the NTSF and the STSF at a rate of 24 Mtpa		Total tailings 790 Mt (additional 450 Mt of tailings) at a rate of 27 Mtpa	
	NTSF – base RL 650 m AHD; approved height 741 m AHD (approx 91 m high)		NTSF – raised by 38 m to RL 779 m AHD (total height approx 129 m)	
	STSF – base RL 631 m AHD; approved height 682 m AHD (approx 51 m high)		STSF – raised by 20 m to RL 702 m AHD (total height approx 71 m)	
Concentrate Transport and Dewatering	Gold/copper concentrate is transported from the ore processing facilities via a concentrate pipeline to the Blayney Dewatering Facility where the concentrate is dewatered and then transported by rail to Port Kembla		Construction of a new CVO Dewatering Facility to the east of Blayney and eventual decommissioning of the existing Blayney Dewatering Facility if it is deemed by Cadia to be redundant	
			Installation of a new concentrate pipeline to the CVO Dewatering Facility	
			Increased rail transportation to reflect increased production	

* Note – Total area is approximate and includes some areas of overlap, e.g. South Waste Rock Dump and zone of influence

Aspect	*Current Approved CVO*	*Total incl. Cadia East Proposal*
Life of Mine	Cadia Hill – approval to 6 September 2017 Ridgeway – approval to 1 June 2020	Cadia Hill – scheduled closure in 2013 Ridgeway – scheduled closure in 2017 Cadia East – mining until approx 2030
Water Use, Supply and Management	Refer Table 3 below	
Employment	Average of 950 employees up to a maximum of approximately 1,100 employees during construction of Ridgeway Deeps	Average of 880 employees up to a maximum of approximately 1,300 employees

A comparison of water supply arrangements between the existing mining complex and the proposed project is provided in Table 3.

Table 3: *Comparison of Proposed Water Supply With Current Approvals*

Aspect	*Current Approved Operations*	*Total incl. Cadia East Proposal*
Make-up (external) water supply	49.9 ML/d (18,215 ML/yr)	55.8 ML/d (20,365 ML/yr) - equivalent to an increase of 5.9 ML/d (2,150 ML/yr) or 12%
Belubula River Extraction		
- General Security	4,080 ML/yr	No change
- Unregulated High Security	3,125 ML/yr	No change
- Pumping capacity	20 ML/d	Increased to 30 ML/d
Orange Sewage Treatment Plant	8.7 ML/d average	No change
Blayney Sewage Treatment Plan and Dewatering Return	1.4 ML/d	Minimal increase (due to increased production)
Mine dewatering	Up to 2.42 ML/d	Maximum predicted 7.76 ML/d Modelled maximum 5.46 ML/d for Cadia East
On-site bores	On-site bores used for process make-up water during 'exceptional circumstances,' up to a maximum of 2 ML/d	Use of on-site bores for process make-up water on an ongoing basis (i.e. not just during 'exceptional circumstances')
Cadiangullong, Flyers, Cadia and Rodds Creeks and Copper Gully	Extraction capped at 4,200 ML/yr	No change to cap Pipeline installed between Cadiangullong Dam and Rodds Creek to increase transfer capacity to a maximum of 20 ML/d
- Flyers Creek Weir	Maximum pumping rate approx 12 ML/d	No change
- Cadia Creek Weir	Average pumping rate up to approx 4.2 ML/day	No change
- Rodds Creek Dam	Storage capacity 3,700 ML	Raise wall by 15 m to increase capacity to 14,500 ML

2.3 Project Need and Justification

The Department recognises that the existing mine has already generated very large economic benefits both to the region and the State.

If approved, the combined future operations at the mining complex would produce approximately (Cadia East contribution in brackets):

- 13.11 million ounces of gold (10.39 million ounces);
- 1.69 million tonnes of copper (1.41 million tonnes); and
- 19,800 tonnes of molybdenum (all molybdenum from Cadia East).

The Department acknowledges that the project represents a logical extension of the existing mining complex, and would make use of existing facilities and equipment. Further, the project would provide major economic and social benefits for a further 21 years. In this regard, the EA predicts the project would provide:

- a total net production benefit of $1,210 million;
- approximately 1,889 direct and indirect jobs;
- approximately $1,025 million in annual direct and indirect regional output;
- approximately $557 million in direct and indirect regional value-added; and
- approximately $165 million in annual household income.

Notwithstanding, the Department recognises that a balance must be met in the promotion and co-ordination of the orderly and economic use of land; the proper management and development of the State's resources; and the protection of the environment and ecologically sustainable development. The Department has considered these matters in detail in its assessment of the project.

3. STATUTORY CONTEXT

3.1 Major Project

The proposal is classified as a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* ("EP&A Act"), as it is development for the purpose of mining with a capital investment value of over $30 million and employs more than 100 people, and therefore meets the criteria in clause 5 of schedule 1 of *State Environmental Planning Policy (Major Development) 2005*. Consequently, the Minister for Planning is the approval authority for the project.

3.2 Permissibility

The project is located within both Blayney and Cabonne local government areas (LGA). The proposed mining operations are located within land zoned 1(a) General Rural under both the *Blayney Local Environmental Plan 1998* (Blayney LEP) and *Cabonne Local Environmental Plan 1991* (Cabonne LEP). These zones permit mining and associated surface activities with development consent.

The proposed new CVO Dewatering Facility is located within Blayney Shire, on land zoned 1(a) General Rural under the Blayney LEP, and is permissible with consent in this zone.

The proposed rail spur extension traverses land zoned 1(a) General Rural, 7(a) Environmental Protection and 2(v) Urban/Village under the Blayney LEP. The rail spur extension is permissible with consent in all these zones.

The new concentrate pipeline would be situated adjacent to the existing pipeline, primarily in road reserve and railway easements, in both the Blayney and Cabonne LGAs. It would traverse land zoned 1(a) General Rural, 1(c) Rural Small Holdings, 2(v) Urban/Village and 7(a) Environmental Protection – Scenic Zone under the Blayney LEP, and would be permissible with development consent in all these zones. The pipeline would traverse land zoned 1(a) General Rural under the Cabonne LEP, and is permissible with consent in this zone.

3.3 Exhibition

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the environmental assessment (EA) of a project publicly available for at least 30 days. After accepting the project EA, the Department:

- made it publicly available from 15 June 2009 until 24 July 2009 (42 days):
  - on the Department's website, and
  - at the Department's Information Centre, Blayney Shire Council, Cabonne Shire Council, Orange City Council and the Nature Conservation Council;
- notified over 300 landholders, local community groups and relevant State and local government authorities by letter; and
- advertised the public exhibition in the Sydney Morning Herald on 17 June 2009, the Central West Daily on 13 and 20 June 2009 and the Blayney Chronicle on 18 and 25 June 2009.

This satisfies the requirements of Section 75H(3) of the EP&A Act.

3.4 Objects of the EP&A Act

Decisions made under the EP&A Act must have regard to the objects of the Act, as set out in Section 5 of the Act. The objects of most relevance to the project are found in Section 5(a)(i),(ii),(vi) and (vii). They are:

"The objects of this Act are:
(a) to encourage:
(i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,
(ii) the promotion and co-ordination of the orderly and economic use and development of land,
(vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and
(vii) ecologically sustainable development"

The EP&A Act adopts the definition of Ecologically Sustainable Development (ESD) found in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD "requires the effective integration of economic and environmental considerations in decision-making processes" and that ESD "can be achieved through" the implementation of the principles and programs including the precautionary principle, the principle of inter-generational equity, the principle of conservation of biological diversity and ecological integrity, and the principle of improved valuation, pricing and incentive mechanisms. In applying the precautionary principle, public decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and an assessment of the risk-weighted consequences of various options.

The Department has fully considered the objects of the EP&A Act, including the encouragement of ESD, in its assessment of the project application. The assessment integrates all significant economic and environmental considerations and seeks to avoid any potential serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences. Cadia has also considered a number of alternatives to the proposed development, including that of not proceeding, and considered the proposal in the light of ESD principles.

Following its consideration, the Department is satisfied that the project is able to be undertaken in a manner that is consistent with the principles of ESD and the objects of the Act.

3.5 Environmental Planning Instruments

Under Sections 75I(2)(d) and 75I(2)(e) of the EP&A Act, the Director-General's report for a project is required to include a copy of, or reference to, the provisions of any State Environmental Planning Policy (SEPP) that substantially govern the carrying out of the project, and the provisions of any environmental planning instruments (EPI) that would (except for the application of Part 3A) substantially govern the carrying out of the project and that have been taken into consideration in the assessment of the project.

The Department has considered the project against the relevant provisions of (SEPPs) and other EPIs, and is satisfied that none of these instruments substantially govern the carrying out of the project. Nevertheless, the Department has included a consideration of relevant SEPPs and other EPIs (including SEPPs 33, 44, 55, and the Infrastructure SEPP) in Appendix C.

3.6 Statement of Compliance

Under Section 75I of the EP&A Act, the Director-General's report is required to include a statement relating to compliance with the environmental assessment requirements issued with respect to the project. The Department is satisfied that the Director-General's environmental assessment requirements have been complied with.

3.6 Environment Protection and Biodiversity Conservation Act

On 19 January 2007, the project was determined to be a "controlled action" under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as it was considered likely that the proposal could have a significant impact on the listed Box-Gum Grassy Woodlands and Derived Native Grasslands Critically Endangered Ecological Community.

Following the lodgement of the project application, it was agreed that the proposal would be assessed under the bilateral agreement between the Commonwealth and NSW Governments. The bilateral agreement provides that the assessment regimes under Part 3A, Part 4 and Part 5 of the EP&A Act are accredited under the EPBC Act. This means that separate assessment processes are not required under both the EPBC Act and the EP&A Act, and the NSW assessment process has been accredited by the Commonwealth. However, the Commonwealth Minister for the Environment maintains an independent approval role, and the Commonwealth provides input to certain stages of the assessment process.

The Department has consulted with the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) throughout the assessment process, and the Department's assessment of Commonwealth matters is detailed in Section 5.2 of this report.

4. ISSUES RAISED IN SUBMISSIONS

The Department received a total of 87 submissions following exhibition of the EA:

- 9 submissions from public authorities;
- 7 submissions from special interest groups; and
- 71 submissions from individuals.

A summary of the issues raised in submissions is provided below. A full copy of these submissions (apart from those which requested confidentiality) is attached in Appendix G.

4.1 Public Authorities

The **Department of Primary Industries**, now part of the Department of Industry and Investment (**DI&I**), supports the project as an appropriate use of the State's mineral resources, subject to the provision of further information on water crossings and a commitment to maintain fish passage.

The **Department of Environment and Climate Change** (now part of the Department of Environment, Climate Change and Water (**DECCW**)), supports the project subject to the implementation of an agreed biodiversity offset. DECCW recommended conditions of approval relating to water quality, air quality, noise, waste and Aboriginal cultural heritage.

The **Department of Water and Energy** (now the NSW Office of Water (**NOW**) within DECCW) supports the project subject to recommended conditions of approval including preparation of surface and groundwater management plans and a water supply contingency strategy.

The **Roads & Traffic Authority** (**RTA**, now part of the Department of Transport and Infrastructure) does not object to the project, and outlined its requirements for the installation of the transfer pipeline crossing of the Mid Western Highway at Blayney.

The **Department of Planning's Heritage Branch** (**Heritage**) considers the mitigation measures proposed to be generally appropriate, and has recommended a condition of approval to revise the mine's Interpretation Plan.

Blayney Shire Council supports the project, given the economic benefits to the Shire, commenting on the proposed community enhancement contributions, and offered its support for an independent review of water issues.

Cabonne Shire Council supports the project, noting that it was in discussion with Cadia about road upgrades and water supply.

Orange City Council supports the project, but provided comments relating to offsetting groundwater impacts, water supply, road maintenance and mine closure and rehabilitation. It has recommended conditions of approval requiring a Voluntary Planning Agreement (for community enhancement contributions), closure planning and rehabilitation.

The **Greater Western Area Health Service** supports the project, noting Cadia has previously assisted with the purchase of medical equipment for the Orange Base Hospital.

4.2 Community and Interest Groups

There were 78 submissions from the community and special interest groups. The six special interest groups that made submissions – and did not request confidentiality – were:

- NSW Greens;
- Environmentally Concerned Citizens of Orange (ECCO);
- Millthorpe Water Users Group;
- Orange Business Chamber;
- Belubula Landholders Association; and
- Newbridge Road Residents Group;

Of these 78 submissions, 37 (48%) objected to the project, 19 (24%) supported the project and 22 (28%) did not object but raised concerns. The key issues from both the community and special interest groups are summarised in Table 4 and shown graphically in Figure 6.

