SECTION 1

Introduction

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1 INTRODUCTION

The Dendrobium Mine is an underground coal mine situated in the Southern Coalfield of New South Wales (NSW) approximately 8 kilometres (km) west of Wollongong (Figures 1-1a and 1-1b).

Illawarra Coal Holdings Pty Ltd (Illawarra Coal), a wholly owned subsidiary of South32 Limited (South32), is the owner and operator of the Dendrobium Mine[1].

This document is an Environmental Impact Statement (EIS) for the Dendrobium Mine – Plan for the Future: Coal for Steelmaking (the Project).

The Project proposes the extraction of additional coal reserves within Consolidated Coal Lease (CCL) 768. The extraction of additional Project coal reserves would be supported by the development of supporting infrastructure and the use and augmentation of existing surface facilities at the Dendrobium Mine.

1.1 PROJECT OVERVIEW

1.1.1 Purpose of this Report

This EIS has been prepared to accompany a Development Application made for the Project, in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act).

This EIS considers the potential environmental impacts of the Project in accordance with clauses 6 and 7 of Schedule 2 of the NSW *Environmental Planning and Assessment Regulation, 2000* (EP&A Regulation) and the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment (DPE) (Attachment 1).

The SEARs were issued in accordance with the requirements of clause 3 of Schedule 2 of the EP&A Regulation. A summary of the SEARs is provided in Section 1.3.

1.1.2 Background

The Dendrobium Mine currently extracts coal from the Wongawilli Seam within CCL 768 using underground longwall mining methods. The Dendrobium Mine primarily produces hard coking coal for steelmaking and has an approved operational capacity of up to 5.2 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal until 31 December 2030 under Development Consent DA 60-03-2001.

Key surface facilities at the Dendrobium Mine include the:

- Dendrobium Nos 1, 2 and 3 Shafts (i.e. ventilation shafts);
- Dendrobium Pit Top;
- Kemira Valley Coal Loading Facility;
- Kemira Valley Rail Line;
- Dendrobium Coal Preparation Plant (CPP) located at Port Kembla; and
- West Cliff Stage 3 Coal Wash Emplacement.

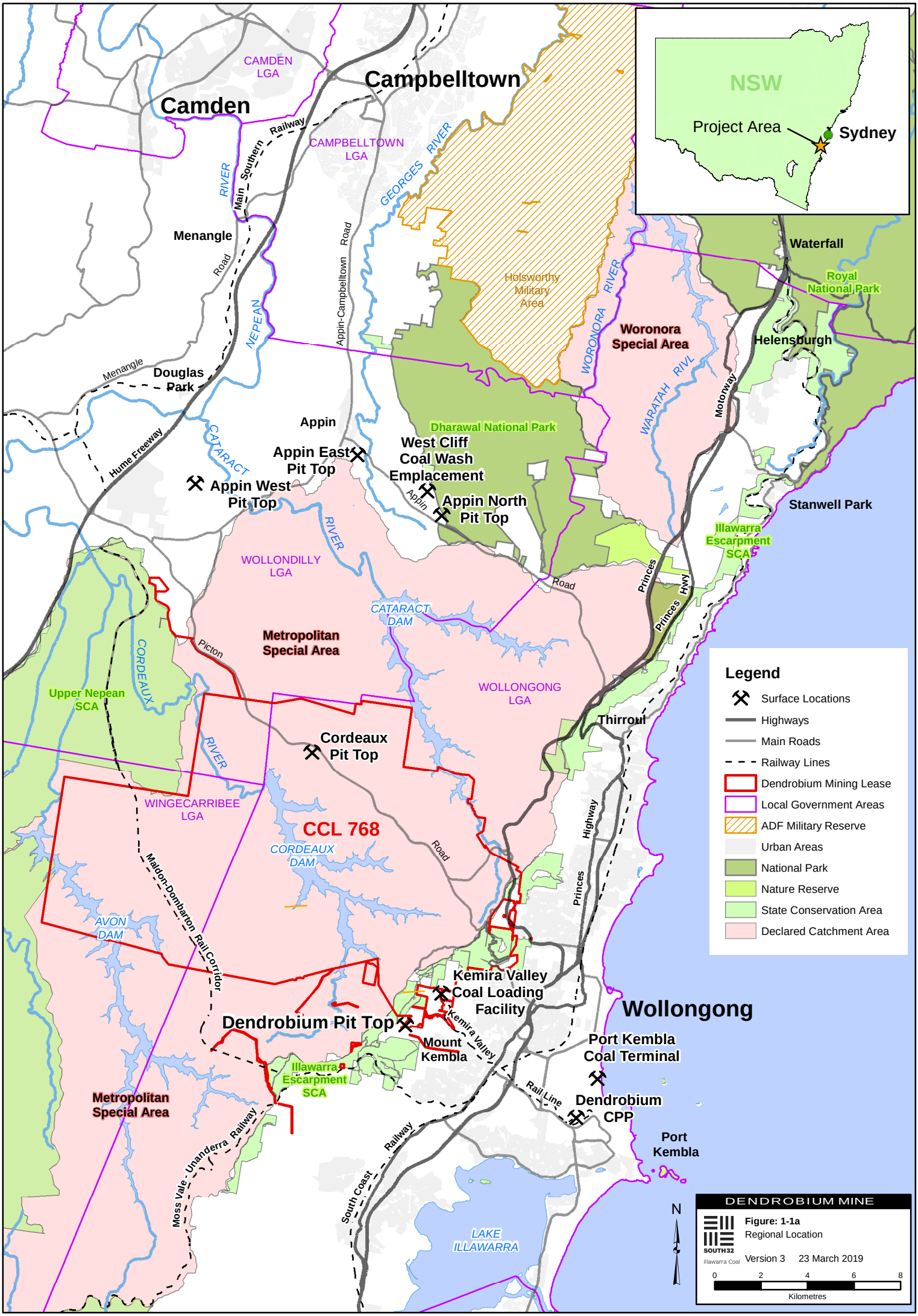
The general arrangement of the approved Dendrobium Mine is shown on Figure 1-2.