Table 4: *Summary of Issues Raised in Submissions*

Issue	Times mentioned	Proportion of submissions (%)
Water Use/ Quantity/ Drawdown	58	74.36
Local Economy	21	26.92
Property Values	18	23.08
Traffic	14	17.95
Air / Dust	14	17.95
Flora and fauna	13	16.67
Visual	9	11.54
Water Quality/ Pollution	8	10.26
Noise	8	10.26
Social/ Amenity	5	6.41
Greenhouse	5	6.41
Vibration	4	5.13
Soil (incl impacts on agricultural capacity)	2	2.56
Aboriginal Heritage	1	1.28

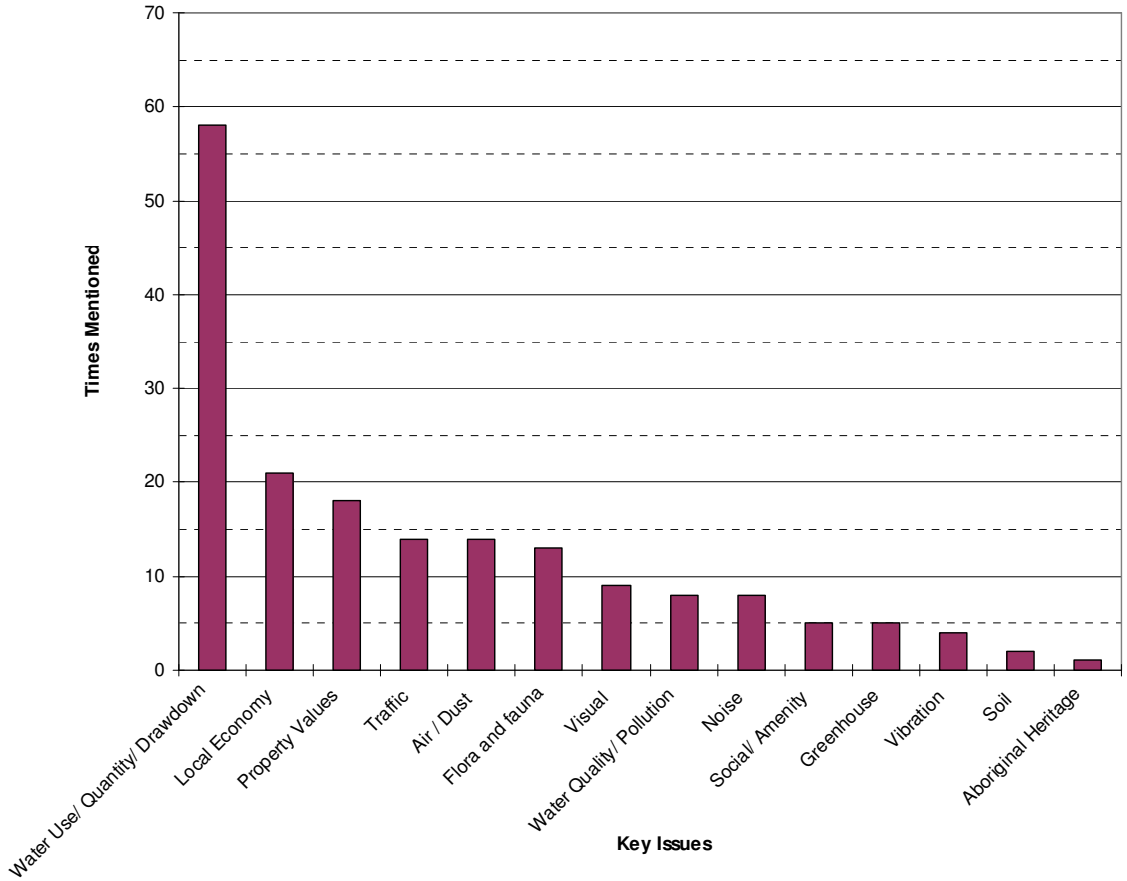

Figure 6: *Key Issues for Community and Special Interest Groups*

Close to 75% of these public submissions raised issues about the potential impacts of the mine on the quantity of water available in the region. These issues included loss of water in bores, springs and creeks as a result of the void created by the underground mine, as well as the reduction in available water following the mine's extraction of water from creeks and bores. These have all been grouped into the key issue of "Water Use/Quantity/Drawdown" as indicated in Figure 6.

Submissions in support of the project generally cited employment and socio-economic benefits ("Local Economy") as key reasons why the project should be approved.

4.3 Response to Submissions

Cadia has provided a response to the issues raised in submissions (see Appendix F).

The Department has fully considered the issues raised in submissions, and Cadia's response to these issues, in its assessment of the project.

5. ASSESSMENT

The Department considers the key environmental issues for the Cadia East Project to be water management, flora and fauna, traffic, noise and blasting, and air quality.

5.1 Water Resources

The project has the potential to affect surface water and groundwater resources in a number of ways, including:

- directly removing local creeks, namely Copper Gully;
- affecting surface water flows in local and regional catchments, and water availability to downstream water users;
- affecting groundwater flows in subsurface aquifers, and water availability to local groundwater users, springs and groundwater dependent ecosystems; and
- affecting water quality in downstream surface water and groundwater resources.

The main catchments in the vicinity of the CVO mining complex (including Cadia East) are shown on Figures 7 and 8, and (from west to east) include the catchments of:

- Swallow Creek;
- Cadiangullong Creek, including the sub-catchments of:
    - Rodds Creek;
    - Cadia Creek; and
    - Copper Gully; and
- Flyers Creek.

The mining operations are primarily located in the Cadiangullong Creek catchment, although mining operations have the potential to affect flows and quality in all these catchments through drawdown of the regional groundwater table, which affects baseflow in creeks (see further discussion below).

All of the catchments and sub-catchments ultimately drain to the Belubula River, which is located about 5 km south of the mining lease area.

Water-related impacts have probably been the key issue associated with the CVO since the inception of the Cadia mine in the mid 1990s. The mining operations require the use of a lot of water (principally for ore processing), and influence the water regime further by drawing down the groundwater table (through mining operations intercepting the groundwater table, which draws water into the mining voids). This has actual and potential impacts on the water supply of adjacent and downstream water users (particularly agricultural land users), and reduces the amount of water available to the environment.

These water-related issues have been exacerbated in recent years due to prevailing drought conditions.

The EA includes detailed surface water and groundwater impact assessments, undertaken by Gilbert & Associates and Australian Groundwater & Environmental Consultants, respectively. Cadia also

engaged Dr Noel Merrick, a respected expert in groundwater impacts associated with mining developments, to peer review the groundwater assessment.

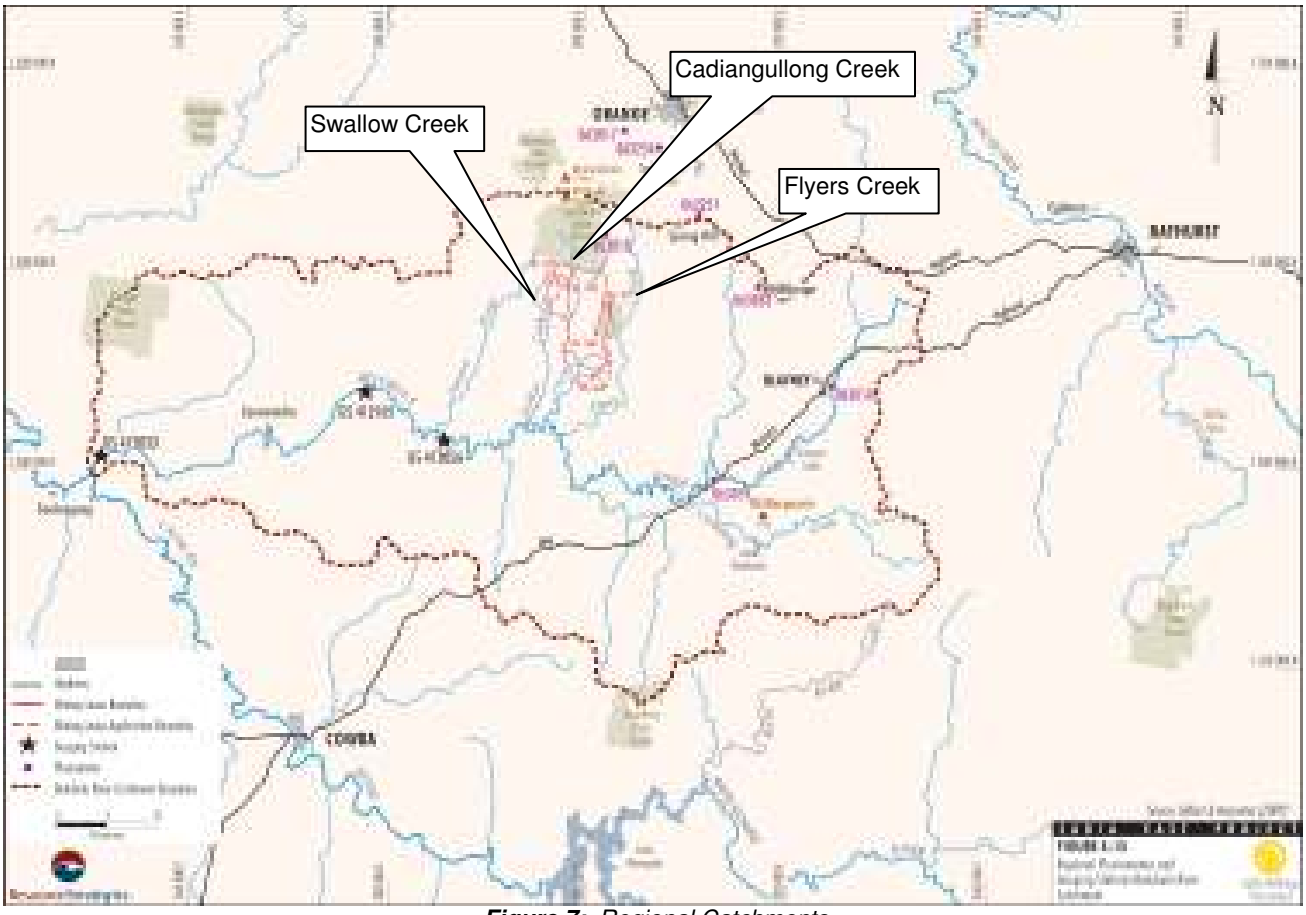

Figure 7: *Regional Catchments*

Given the historical concerns about water-related impacts associated with the mining complex, the potential for impact, and the concerns raised in submissions to the project, the Department engaged independent experts, Emeritus Professor Tom McMahon and Mr Larry Cook, to review the surface water and groundwater impacts of the project, respectively. The independent water experts' reviews are attached in Appendices D and E.

Water Balance

Water balance modelling indicates that the Cadia East project would increase the water demand at the mining complex by 5.9 ML/d (an increase of 12%), to a total of about 56 ML/d. The key water demands are associated with:

- ore processing (most of which would be recycled);
- underground mining water;
- dust suppression; and
- other potable and non-potable uses.