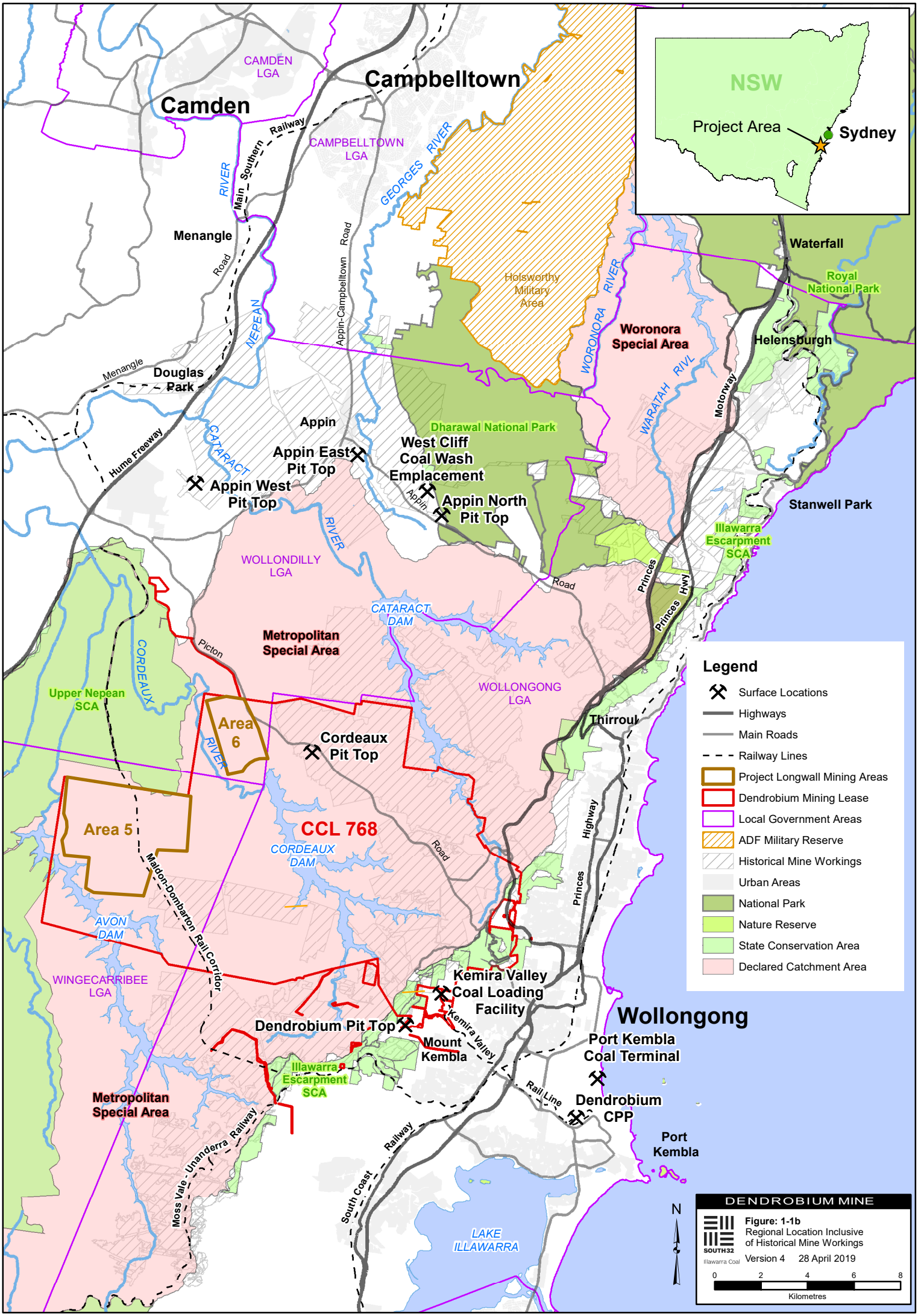
The Project includes the extraction of additional coal in the Wongawilli and Bulli Seams in two proposed underground mining areas, namely Areas 5 and 6 (Figure 1-3). The Project would provide continued employment for the existing Dendrobium Mine workforce, with some increase in employment during Project construction and during additional underground development.

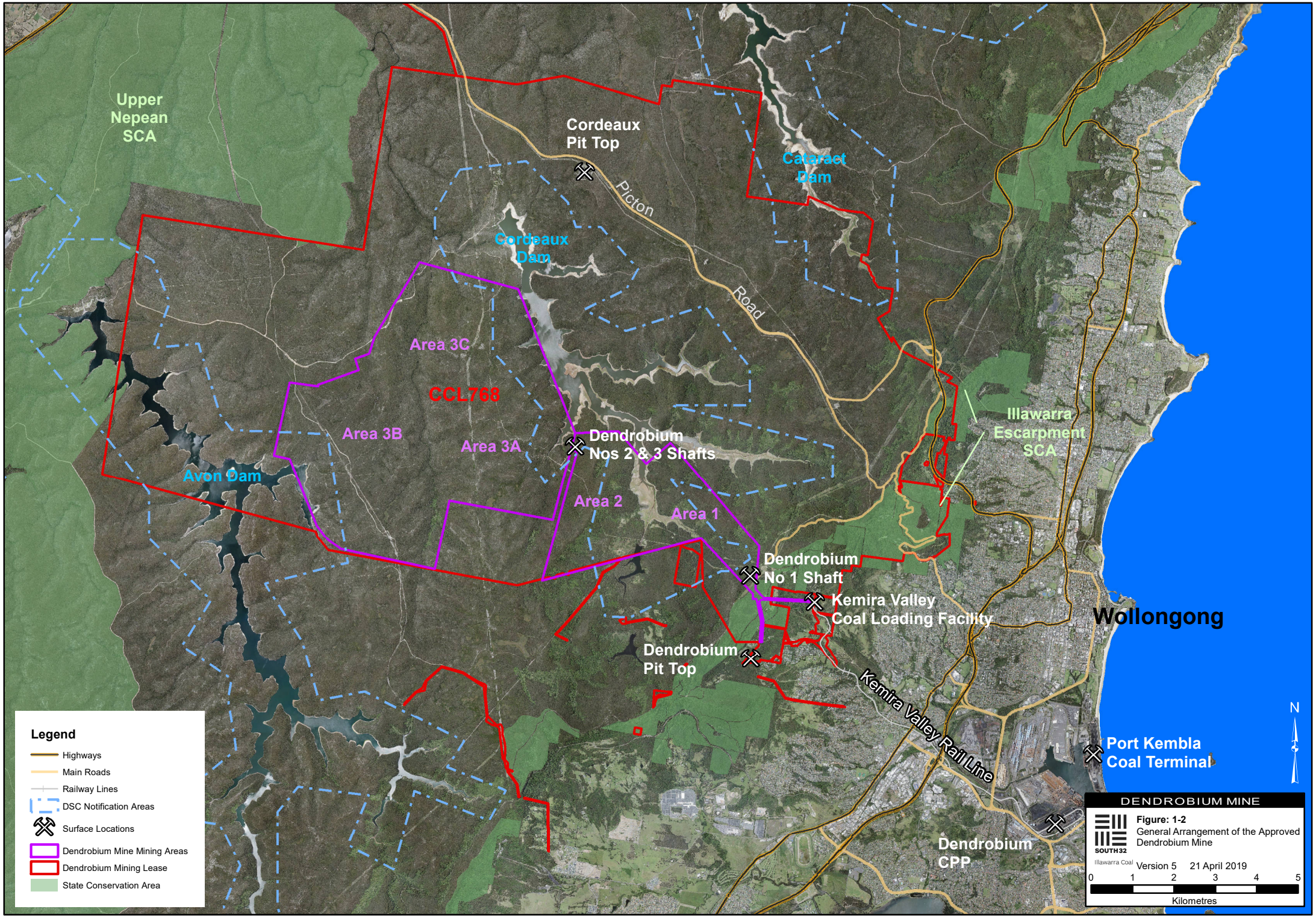
The Cordeaux Pit Top was used for personnel and materials access for the Cordeaux Colliery, which is now in care and maintenance (Figures 1-1a and 1-1b). The Project is seeking development consent for use of the Cordeaux Pit Top for mining support activities for the Project and Project mine access.