The additional water required for the project is proposed to be sourced by augmenting the mine's existing water supplies, including:

- construction of a pipeline to transfer up to 20 ML/d of water from Cadiangullong Dam to Rodds Creek Water Holding Dam. Transfer would occur until the volume in Cadiangullong Dam drops to 10% capacity, at which point all extraction from Cadiangullong Dam would cease. The amount of water extracted would not exceed the existing licensed annual cap of 4,200 ML;
- upgrading the pumping capacity of the Belubula River extraction system from 20 ML/d to a maximum of 30 ML/d. The amount of water extracted would not exceed the existing licensed cap;

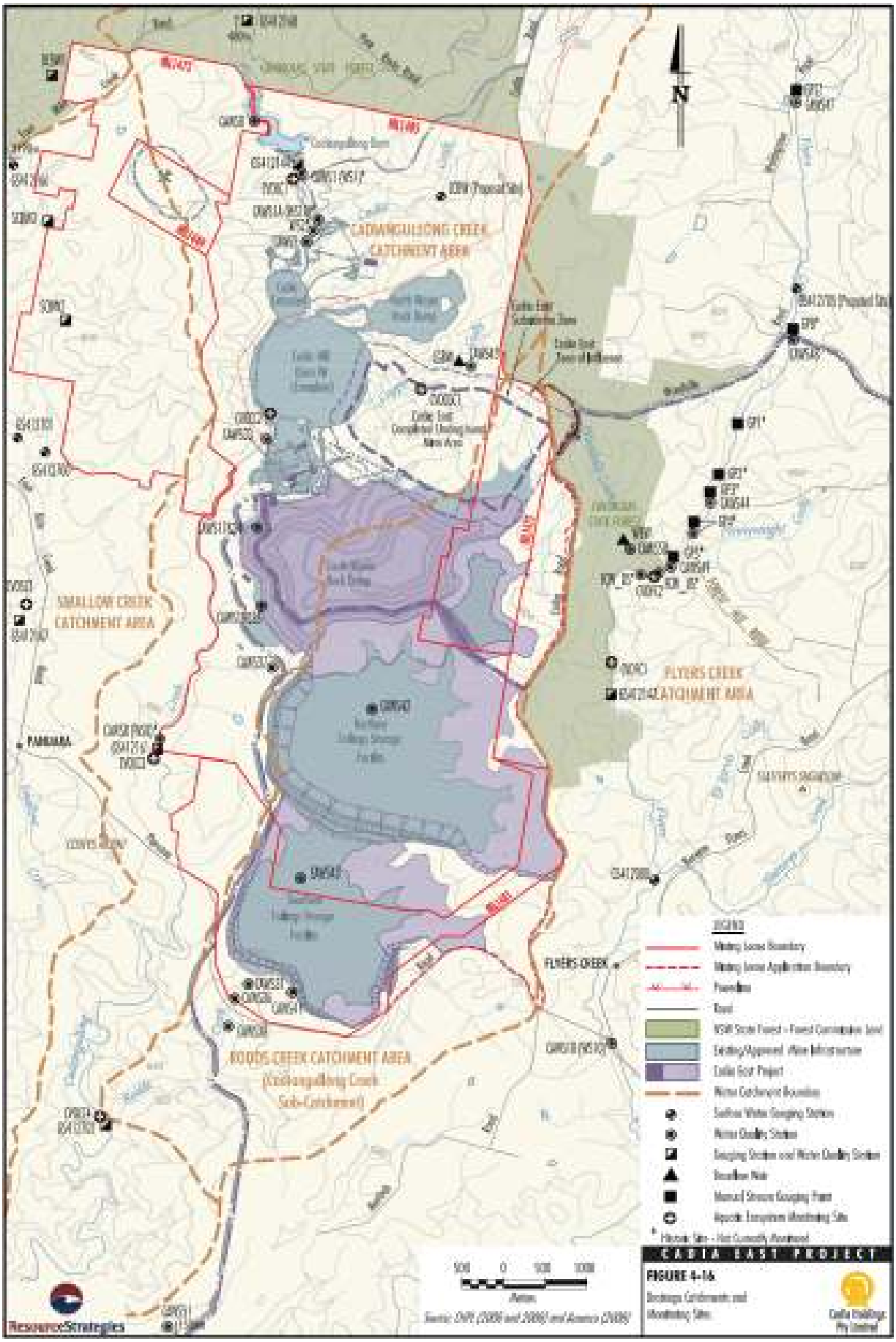

Figure 8: *Local Catchments*

- raising the spillway level of Rodds Creek Water Holding Dam by 15 m to increase storage from 3,700 ML to 14,500 ML; and
- use of the existing on-site borefield to provide up to 2 ML/d for ore processing. The borefield at present is only allowed to be used under defined exceptional circumstances.

It is also noted that the Cadia East project would result in a significant increase in dewatering on site (i.e. from groundwater leaking into the mine workings), from a current maximum of 2.3 ML/d up to about 7.76 ML/d. However, the water balance model conservatively included only 1 ML/d from this source.

The water balance includes modelling for dry, median and wet rainfall years based on these additional supplies, which demonstrated a water supply reliability of between 95% and 99% over the project life.

NOW and the independent experts do not object to the project's water balance or proposed water supply (environmental issues associated with the proposed supply are considered separately below). However, NOW noted that Cadia would be required to obtain a number of approvals and licences under the *Water Act 1912* or the *Water Management Act 2000* to address and account for the proposed water supply, which would include approvals/licences for the:

- installation of the extraction point for the pipeline from Cadiangullong Dam to the Rodds Creek Dam;
- increased storage volume of Rodds Creek Dam;
- increased daily pumping capacity on the Belubula River;
- relocation and increased extraction from on-site production bores;
- increase in groundwater entitlement (associated with dewatering), and reduction in baseflow contribution to the Belubula River system; and
- installation of baseflow weirs on Flyers Creek.

NOW also noted that the groundwater resource is currently subject to an embargo, but stated that Cadia could nevertheless obtain access to the required additional groundwater supplies by:

- sourcing the water on the market from other licence holders; or
- applying for additional licences in accordance with the exemptions in the embargo.

NOW further noted that it is proposing to amend the current embargo to allow access to additional groundwater where a proponent is willing to effectively offset the loss through acquiring and retiring an equivalent volume of surface water, for catchments where the groundwater and surface water systems are connected (as is the case in this area).

The Department is satisfied that Cadia has adequately demonstrated that it is able to access enough water to meet the project's ongoing water demands. However, the Department acknowledges that the project's water demand does have the potential to affect the water supply to adjacent and downstream water users, and the environment. The Department has recommended conditions requiring Cadia to offset or compensate any such impacts, as discussed in the following sections.

With regard to the reliability of water supply, the Department notes that, like any other significant water user in the State, access to adequate water supplies is a commercial risk for Cadia. And like any other significant water user, if Cadia is not able to secure enough water to meet its demands, its operations may need to be curtailed, or it may need to investigate additional water efficiency measures. This is consistent with the water sharing principles introduced under the *Water Management Act 2000*.

To demonstrate it has access to adequate water supplies, and to ensure that it uses water as efficiently as possible, the Department has recommended conditions requiring Cadia to:

- maintain a detailed water balance throughout the life of the project, and to investigate and describe measures to minimise and manage water use by the project; and
- ensure it has sufficient water for all stages of the project, to the satisfaction of the Director-General.

Groundwater

There are 3 main local aquifers, associated with the following rock types:

- Tertiary basalt cap:
- Silurian sedimentary unit; and
- Ordovician volcanic unit.

The Tertiary basalt and Silurian sedimentary units contain good quality water, while the Ordovician volcanic unit is of poor quality (i.e. saline). The aquifers are exploited in the region for domestic and agricultural use, and also provide baseflow to local creeks and springs.

The groundwater assessment indicates that the Cadia East project, together with the existing mining complex, would result in a considerable 'drawdown' of groundwater levels surrounding the mine. This drawdown would reduce groundwater levels and reduce baseflows in features where this groundwater expresses itself at the surface (i.e. creeks and springs). The cumulative drawdown contours are shown on Figure 9. The modelling in the EA predicted that the project would cause a drawdown of more than 1 m on regional groundwater levels up to about 8 km from the Cadia East subsidence area, or up to 5 km from the mining lease boundary. However, these distances vary greatly depending on direction, as shown in Figure 9.

The Department notes that this assessment is inherently conservative, in that it treats the geology surrounding the mine as a single, stratified system (i.e. it is not disrupted by faults or other lineaments which would intercept or prevent regional drawdown of groundwater towards the mining voids). Thus the model is expected to provide a theoretical maximum to the actual drawdown contours.

The assessment indicated that 23 privately-owned bores would experience a drawdown of more than 1 m, with the largest predicted drawdown being 44.24 m. The assessment also addressed seepage around springs, concluding that none were likely to be impacted as they are considered to be fed by perched aquifers and not connected to the regional aquifer system. However, the project would affect groundwater discharges (i.e. baseflow) to local streams, as indicated in Table 5.

***Table 5**: Groundwater Discharge Loss to Local Creeks*

Creek	***Cadia East Loss***		***Cumulative Loss (i.e. Cadia East and existing CVO)***	
	ML/day	***Percent***	***ML/day***	***Percent***
Flyers Creek	0.49	20%	0.50	21%
Cadiangullong Creek	1.2	20%	1.9	29%
Swallow Creek	0	0%	0.33	30%

Following mining operations, regional groundwater levels would recover only marginally, as the Cadia open pit and Cadia East mining voids would continue to act as permanent sinks, through evaporation of the groundwater collecting in the bottom of the open voids.

The EA also indicates that there would not be much recovery of baseflow in Flyers Creek and Cadiangullong Creek following mining, although there would be good recovery in Swallow Creek. This loss of baseflow would affect surface water flows and supplies to downstream water users. Surface water impacts are discussed separately below.

To mitigate groundwater drawdown impacts, Cadia has proposed a management strategy that includes:

- a detailed monitoring network;
- establishment of impact criteria or triggers; and
- implementation of compensatory measures if triggers are breached, such as lowering of pumps, deepening of bores, or provision of new bores or alternative water supplies.

Whilst highlighting a small number of areas where the groundwater assessment could have been technically improved, the Department's independent groundwater expert, Larry Cook, was satisfied that Cadia's groundwater assessment provided a thorough and conservative prediction of the groundwater impacts of the project.

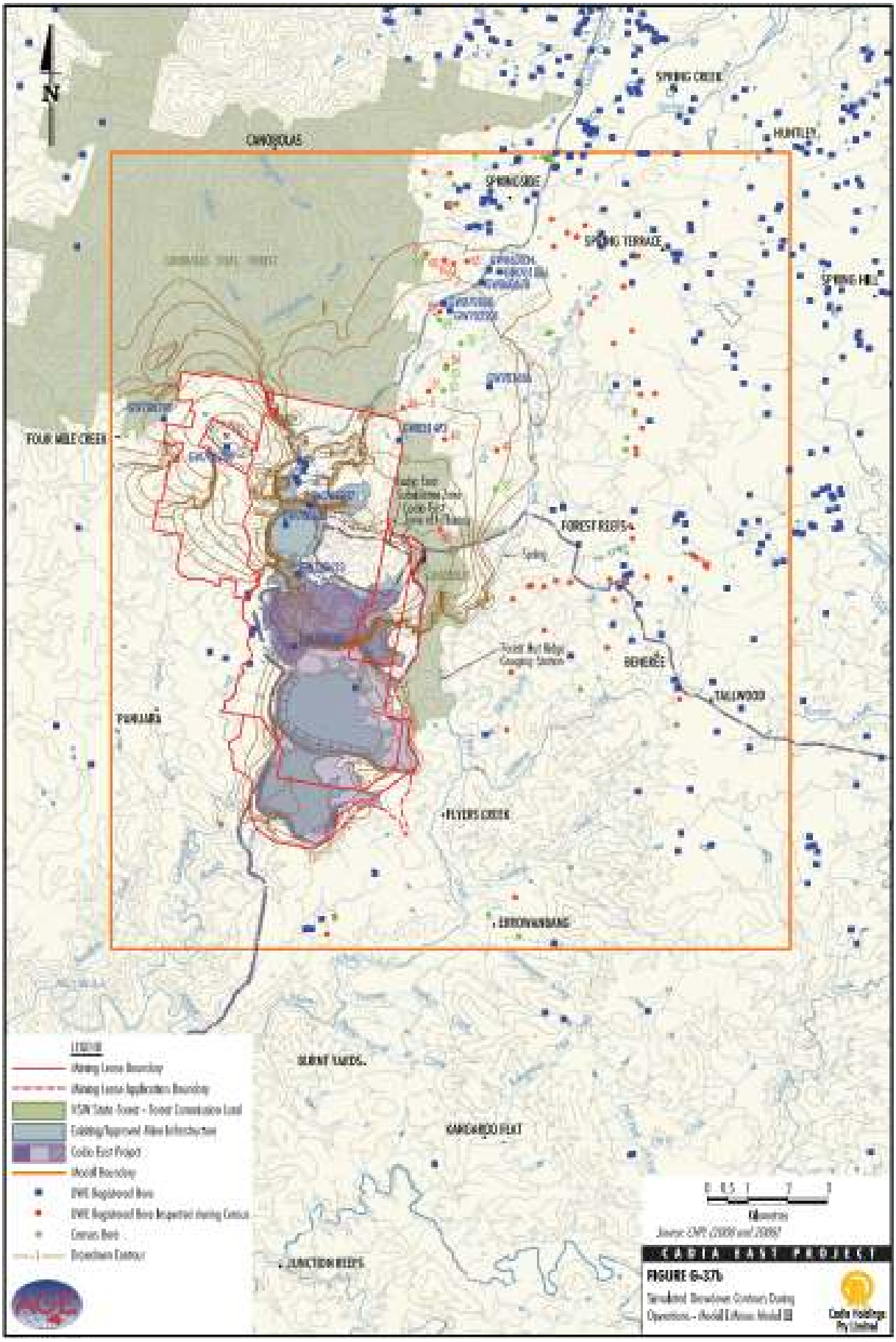

Figure 9: *Predicted groundwater drawdown*

Mr Cook considered the groundwater modelling to be conservative (i.e. overestimating the impacts) because the modelling assumed infinite stress on the groundwater system, and did not include geological faults, which may effectively 'compartmentalise' aquifers and limit regional impacts. Notwithstanding, Mr Cook acknowledged that the extent and degree of any impacts remains highly uncertain, given the complex nature of the regional fractured rock groundwater system.

Based on Cadia's assessment and the independent review, the Department (and NOW) recognise that the project may have a significant and permanent effect on groundwater resources surrounding the mine, with the potential to impact a number of groundwater users in the area.

However, the Department is satisfied that Cadia has taken a precautionary approach by considering the worst-case scenario in assessing these impacts, and that these worst-case impacts are able to be mitigated, or at least offset or compensated, to ensure that surrounding landowners' water entitlements are maintained and environmental impacts are mitigated as far as possible.

In this regard, the Department has recommended conditions requiring Cadia to provide compensatory water supplies, equivalent to the loss attributable to the project, to any landowner whose water entitlements are affected by the cumulative impacts of the CVO operations (except where such compensatory measures have already been provided under existing consents for the mining complex, or where the loss attributable to the project is negligible). The Department is satisfied that such compensatory measures should be able to be reliably achieved, through measures such as deepening existing bores or drilling new bores.

However, in the event that Cadia is not able to provide an alternative long term supply of water, the Department has recommended conditions requiring Cadia to acquire affected properties, at the request of the landowner. Such acquisition would be at a price as if the property was unaffected by the mine, to be determined through an independent valuation process.

The Department has also recommended conditions requiring Cadia to prepare and implement a comprehensive:

- Groundwater Monitoring Program, including agreed impact assessment criteria or triggers; and
- Surface and Ground Water Contingency Plan, including procedures for:
    - managing exceedances of the impact assessment criteria;
    - provision of compensatory water supplies; and
    - providing advance warning and early compensation measures for properties predicted to be affected.

The Department has also recommended a condition requiring Cadia to undertake periodic independent environmental audits of the mining complex, with the audit team to include a recognised expert in groundwater assessment.

Surface Water

The Cadia East project would affect surface water flows in Flyers Creek and Cadiangullong Creek, which would in turn affect flows in the downstream Belubula River.

Flyers Creek would be affected by a baseflow loss caused by regional groundwater drawdown, which would result in a loss of flow of about 0.49 ML/d (see Table 5). The EA indicates that Flyers Creek has a predicted minimum daily flow of approximately 1.6 ML/d. The project would therefore reduce this to approximately 1.1 ML/d. However, the EA notes that the total predicted existing downstream water demand on Flyers Creek is approximately 0.55 ML/d, so the project is unlikely to result in a significant direct impact on these downstream water users.

Cadiangullong Creek would be affected by a baseflow loss caused by regional groundwater drawdown, as well as through proposed changes to the operation of Cadiangullong Dam (including transfers to Rodds Creek Dam, as outlined in Water Balance above), the increased capacity of Rodds Creek Dam, and through direct catchment loss associated with the Cadia East subsidence zone. These impacts would have the following effects on Cadiangullong Creek:

- decrease baseflows by 1.2ML/d (20%);
- decrease flow duration by up to 12%;

- increase periods when the creek effectively ceases to flow from 8% to 19% of days; and
- increase the percentage of time that Cadiangullong Dam would be effectively empty from 2.8% to 5.8% of days.

It is noted that Cadia owns most of the land within the Cadiangullong Creek catchment between the mine and the Belubula River (see Figure 10), and therefore the impacts on downstream water users on Cadiangullong Creek would be limited. However, the EA acknowledges that there may be a small impact on water availability for one property (Property 169, see Figure 10), and Cadia has committed to providing compensatory water measures to this property if required. Cadia further contends that the proposed changes to cease-to-flow conditions in Cadiangullong Creek would more closely mimic the natural pre-existing variation in the creek (i.e. prior to regulation via the Cadiangullong Dam), where there was a cease-to-flow frequency of 15-25%.

In this regard, the existing Cadia Hill consent requires Cadia to maintain an environmental flow release regime for Cadiangullong Dam, including requirements to maintain minimum downstream flows during low (or no) inflow periods, and requirements for periodic (i.e. up to 4 per year) releases of medium flows, where a considerable (up to 15 ML/d) volume of water is released in one event (over 1 to 3 days) to 'flush' the system.

The Department has recommended a condition requiring Cadia to continue this regime, albeit with some minor addition to, and clarification of, the existing regime for periods when the water levels in the Dam are lower than the dam's lowest release valve, but above the dam's scour valve. The changes would require Cadia to release flows at a rate equivalent to the inflow into the dam during these periods, and clarifies that releases are not required when the water level drops below the scour valve (i.e. when the dam is effectively empty). The changes have been agreed to in-principle by NOW.

The losses in Flyers and Cadiangullong Creeks would also affect regional downstream flows in the Belubula River. The EA indicates that the long term loss from the project would be up to 588 ML/yr, or approximately 0.6% of the mean annual flow. To mitigate these impacts Cadia has committed to acquiring and retiring active water licences equivalent to the volume of the loss, essentially offsetting the loss caused by the project.

The Department's independent surface water expert, Prof. McMahon, was satisfied that Cadia's surface water assessment provided an adequate prediction of the surface water impacts of the project. However, as with the independent groundwater expert, Prof. McMahon noted that there does remain some uncertainty about the filling behaviour and equilibrium condition of the final void. The Department is satisfied that this long-term filling would not significantly affect the surface water impacts of the project (void filling is further outlined in Section 5.12).

Based on Cadia's assessment and the independent review, the Department and NOW recognise that the project would result in a significant and permanent reduction in flows in local creeks (Flyers Creek and Cadiangullong Creek), but the Department is satisfied that the project is unlikely to significantly affect flows in the wider region (i.e. Belubula River).

The Department acknowledges Cadia's commitment to effectively offset the loss from the regional water 'budget' through acquiring and retiring an equivalent volume of water licences. The Department has recommended conditions requiring this to occur, with the acquired water licences to preferentially come from the Flyers Creek and Cadiangullong Creek catchments (i.e. where the loss occurs).

With regard to Cadiangullong Creek, the Department acknowledges Cadia's argument that the proposed changes to the operation of Cadiangullong Dam would result in the system more closely resembling the pre-mining flow characteristics (with baseflows ceasing between 15-25% of the time). However, the Department nevertheless considers that this represents a considerable change to the downstream water flows from current conditions, and from those that have been occurring over many years.

The Department understands that the main potentially affected property (Property 169) is already receiving compensatory water supplies from Cadia. Notwithstanding, the Department has recommended a condition requiring Cadia to provide compensatory water supplies to this landowner or any other landowner whose surface water entitlements are affected as a result of the

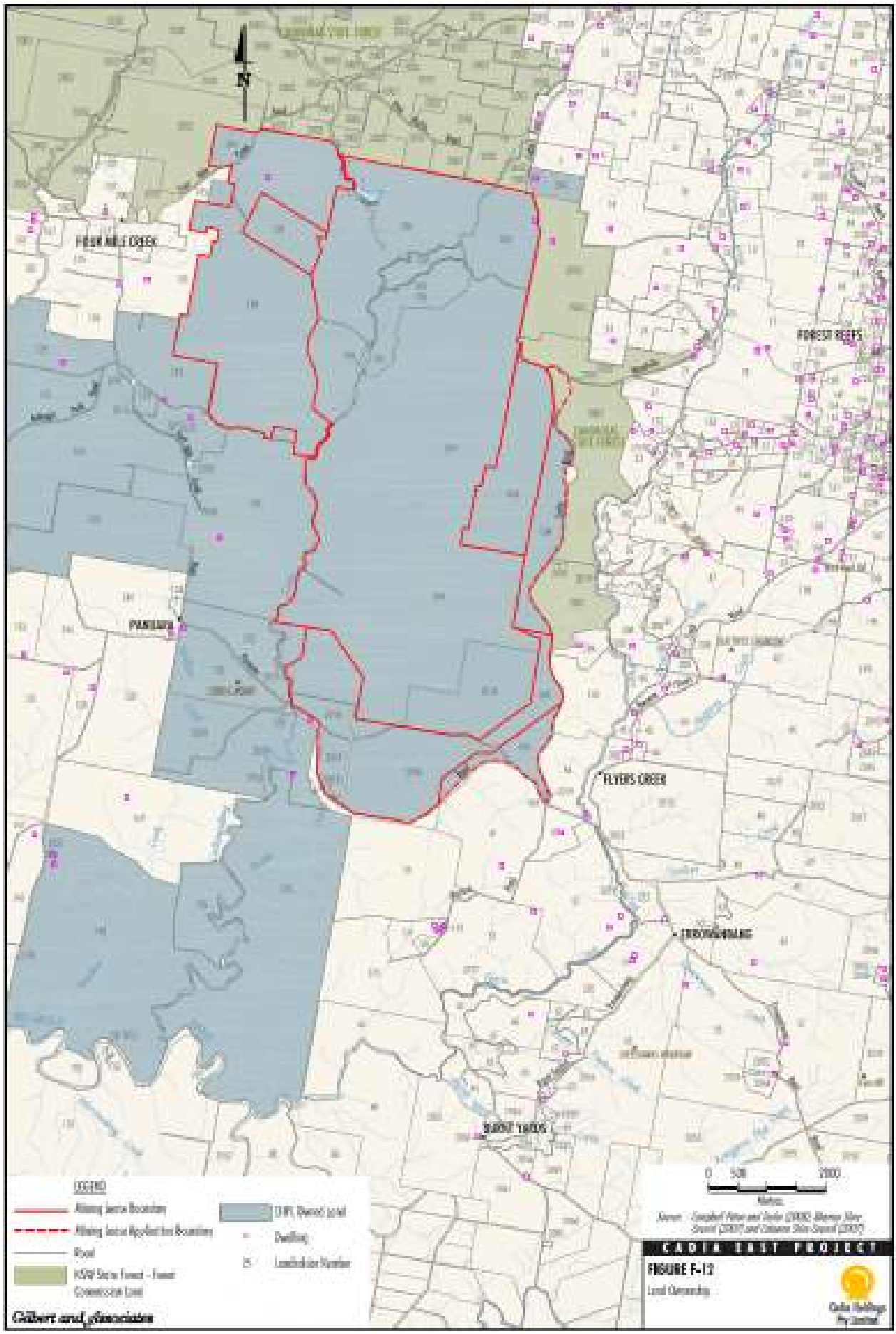

Figure 10: *Land ownership downstream of CVO*

project (subject to similar provisions as for compensation for loss of groundwater entitlements, discussed above).

The Department has also recommended conditions requiring Cadia to:
- manage environmental flows in local creeks generally in accordance with existing arrangements (albeit with the minor amendments described above), unless otherwise agreed by NOW;
- prepare and implement a comprehensive Surface Water Monitoring Program, including agreed surface water and stream health impact assessment criteria;
- prepare and implement a comprehensive Surface Water and Groundwater Contingency Plan (as discussed above); and
- undertake periodic independent audits of the mining complex, with the audit team to include a recognised expert in surface water assessment.

5.2 Flora and Fauna

The EA includes assessments of the impacts on flora and fauna by specialist consultants FloraSearch and Western Research Institute (WRI), respectively, in collaboration with Resource Strategies. These assessments included consideration of historical studies for the mining complex. Additional flora and fauna surveys were undertaken in Autumn and Spring 2004, with further vertebrate fauna studies in Spring 2006 and Summer 2007.

The EA estimates the proposal would disturb approximately 786 ha of land in addition to the currently approved mine footprint. Of this, approximately 238 ha of treed native vegetation would be disturbed, including 153 ha resulting from the new underground mine and 85 ha from the expansion of the tailings storage facilities. Of the remaining areas that would be disturbed by the proposed expansion, approximately 360 ha is classified as 'scattered trees in cleared agricultural land' and 184 ha is pine plantation in the Canobolas State Forest. The proposed dewatering facility would cover 2.6 ha of cleared agricultural land.

Flora

The flora assessment identified 6 vegetation communities in the area to be affected by the project:
- White Box Woodland;
- Long-leaved Box/Blakely's Red Gum/Yellow Box Tall Woodland;
- Apple Box/Blakely's Red Gum/Yellow Box Tall Woodland;
- Red Stringybark/Long-leaved Box Open Forest;
- Red Box/Red Stringybark Open Forest; and
- Ribbon Gum/Blackwood Forest.

Of these communities, 3 contain vegetation which is classified as the Box-Gum Woodland Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act 1995* (TSC Act) and the Box-Gum Grassy Woodlands and Derived Native Grasslands Critically Endangered Ecological Community (CEEC) under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EA found that no critical flora habitat would be impacted by the project.

Of the 238 ha of treed native vegetation that would be impacted, the assessment found that approximately 23.5 ha is classified as Box-Gum EEC, 23 ha of which is also classified as the Box-Gum CEEC. Most of this vegetation community would be impacted by the subsidence zone and zone of influence, with a small section to be impacted by the Cadia Road realignment.

The flora assessment takes into account the following mitigation measures in assessing impacts on the EEC and CEEC:
- delineating areas of disturbance to avoid excessive clearing;
- on-site management of grazing, introduced fauna, fire and weeds;
- rehabilitation of areas with EEC species; and
- provision of areas of land to offset the loss of vegetation (discussed under Biodiversity Offset, further below).

Based on these measures (including the proposed biodiversity offset), the assessment concludes that the project is unlikely to significantly impact the Box-Gum Woodland EEC or CEEC.

Cadia currently implements a range of measures to manage the impacts of the existing mine on native vegetation and proposes to review and update its suite of management plans to accommodate the Cadia East project.

Cadia also proposes to salvage seed from the areas to be impacted, to augment its existing seed collection and for use in future rehabilitation and/or enhancement of other similar areas of Cadia-owned land. The Department considers that Cadia should investigate ways to maximise the salvage of resources (including timber, fauna habitat, seed and topsoil) in areas subject to subsidence, and has accordingly recommended a condition requiring this to be undertaken.

Three threatened flora species were recorded near the project area, namely the Silver-Leaf Candlebark, New England Bush-pea and Narrow-leaved Black Peppermint. Despite the identification of potential habitat for the Silver-Leaf Candlebark and New England Bush-pea, targeted surveys did not reveal any within the project area. The assessment found that the Narrow-leaved Black Peppermint is not an endemic species to the project area, but has been planted for amenity purposes in parkland adjacent to the proposed concentrate pipeline in Blayney. Tests of significance were conducted for all threatened species potentially affected by the project, with the assessments concluding that no threatened species would be significantly impacted.

Another potential impact on native vegetation considered in the EA is the alteration of natural flow regimes, a Key Threatening Process listed under the TSC Act. A number of waterways in the region have the potential to be affected, including those outside the direct footprint of the mine (as discussed in Section 5.1). The EA determined that Copper Gully would be directly impacted by the subsidence zone, and Rodds Creek downstream of the mine is already affected by the water storage and tailings facilities. The upstream section of Rodds Creek consists of pine plantation. The EA concludes that the alteration of flows on Cadiangullong Creek, already affected by the existing approved mine, would not significantly impact native vegetation, due to the originally ephemeral nature of Cadiangullong Creek and drought resistant species that exist along the creek. The EA predicts that the altered flow regimes on Flyers Creek and the Belubula River would not be large enough to significantly affect native vegetation.

The groundwater assessment found that the uppermost aquifer that would potentially experience drawdown due to the project is approximately 20 m below the surface. The flora assessment considers this is too deep for any drawdown to affect surface vegetation.

The groundwater assessment also identified a number of springs and seeps in the headwaters of Cadia Creek and Flyers Creek, which may support nearby vegetation. However, it concludes that these seeps and springs are associated with perched aquifers that would not be impacted by groundwater drawdown due to the project.

The EA considers other potential impacts of the project on native flora, including introduced flora and fauna, dust and bushfire. It concludes that, with the implementation of existing management plans updated to include the Cadia East Project, the impacts of the proposal would not be significant.

DECCW initially raised concerns about the impacts of the proposal on a potentially rare orchid species, *Pterostylis striata*. FloraSearch has advised that since the orchid was originally identified in the Cadia Hill surveys it has been grouped within a species of orchid that is more widely spread in the region. Cadia maintains that given it is not threatened, no further action is necessary.

The Department and DECCW are satisfied that the project is unlikely to have a significant impact on these communities, subject to adequate biodiversity offsetting. This issue is discussed under a separate sub-heading below.

Fauna

Fauna surveys within and adjacent to the project site recorded 205 native vertebrate species and 14 introduced species. No critical habitat or endangered fauna populations were found to occur within the project area.

Ten threatened species were identified, namely:

- Superb Parrot;
- Swift Parrot;
- Turquoise Parrot;

- Brown Treecreeper (eastern subspecies);
- Speckled Warbler;
- Regent Honeyeater;
- Diamond Firetail;
- Squirrel Glider;
- Yellow-bellied Sheathtail-bat; and
- Eastern Bentwing-bat.

Two of these, the Swift Parrot and Regent Honeyeater, are listed as endangered under both the TSC Act and the EPBC Act. The remainder are listed as vulnerable under the TSC Act and the Superb Parrot is listed as vulnerable under the EPBC Act. Tests of significance were undertaken for these species. The EA considers that the Squirrel Glider and the two bats are the only species likely to have a viable population within the area to be impacted by the project.

The assessment also recorded 18 migratory species listed under the EPBC Act within the project area and surrounds.

Although the assessment found that the project was unlikely to lead to the extinction of any species or place any at risk of extinction, the expansion of the NTSF would remove the remaining Squirrel Glider habitat at the mine, and the assessment considers it very likely that the local population would be lost.

Cadia proposes to implement a Squirrel Glider Monitoring Program, which would verify if Squirrel Gliders are present in the remnant vegetation to be removed, and include a translocation and monitoring program. Following exhibition of the EA, Cadia has indicated that monitoring in the Squirrel Glider habitat has commenced, without a confirmed sighting. Further, since the time of exhibition the Squirrel Glider has been recorded within the proposed offset area of Black Rock Range (discussed further below).

The Department and DECCW are satisfied that the project is unlikely to have a significant impact on these species, subject to adequate biodiversity offsetting and the implementation of a Squirrel Glider Monitoring and Translocation Program. The offset is discussed below.

Biodiversity Offset

Cadia has developed a biodiversity offset strategy to offset the 238 ha of native vegetation to be cleared for the project, and particularly the impact on the Box-Gum Woodland EEC and CEEC and threatened species. The offset strategy has been modified since exhibition of the EA, following detailed consultation with DECCW and the Department. These changes satisfy DECCW and the Department that the project would effectively compensate for the project's biodiversity impacts, and meet the 'improve or maintain' biodiversity guidelines.

The final offset strategy is based on these detailed consultations, and was agreed to in-principle by DECCW in November 2009. The strategy is shown on Figure 11 and comprises:

- revegetation, enhancement and long term conservation of a total of 938 ha of land, comprising:
  - 653 ha of native vegetation and 173 ha of cleared agricultural land at Black Rock Range, and
  - 62 ha of native vegetation in a 112 ha area of Cadia-owned land at the junction of the Belubula River and Flyers Creek;
- development and implementation of a management plan for the identification, translocation and monitoring of Squirrel Gliders potentially impacted by the project and within Black Rock Range; and
- securing the offset land for conservation purposes in perpetuity.

DEWHA has supported the enhanced offset strategy developed by Cadia in consultation with the Department and DECCW, and supports the requirement to ensure that the recommended offset is secured in perpetuity.

DECCW and the Department are satisfied that, subject to the implementation of this biodiversity offset strategy, the project can be undertaken in a manner that would improve or maintain the biodiversity values of the locality over the medium to long term. The Department has recommended conditions requiring Cadia to implement, and report on progress against, this offset strategy.

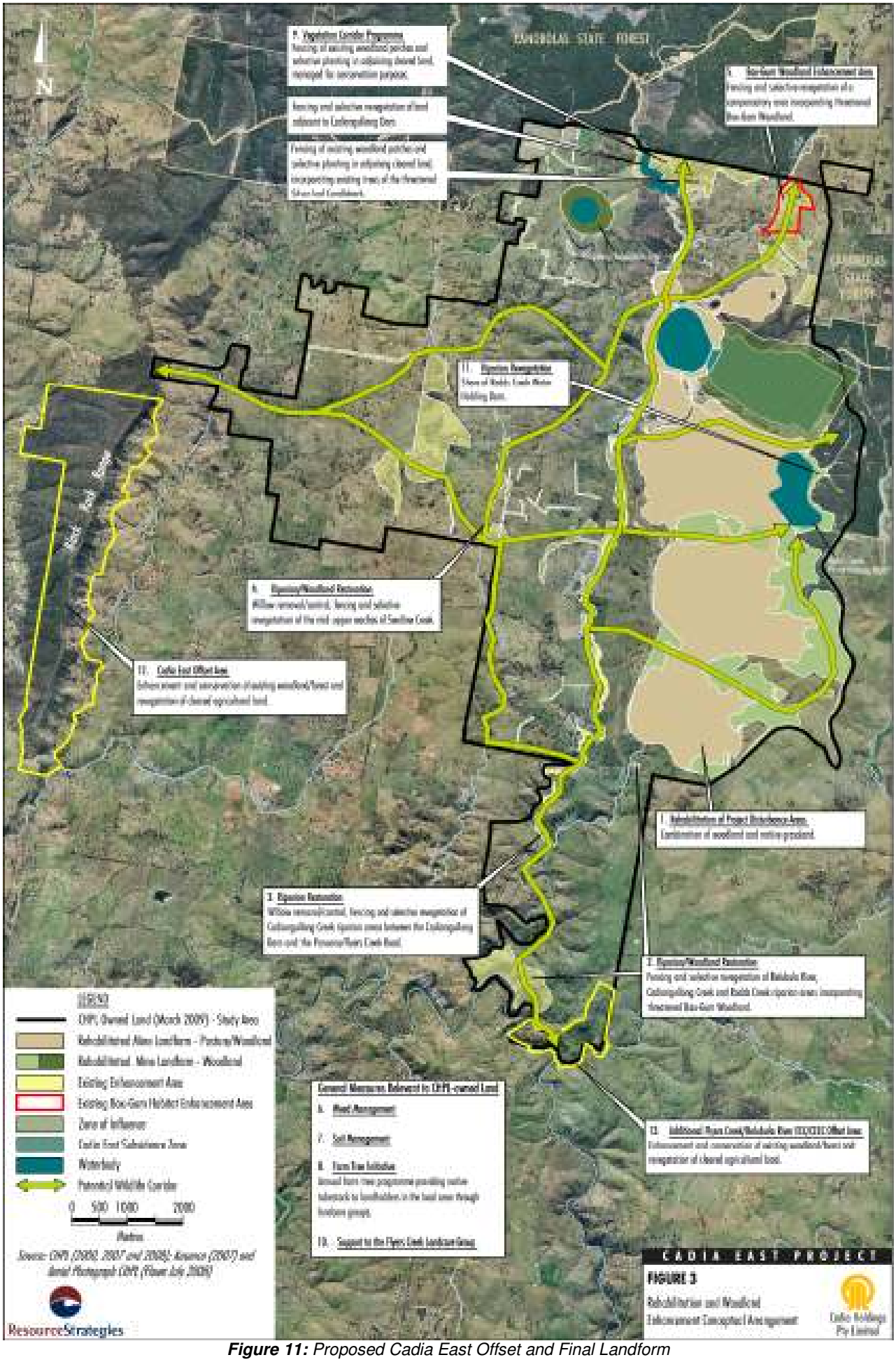

Figure 11: *Proposed Cadia East Offset and Final Landform*

Conclusion

The Department and DECCW are satisfied that Cadia has adequately assessed the potential flora and fauna impacts of the project. Cadia's assessment indicates that the project, without any offsetting measures, would result in significant flora and fauna impacts, most notably:

- the removal of 238 ha of treed native vegetation;
- the removal of about 23.5 ha of EEC, including 23 ha of CEEC; and
- removal of viable habitat for the threatened Squirrel Glider.

The Department and DECCW are satisfied that these impacts are able to be minimised, mitigated and/or offset to an extent such that the project could be considered to 'improve or maintain' biodiversity values of the area over the medium to long term.

To achieve this, the Department has recommended conditions requiring Cadia to:

- implement the final offset strategy as agreed in-principle by the DECCW and the Department;
- provide for the long term conservation security of the offset areas;
- develop a Rehabilitation Strategy, which would set the objectives for rehabilitation and future use of the mining complex;
- develop a comprehensive Landscape Management Plan; and
- lodge substantial rehabilitation and offset bonds to ensure that the rehabilitation and offset areas are established to the satisfaction of the Director-General.

5.3 Noise

The EA includes a noise impact assessment undertaken by specialist acoustics consultants Wilkinson Murray in accordance with applicable contemporary guidelines, including the *NSW Industrial Noise Policy (INP)*, the *Interim Construction Noise Guideline* and the *Environmental Criteria for Road Traffic Noise.*

Mining Operations

The noise assessment indicates that noise emissions from existing operations, together with the Cadia East project, would generally comply with the mining complex's existing noise limits at all surrounding sensitive receivers. The sole exception is at Property 22 (Jackson), where a minor 1 decibel exceedance of the night time noise limit (i.e. 35 decibels) is predicted during the construction phase of the project. Following the construction phase, the noise levels would reduce, and would comply with the existing noise limit for this property.

The Department and DECCW are satisfied that this noise exceedance is minor[†] and temporary, and that the project is unlikely to result in any significant operational noise-related impacts.

To ensure that noise from the project is adequately managed, the Department has recommended a number of conditions to contemporise and expand operational noise controls at the mine, including requiring Cadia to:

- comply with contemporary operational noise limits, and strive to continually improve the noise performance of the project;
- restrict construction to daytime hours for construction associated with the raising of Rodds Creek Dam, the tailings storage facilities, and the new pipelines;
- undertake additional noise mitigation measures (such as double glazing, insulation and/or air conditioning), at the request of the landowner, on any residence where monitoring indicates that noise limits are being exceeded by more than 2 decibels;
- acquire any property, at the request of the landowner, where monitoring indicates that noise limits are being significantly exceeded (i.e. by more than 5 decibels); and
- prepare a detailed Noise Monitoring Program for the project, including a combination of attended and unattended noise monitoring.

CVO Dewatering Facility

Construction

The noise assessment indicates that construction of the CVO Dewatering Facility would exceed applicable construction noise limits at 3 sensitive receivers during worst case activities (i.e. bulk excavation), as outlined in the Table 6.

[†] exceedances of 1 to 2 decibels are generally not perceptible by the human ear

***Table 6**: CVO Dewatering Facility Construction Noise Impacts, dBA $L_{Aeq\ (15mins)}$ (exceedances in brackets)*

Receiver	Criteria	Prediction
MC & PA Ewens	44	54 (+10)
GP Nixon & Sons		51 (+7)
ML Gardner		49 (+5)

Given the temporary and variable nature of construction works, the Department is satisfied that the construction noise emissions are unlikely to significantly impact surrounding residents. However, because the CVO Dewatering Facility is also expected to exceed applicable noise limits during operations (see below), the Department has recommended conditions requiring Cadia, at the request of the landowner, to acquire the most affected property and/or implement additional noise mitigation measures at this and the second-most affected property. The Department has also recommended conditions requiring Cadia to restrict construction activities for the CVO Dewatering Facility to the day time period only.

Operation

The noise assessment indicates that operation of the CVO Dewatering Facility would also exceed applicable operational noise limits at these 3 sensitive receivers during worst case operations, as outlined in Table 7. The noise predictions include incorporating a 3 m noise barrier between the facility and the residents.

***Table 7**: CVO Dewatering Facility Operational Noise Impacts, dBA $L_{Aeq\ (15mins)}$ (exceedances in brackets)*

Receiver	Criteria			Prediction		
	Day	Evening	Night	Day	Evening	Night
MC & PA Ewens	39	35	35	50 (+11)	42 (+7)	42 (+7)
GP Nixon & Sons				43 (+4)	35	35
ML Gardner				40 (+1)	34	34

The Department's typical policy with regard to exceedances of noise criteria is as follows:

Noise Impact	Exceedance	Management Required
Marginal	1-2 dBA	Noise mitigation, if possible
Moderate	3-5 dBA	Noise mitigation, inc. noise mitigation at residence
Significant	>5 dBA	Noise mitigation at residence and acquisition upon request

In accordance with this policy, the Department has recommended conditions requiring Cadia, at the request of the landowner, to:

- acquire the Ewens property;
- undertake additional noise mitigation measures (such as double glazing, insulation and/or air conditioning) on the Ewens residence (whilst it remains privately owned) and Nixon residence; and
- undertake additional noise mitigation measures at any other residence where monitoring indicates an exceedance of the noise limits of more than 2 decibels (or 1 decibel during the day in the case of the Gardner property).

The Department has also recommended conditions requiring Cadia to:

- restrict train loading operations to the day time period; and
- prepare and implement a detailed Noise Monitoring Program for the project including the dewatering facilities, and seek to continually improve the noise performance of the project.

Road Noise

The noise assessment (and additional information later provided by Cadia) indicates that the project would exceed applicable traffic noise criteria at a number of residences, including approximately:

- 43 residences on Forest Road at Spring Hill;
- 4 residences on Orchard Road east of Cadia Road; and
- 2 residences on Woodville Road east of Cadia Road.

The key area of affectation, Forest Road at Spring Hill, is a small village with a large number of residences located close to the road (i.e. within 25 metres of the road). The exceedances are generally related to early morning heavy vehicle movements travelling to the mine site from Sydney and Newcastle.

It is noted that these traffic noise exceedances are already a feature of the existing CVO operations, and in this regard the existing consent for the Cadia Hill mine includes a condition requiring Cadia to carry out mitigation measures necessary to reduce traffic noise impacts on properties outside the mining lease area, where exceedances of the traffic noise limits are identified. Consistent with this condition, the Department has recommended a condition requiring Cadia to undertake additional noise mitigation measures on residences predicted to exceed applicable traffic noise criteria as a result of the project. The Department has also recommended conditions requiring Cadia to investigate ways to reduce off-site road noise, and to continually improve noise performance.

Rail Noise

The project would increase rail movements on the Main Western Railway from 3 to 6 movements a week. Given that the operations would still typically generate only one project-related train movement per day, the Department is satisfied that the project would not result in any significant rail-noise-related impacts. Notwithstanding, the Department has recommended a condition requiring Cadia to investigate ways to reduce rail noise associated with the project.

5.4 Blasting

Blasting for the Cadia East project would be undertaken up to 24 hours a day, 7 days a week. The EA includes a specialist assessment of the impacts associated with these blasting operations, undertaken by Wilkinson Murray.

Private Property and Residences

The blast assessment indicates that, without any mitigation measures, the project would exceed the applicable amenity-based vibration criteria during the Evening and Night-time periods at a number of properties surrounding the mine, although the blasting would be well within the applicable structural damage criteria (see Table 8).

***Table 8**: Worst Case Ground Vibration Impacts – No Mitigation*

Receiver	***Predicted 95% Vibration (mm/s)***	***Amenity Criteria* (mm/s)***			***Structural Damage Criteria***
		Day	***Evening***	***Night***	
de Gruchy	3.8	5	2	1	10
Jackson	3.4				
McKie	3.1				
Munro	2.5				
All others	<1.9				

* The criteria have been grouped generally into Day, Evening and Night for the purposes of this report, however the criteria do vary throughout the week (e.g. all of Sunday has a criteria of 1 mm/s).

To mitigate the amenity-related vibration exceedances, Cadia proposes to manage the explosive size (i.e. the maximum instantaneous charge) for the Evening and Night periods to ensure compliance with all applicable criteria.

Blasting associated with mining generally generates vibration and overpressure (or noise) emissions. As the blasting associated with the project would be undertaken underground, the overpressure associated with the project would be insignificant.

The Department and DECCW are satisfied that blasting operations can be managed to comply with the applicable criteria, and that blasting operations are unlikely to result in any significant damage to structures on privately-owned land.

To ensure that blasting operations are appropriately managed, the Department has recommended conditions requiring Cadia to:

- manage blasting operations to comply with all relevant criteria at private properties;
- keep residences notified and up to date regarding blasting operations, and facilitate feedback/complaint management;
- provide for structural property inspections and investigations; and
- develop a comprehensive blast monitoring program.

Heritage Structures

The blast assessment includes consideration of the effects of blasting on heritage structures, including the Cadia Engine House and Surrounds, which is listed on the State Heritage Register. The

assessment indicates that the maximum predicted vibration levels (i.e. 2.5 mm/s) would be well within the established criteria for heritage structures (i.e. 15 mm/s).

To ensure that heritage structures are appropriately protected from blasting, the Department has recommended conditions requiring Cadia to comply with relevant criteria, and to monitor blast-related impacts on all heritage items (excluding the Little Cadia precinct, which would be within the subsidence zone, see Section 5.10).

5.5 Air Quality

The EA includes a specialist air quality assessment undertaken by Holmes Air Sciences. The assessment includes consideration of total suspended particulates (TSP), dust deposition and fine particulate matter (PM_{10}) generated by the project, with reference to relevant 24-hour, monthly and annual air quality goals. The assessment includes consideration of the incremental increase in emissions caused by the project, including the existing approved operations, and the total cumulative emissions generated by the mine together with background dust levels in the area.

The assessment is based on the implementation of a number of existing and proposed mitigation measures, including:

- watering of unsealed haul roads and disturbed surfaces;
- minimising areas of disturbance;
- capturing dust where possible (e.g. during drilling);
- enclosing material transfer points;
- undertaking progressive rehabilitation of disturbed areas; and
- installing fixed water sprays on coarse ore stockpiles.

The assessment indicates that the mine would comply with applicable dust criteria during all stages of the project. The worst-case scenario is during Year 1, which includes open pit mining and construction of the Ridgeway and Cadia East underground mines. The predicted maximum dust levels at the nearest privately-owned sensitive receivers are shown in Table 9.

***Table 9**: Air Quality Predictions During Year 1 of Operations*

Pollutant	***Averaging Period / Units***	***Criterion / Goal***	***Max. Predicted Incremental Dust Level***	***Max. Predicted Total Dust Level (Increment + Background)***
Particulate matter < 10 µm (PM10)	Annual / µg/m3	30	1.5	21.5
	24 hour / µg/m3	50	14.7	-
Deposited Dust	Annual / g/m2/month	2 (max. increase)	0.36	-
		4 (total)	-	2.46
TSP	Annual / µg/m3	90	1.9	51.9

Cadia's existing air quality monitoring program would continue for the project and would be expanded to include installation of dust deposition gauges at locations representative of potentially-affected residences neighbouring the site of the proposed CVO Dewatering Facility.

The Department is satisfied that Cadia would be able to comply with relevant air quality criteria at each stage of the project (including at the CVO Dewatering Facility) and that its proposed air quality impact management measures would be adequate to achieve and maintain compliance. However, the Department has recommended a number of conditions to minimise, monitor and manage the air quality impacts of the project, including requirements to:

- comply with incremental and cumulative air quality criteria; and
- implement an updated air quality monitoring program.

5.6 Greenhouse Gas Emissions

The proposal would generate greenhouse emissions through on and off-site diesel consumption for extraction and transport vehicles, use of explosives, vegetation clearance and on-site electricity consumption to power processing and mining equipment, offices and amenities buildings.

The EA includes an assessment of greenhouse gases prepared in accordance with relevant Commonwealth guidelines. The assessment determined that total Scope 1, 2 and 3 greenhouse gas

emissions from the proposal would be approximately 1.41 million tonnes of CO_2 equivalent each year, which represents approximately 0.245% of annual national emissions.

The Department is satisfied that this represents a negligible contribution to national and global greenhouse emissions, and considers that the energy efficiency measures proposed in the EA accord with best practice for mining operations in NSW.

5.7 Transport

The EA includes a road transport assessment undertaken by Traffix, which assessed the impact of the project on the existing road network. The assessment considered three scenarios at various stages of the project (see Table 10). The worst-case scenario in terms of maximum generated traffic was during Year 2, when construction of Cadia East would be underway.

Table 10: *Predicted Increase in Traffic Levels*

Scenario	Project Year	Employee vehicles (trips per day)	Operation Trucks (trips per day)	Construction Trucks (trips per day)
	Existing	1,200	80	0
1	2	1,643	132	150
2	4	1,191	132	5
3	17	990	132	5

The assessment considered increased traffic at 12 locations on roads likely to be used by mine generated traffic (see Figure 12). A summary of the predicted increase in single trips (i.e. excluding the return journey) compared with current levels is provided in Table 11.

Table 11: *Predicted Peak Period Traffic Flows on the Local Road Network (Scenario 1/Year 2)*

Site No	Location	Existing Traffic Volume		Additional Volume		Predicted Total Traffic Volume	% Total Volume Increase	Trucks as a % of Total Traffic Volume
		Total	% Trucks	Light	Trucks			
1	Forest Road (MR 245) South of Orange	3,975	7.0%	288	61	4,324	8.78%	7.9%
2	Cadia Road South of Forest Road	1,710	11.6%	288	61	2,059	20.41%	12.6%
3	Cadia Road South of Four Mile Creek Road	935	10.8%	332	152	1,419	51.76%	17.9%
4	Orchard Road East of Cadia Road	246	56.2%	39	91	376	52.85%	61.0%
5	Four Mile Creek Road West of Cadia Road	190	8.1%	5	0	195	2.63%	7.9%
6	Four Mile Creek Road South of Ridgeway	92	0	5	0	97	5.43%	0
7	Woodville Road East of Cadia Road	254	9.6%	89	50	393	54.72%	18.9%
8	Cadia Road North of Panuara Road	65	0	22	0	87	33.85%	0
9	Forest Road at Spring Hill (MR 245)	760	-‡	39	91	890	17.11%	-‡
10	Orange Road (MR 559) at Railway Overbridge	2,432	-‡	89	50	2,571	5.72%	-‡
11	Panuara Road East of Four Mile Creek Road	63	30.2%	22	0	85	34.92%	22.4%
12	Cadia Road South of Woodville Road	65	30.2%	22	0	87	33.85%	22.6%

‡ Cadia has advised that data for the proportion of heavy vehicles on Forest Road and Orange Road is not available.

Issued raised during the exhibition of the EA include:

- safety issues at the intersection of Cadia Road and Four Mile Creek Road;
- impacts on pavement life (wear and tear);
- Cadia Road creek crossing (60km/hr zone);
- increased truck movements and road alignment, particularly on Orchard Road; and
- interaction with project vehicles and bus stops.

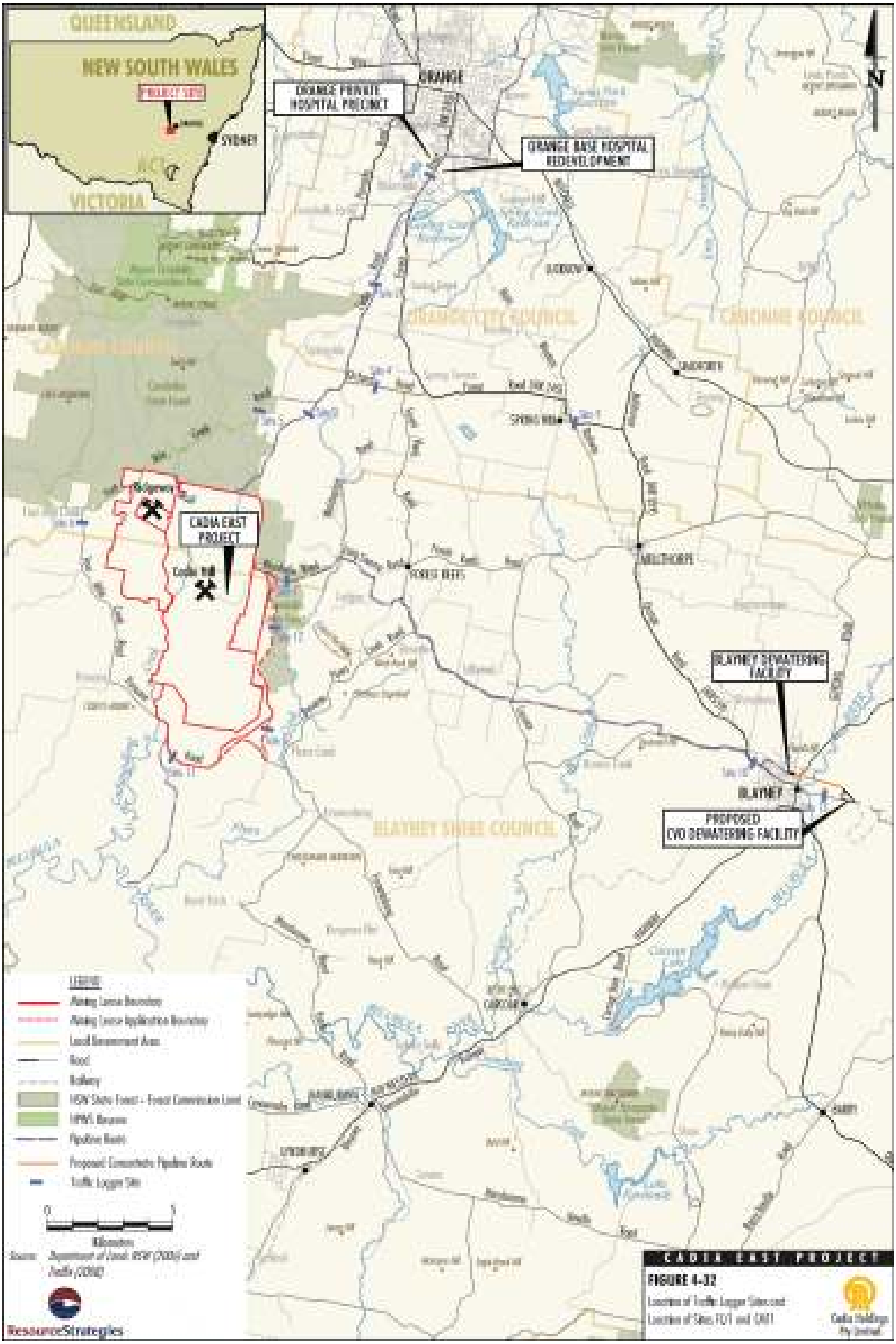

Figure 12: *Traffic Assessment Locations*

The traffic assessment considered that the roads and intersections function well under current traffic levels during peak periods. The assessment of the proposed increase in traffic levels, including on Orchard Road, indicates that the level of service for roads and intersections would not change, and that the risks to road users would be acceptable.

The EA also considered the potential cumulative effects of the project and the redevelopment of the Orange Base Hospital on Forest Road to the north of the intersection with Cadia Road. The peak times for vehicle movements associated with the mine do not occur at the same time as the predicted peak for the hospital and commuter traffic. Furthermore, the hospital is currently in construction and is not expected to reach full operation until 10 years after construction began, at which time vehicle movements to and from the mine would have reduced from the predicted peak. The Department is satisfied that the cumulative impacts of the proposal on the regional road network would not be significant.

Cadia has indicated that it has negotiated a contributions strategy with the three affected Councils towards the maintenance of roads used by project-related vehicles. The upgrade of sections of Cadia Road (including the culvert of the creek crossing) and the intersection of Cadia Road and Four Mile Creek Road have been included in these discussions. The Department has recommended a condition requiring the provision of contributions towards the maintenance of roads in the region, however it cannot specify that specific upgrades be carried out.

To accommodate the predicted subsidence zone and zone of influence from the underground void, Cadia proposes to realign a 1.1 km section of Cadia Road and to relocate the main access road to the mine (see Figure 3 – proposed project). This would involve the construction of two new intersections on Cadia Road, one with Woodville Road and the other with the new mine access road. Cadia has committed to design and construct the new roads and intersections in accordance with Council and RTA design standards. The Department has recommended a condition requiring this realignment of Cadia Road to be completed to the satisfaction of Blayney and Cabonne Councils.

The construction of the CVO Dewatering Facility in Blayney requires the construction of a new access road and intersection with Newbridge Road. The Department has recommended a condition requiring the access road and intersection be completed to the satisfaction of Blayney Shire Council.

The EA indicates that the morning and afternoon peak times for mine related traffic (6-7 am and 6-7 pm, respectively) fall outside the times when school buses would be operating. The Department is satisfied that the impacts of mine related traffic on school bus routes would be minimal.

The Department is satisfied that, with the proper design of new roads and intersections and the provisions of contributions to the affected Councils for ongoing road maintenance, the project is able to be managed in a manner that would not result in significant traffic safety risks to users along the roads used by project vehicles.

5.8 Visual

The EA considers the visual character of the areas surrounding the mining complex and the proposed dewatering facility.

Mining Operations

The mine is situated in an undulating valley which falls generally from Mount Canobolas and Mount Tomac in the north to the Belubula River in the south. The area has been subject to historical disturbance from agriculture and mining, and the mining complex is visible from properties to the east, south and west as well as from sections of the surrounding road network. Some screening vegetation has been established as part of the existing Cadia and Ridgeway development consents.

The key aspects of the project that have the potential to impact on the mine's visibility to sensitive receivers include the raising of the tailings storage facilities (northern facility to be raised by 38 m and southern facility to be raised by 20 m), the subsidence zone and light emissions during nighttime operations. The existing South Waste Rock Dump would not be raised above its current approved height.

The visual assessment and simulation in the EA indicates that the project would not significantly increase the visibility or visual impact of the project from surrounding areas. With the growth of

existing screening vegetation and the progressive rehabilitation of tailings facilities and the south waste rock dump, the EA concludes that the visual impacts would be negligible.

CVO Dewatering Facility

The proposed dewatering facility is in gently to moderately undulating land east of Blayney and would be located adjacent to an existing industrial complex (cold storage and distribution warehouse facility) in cleared land next to the Main Western Railway.

Although the proposed facility would generally be visually concealed from Blayney by existing vegetation, it would be visible from one residence approximately 500 m to the east, from Newbridge Road and the railway. The EA considers that the potentially-affected residence would have high sensitivity and the potential visual impacts have been assessed as moderate. Cadia proposes to plant vegetation along the perimeter fence to provide some screening as well as use design features to blend the new buildings in with the surrounding landscape.

The Department is satisfied that the project would not result in significant visual impacts, although the project would be partly visible from a number of residences. To mitigate the visual impacts of the project as far as practicable, the Department has recommended conditions requiring Cadia to:

- undertake additional mitigation measures, such as screening vegetation, for any significantly impacted private residence in the vicinity of the project with direct views to the project areas, at the request of the landowner;
- take all reasonable and feasible measures to mitigate lighting impacts; and
- prepare architectural plans and a landscape plan for the dewatering facility, to the satisfaction of Blayney Shire Council.

5.9 Aboriginal Heritage

The EA includes a specialist Aboriginal cultural heritage assessment, undertaken by Colin Pardoe Bio-Anthropology & Archaeology in consultation with the Orange Local Aboriginal Land Council. The assessment draws on previous archaeological assessments for the area undertaken since 1979, including an assessment and sub-surface investigation on Rodds Creek in 1995.

The investigations found that Aboriginal sites are rare in the Orange area and the majority of the site has been subject to agricultural disturbance. Some objects have been salvaged from areas disturbed by the existing mine and collected for safe keeping.

The additional assessment undertaken for the project identified 5 Aboriginal sites/items within the potential project disturbance area, that had not been previously assessed and for which no consent to disturb or destroy had been granted, as outlined in the Table 12.

***Table 12**: Aboriginal Sites*

Site ID	Site Type	Impact	Management
Woodville 1	Quartz flake	Within the Blayney dewatering/ concentrate pipeline easement	Salvage prior to excavation and relocation to original location upon completion of construction
Woodville 2	Artefact scatters	Possible indirect impact – to the east of the Cadia East zone of influence	Additional survey and subsurface test excavations, salvage if necessary
Woodville 3	Artefact scatters	As above	As above
PAD 2	Potential Archaeological Deposit	Within the Cadia East zone of influence and potentially impacted by bund and fence construction	None proposed
Southern Sloping Plain and Terraces	Potential Archaeological Deposit	Within the Cadia East zone of influence	Additional survey and subsurface test excavations, salvage if necessary

Although the EA does not describe management measures for the site PAD 2, the Department considers that the site should be subject to additional survey and subsurface excavation, as for sites Woodville 2 and 3, given it is potentially impacted by the construction of the bund and fence around the subsidence zone of influence.

DECCW and the Department are satisfied that the project is unlikely to have any significant impact on Aboriginal heritage values. The Department has recommended a condition that would require Cadia

to prepare an Aboriginal Cultural Heritage Management Plan for the project, which includes provisions for:

- salvage and management of sites and potential archaeological deposits within the project disturbance area;
- protection and monitoring of sites outside the project disturbance area;
- management of any Aboriginal sites/objects identified during the project; and
- ongoing consultation with the Aboriginal community.

5.10 European Heritage

The EA includes a specialist European heritage assessment, undertaken by Edward Higginbotham & Associates. The assessment draws on previous heritage assessments for the mine and archival recording, excavation and salvage at the Little Cadia precinct in 2005.

The assessment identified 2 sites that would be potentially impacted by the project, as outlined in Table 13.

***Table 13**: European Heritage Sites*

Site ID	Site Type	Impact	Management
Little Cadia	Former copper mine, commencing in 1856, containing 22 historical items	Part of the Little Cadia precinct is within the subsidence zone and zone of influence	Conserve on site and protect areas not impacted by the project
Wire Gully Gold Workings	Former gold mine commencing in the 1880s and containing 15 historical items	Part of the area is already impacted by the STSF and expansion would impact additional areas through inundation	Salvage components within the STSF area

The Department's Heritage Branch is satisfied that the project is unlikely to have any significant impact on non-indigenous heritage values. The Department has recommended a condition that would require Cadia to prepare an Historical Heritage Management Plan for the project, which includes provisions for:

- archival recording, excavation and/or salvage of heritage items within the project disturbance area; and
- a conservation management strategy which details protection measures for sites outside the project disturbance area, including impacts from blasting and vibration.

5.11 Socio-economic

The EA includes a specialist socio-economic assessment undertaken by Gillespie Economics. The assessment indicates that the project would provide considerable socio-economic benefits to the region, including:

At the mine:

- a maximum of 1,300 direct jobs during Cadia East construction;
- an average of 880 direct jobs over the life of the project; and
- $2.2 billion in capital investment;

For the regional economy:

- 1,889 direct and indirect jobs averaged over the life of the project;
- $1,025 million in direct and indirect regional output or business turnover;
- $557 million in direct and indirect regional value-added; and
- $165 million in household income.

The EA includes an assessment of the impact of the project on public services and facilities, which indicates that:

- during construction, there is expected to be sufficient temporary housing available to accommodate the construction workforce;
- during operation, there is expected to be sufficient permanent housing available to accommodate the workforce;
- there is sufficient capacity in educational facilities to service the project workforce; and
- health services in the region are at or exceeding capacity to accommodate additional demand.

The three affected Councils did not raise any significant concerns about the socio-economic effects of the project, however Orange City Council noted the increased demand on community services and facilities and the potential effects of reduced employment following closure of the mine. Cadia noted

in its response to submissions that it has negotiated an agreement with the Councils to provide a financial contribution towards the upgrade and maintenance of roads as well as for community services and facilities.

Cadia also committed to prepare a mine closure plan in consultation with Councils and the Department, taking into consideration the potential effects of cessation of mining and reduction in available employment and associated economic benefits

The Department is satisfied that the socio-economic benefits of the project are likely to far exceed its costs, and is satisfied that the region is able to accommodate the project, subject to a suitable contribution toward community services and facilities. In this regard, the Department has recommended a condition that would require Cadia to enter into planning agreements with the Councils, to provide suitable community enhancement contributions.

5.12 Rehabilitation and Landuse

The EA includes conceptual plans for the final rehabilitated landform for the project and for Cadia-owned land surrounding the mining complex (see Figure 11). Rehabilitation of the mining complex would be undertaken progressively, with the EA indicating that the primary focus would be reinstatement of landforms, where possible, and to achieve a balance between agricultural and ecological land use.

Key features of the post-mining landform include:

- mine voids and subsidence zones would gradually fill with water (it would take about 150-160 years for the caving zone to fill with groundwater, and a further 170 years for the waterbody in the subsidence zone to reach an equilibrium level – of about 5 metres depth above the broken rock in the subsidence zone) through seepage of groundwater and collected rain, resulting in poor quality water bodies which are unlikely to sustain life;
- a portion of the South Waste Rock Dump (SWRD) would need to be relocated as it is situated within the predicted subsidence zone and zone of influence;
- batter slopes of tailings facilities and the SWRD would be vegetated to woodland and flatter areas rehabilitated to provide pasture grass with scattered trees;
- water storages, pipelines and roads would be retained;
- site infrastructure would be either dismantled and reused or disposed of, or retained for future land use; and
- the dewatering facility would be decommissioned and if the site is not to be used it would be demolished and rehabilitated.

The Department is satisfied that Cadia's rehabilitation and final land use objectives are achievable, that they are compatible with surrounding land uses, and are consistent with the rehabilitation strategies for the existing mining complex.

The Department has recommended conditions requiring Cadia to:

- develop a Rehabilitation Strategy, which would set the objectives for future use of the mining complex, including detailed performance and completion criteria for the progressive revegetation and rehabilitation of the site; and
- prepare and implement a comprehensive Landscape Management Plan for the project, including future land-use options and ongoing environmental management for the site, including the management of acid rock drainage and tailings seepage.

6. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the project (see Appendix B), and summarised these conditions in Appendix A. These conditions are required to:

- prevent, minimise and/or offset adverse impacts of the proposal;
- set standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting in accordance with current best practice;
- provide for the ongoing environmental management of the project; and
- ensure that long term rehabilitation and final land use objectives for the mine are satisfactorily achieved.

Cadia has reviewed and accepted the recommended conditions. The Department believes the conditions reflect current best practice for the regulation of mines in NSW.

7. CONCLUSION

The Department has assessed the project application, the EA, submissions received following exhibition of the EA and Cadia's response to submissions, in accordance with the relevant statutory requirements.

The key issue identified in this assessment is the project's impacts on water resources, with other issues including flora and fauna impacts, noise and blasting, air quality impacts and traffic impacts.

The Department recognises the significance of the potentially permanent drawdown on the surrounding aquifer and the consequent impacts on bores and creeks reliant upon this aquifer. In this regard, the Department has comprehensively assessed the potential impacts on water resources, and engaged independent experts in the fields of groundwater and surface water to undertake a review of the proposal (see Appendices D and E).

This assessment has concluded that the project would have significant localised impacts on water resources, although the regional impacts would be relatively minor. The Department has recommended a broad suite of conditions requiring Cadia to effectively offset the localised impacts, principally through compensation of the affected landowners and provision of environmental flows and baseflow offsets to local creeks. The Department has also recommended conditions requiring Cadia to develop a comprehensive water management plan for the mining complex, including measures to ensure advance warning of any water impacts. The Department is satisfied that with these measures in place, the impacts of the project on water resources can be effectively minimised, managed or offset.

Cadia has developed a biodiversity offset strategy comprising a total of 938 ha of land to offset the 238 ha of native vegetation to be cleared for the project, and in particular the impacts on the Box-Gum Woodland EEC and CEEC and threatened species. The Department and DECCW are satisfied that these compensatory measures would effectively offset the project's biodiversity impacts to an extent such that the project could be considered to 'improve or maintain' biodiversity values in the area over the medium to long term.

Noise impacts would be effectively managed through the implementation of a comprehensive noise monitoring program at nearby residences. In addition, the Department has included conditions requiring Cadia to acquire one property at the request of the landowner where impacts would be excessive, and to offer architectural treatments to other residents predicted to be moderately affected by noise from the mining complex.

With regard to other impacts, the Department has recommended conditions which provide a comprehensive and contemporary basis for mitigating, managing, offsetting and/or compensating for both existing and proposed impacts.

The Department recognises that the project utilises existing facilities and equipment associated with the Cadia and Ridgeway mining complex, and would provide major economic and social benefits, including:

- a maximum of 1,300 direct jobs during Cadia East construction;
- an average of 880 direct jobs over the life of the project;
- 1,889 direct and indirect jobs averaged over the life of the project;
- $2.2 billion in capital investment;
- $1,025 M in direct and indirect regional output or business turnover;
- $557 M in direct and indirect regional value-added; and
- $165 M in household income.

On balance, the Department believes that the project's benefits substantially outweigh its residual costs, and that it is therefore in the public interest and should be approved, subject to conditions.

8. RECOMMENDATION

It is RECOMMENDED that the Minister:

- **consider** the findings and recommendations of this report;
- **approve** the project application, subject to conditions, under section 75J of the Environmental Planning and Assessment Act 1979; and
- **sign** the attached instrument of approval (Tagged B).

Director,
Major Development Assessment

Executive Director,
Major Projects Assessments

Deputy Director-General

Director-General

APPENDIX A SUMMARY OF CONDITIONS OF APPROVAL

Aspect	Condition	Requirement
Schedule 2: Administrative Conditions		
Minimising Harm	1	Obligation to minimise harm to the environment
Limits on Approval	5	Approval for mining restricted until 30 June 2031
	6	Restriction on production to 27 million tonnes of ore per year
	7	Preventing the use of cyanide or mercury to process or extract gold or copper
Planning Agreement	13	Requirement to enter into a planning agreement with Councils to provide contributions for upgrade and maintenance of road infrastructure and towards general community enhancement
Schedule 3: Specific Environmental Conditions		
Acquisition	1	Requirement to acquire the private property predicted to be significantly affected by noise, upon request by the landowner
Noise	7	Requirement to undertake additional noise mitigation measures on properties predicted to be moderately or significantly affected by noise
Blasting	13-15	Structural inspections of private properties potentially impacted by vibration and repair of damage caused by the mine
Air Quality	17-20	Air quality impact assessment criteria and monitoring
Surface and Ground Water	24	Provision of compensatory water supplies to properties impacted by project-related drawdown
	25-26	Requirement to secure offsets for the loss of baseflow in creeks
	27-29	Maintenance of environmental flows in Cadiangullong Creek and Flyers Creek
	30	Site Water Management Plan
Rehabilitation and Landscape Management	36-37	Prepare and implement a Rehabilitation Strategy including completion criteria and progressively rehabilitate the site
	38	Requirements to implement the offset strategy
	39	Requirement to provide for long term security for the offset areas
	40	Requirement to provide a monetary bond for the offset strategy
	41	Landscape Management Plan, including rehabilitation and mine closure planning
Heritage	42	Aboriginal Cultural Heritage Management Plan
	43	Historical Heritage Management Plan, including the Cadia Interpretation Strategy
Traffic and Transport	44	Construction of new section of Cadia Road 6 months prior to subsidence effects
	45	Transport of concentrate by rail from the dewatering facility
Visual	47	Requirements to prepare architectural and landscape plans to minimise the visual impacts of the new dewatering facility
	48	Requirements for the provision of visual screening at the request of affected landowners
	49	Requirements to minimise the project's lighting impacts
Schedule 4: Additional Procedures		
Notification of Landowners	2	Requirement to notify landowners of exceedances of relevant criteria during monitoring
Independent Review	3-7	Procedures for independent review if landowners believe the project to be exceeding relevant impact assessment criteria
Schedule 5: Environmental Management, Monitoring, Auditing and Reporting		
Environmental Management Strategy/ Program	1	Environmental Management Strategy/ Environmental Management Program
Annual Review	2	Annual review of environmental performance
CCC	4	Requirement for Community Consultative Committee
Incident Reporting	5	Requirement to report incidents
Independent Environmental Audits	7	Requirement for independent environmental audit team to include experts in surface water and groundwater
Access to Information	9	Requirement to publicly report environmental management plans/programs/strategies, and monitoring results

APPENDIX B RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX C CONSIDERATION OF ENVIRONMENTAL PLANNING INSTRUMENTS

State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP)

See discussion in Section 3.1.

SEPP (Infrastructure) 2007
In accordance with clause 104 of the Infrastructure SEPP, the application was referred to the RTA. The Department is satisfied that the project can be undertaken in a manner that is generally consistent with the aims, objectives, and provisions of the SEPP.

SEPP No. 33 – Hazardous and Offensive Development

SEPP 33 requires consideration of whether an industrial proposal is a potentially hazardous or offensive industry. This is defined as a development that 'would pose a significant risk in relation the locality: to human health, life or property; or to the biophysical environment, and includes a hazardous industry and a hazardous storage establishment'.

The EA details management considerations for various aspects such as waste management, fuel storage and emergency response. All hazardous materials would be managed in general accordance with the company's existing management procedures. An Environment Protection Licence (EPL) would be obtained for the proposed development. As such, the Department is satisfied that the proposal is generally consistent with the aims, objectives, and requirements of SEPP 33.

SEPP No. 44 – Koala Habitat

The site does not contain Koala feed trees and therefore it is highly unlikely that it contains Koala habitat. The Department is therefore satisfied that the proposal is generally consistent with the aims, objectives, and requirements of SEPP 44.

SEPP No. 55 – Remediation of Land

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. In particular, this policy requires consideration of whether a development requires a consent for remediation works or not and requires that remediation works meet certain standards and notification requirements. It also requires a consent authority to consider whether, if land is contaminated, it is suitable in this state for the proposed development.

The Department is satisfied that the proposal is generally consistent with the aims, objectives and requirements of SEPP 55.

APPENDIX D INDEPENDENT SURFACE WATER REPORT

APPENDIX E INDEPENDENT GROUNDWATER REPORT

APPENDIX F PROPONENT'S RESPONSE TO SUBMISSIONS

See attached CD-ROM

APPENDIX G SUBMISSIONS

See the attached CD-ROM

APPENDIX H ENVIRONMENTAL ASSESSMENT

See the attached CD-ROM