South32 is seeking development consent for development application SSD 16_8194 under Division 4.7 of Part 4 of the EP&A Act for the Project.

[1] Throughout this Environmental Impact Statement Illawarra Coal is referred to as South32.


NSW
Project Area
Sydney
Campbelltown
Camden
CAMDEN LGA
CAMPBELLTOWN LGA
Main Southern Railway
Menangle
Menangle Road
NEPEAN RIVER
Appin-Campbelltown Road
GEORGES RIVER
Holsworthy Military Area
WORONORA RIVER
Waterfall
Royal National Park
Woronora Special Area
Helensburgh
WARATAH RIVL
Motorway
Douglas Park
Hume Freeway
Appin
CATARACT
Dharawal National Park
West Cliff Coal Wash Emplacement
Appin East Pit Top
Appin West Pit Top
Appin
Appin North Pit Top
Stanwell Park
Illawarra Escarpment SCA
WOLLONDILLY LGA
RIVER
Princes Hwy
Road
CATARACT DAM
Metropolitan Special Area
Picton
CORDEAUX
Upper Nepean SCA
WOLLONGONG LGA
Thirroul
Cordeaux Pit Top
RIVER
WINGECARRIBEE LGA
CCL 768
CORDEAUX DAM
Road
Highway
Princes
Maldon-Dombarton Rail Corridor
AVON DAM
Kemira Valley Coal Loading Facility
Wollongong
Dendrobium Pit Top
Mount Kembla
Kemira Valley
Port Kembla Coal Terminal
Illawarra Escarpment SCA
Rail Line
Dendrobium CPP
Metropolitan Special Area
Moss Vale - Unanderra Railway
Railway
Port Kembla
South Coast
LAKE ILLAWARRA
Legend
Surface Locations
Highways
Main Roads
Railway Lines
Dendrobium Mining Lease
Local Government Areas
ADF Military Reserve
Urban Areas
National Park
Nature Reserve
State Conservation Area
Declared Catchment Area
N
DENDROBIUM MINE
SOUTH32
Illawarra Coal
Figure: 1-1a
Regional Location
Version 3
23 March 2019
0
2
4
6
8
Kilometres


NSW
Project Area
Sydney
Campbelltown
Camden
CAMDEN LGA
CAMPBELLTOWN LGA
Main Southern Railway
GEORGES RIVER
Menangle
Menangle Road
Appin-Campbelltown Road
Holsworthy Military Area
Waterfall
Royal National Park
NEPEAN RIVER
WORONORA RIVER
Woronora Special Area
Helensburgh
Douglas Park
Menangle
Hume Freeway
CATARACT RIVER
Appin
Dharawal National Park
Appin East Pit Top
West Cliff Coal Wash Emplacement
Appin West Pit Top
Appin North Pit Top
WARATAH RIVL
Motorway
Stanwell Park
Illawarra Escarpment SCA
WOLLONDILLY LGA
Princes Hwy
CATARACT DAM
Metropolitan Special Area
Picton
CORDEAUX
Upper Nepean SCA
WOLLONGONG LGA
Thirroul
Area 6
Cordeaux Pit Top
RIVER
Area 5
CCL 768
CORDEAUX DAM
Maldon-Dombarton Rail Corridor
Highway
Princes
AVON DAM
WINGECARRIBEE LGA
Kemira Valley Coal Loading Facility
Wollongong
Dendrobium Pit Top
Mount Kembla
Kemira Valley
Port Kembla Coal Terminal
Illawarra Escarpment SCA
Rail Line
Dendrobium CPP
Metropolitan Special Area
Moss Vale - Unanderra Railway
South Coast Railway
Port Kembla
LAKE ILLAWARRA
Legend
Surface Locations
Highways
Main Roads
Railway Lines
Project Longwall Mining Areas
Dendrobium Mining Lease
Local Government Areas
ADF Military Reserve
Historical Mine Workings
Urban Areas
National Park
Nature Reserve
State Conservation Area
Declared Catchment Area
N
DENDROBIUM MINE
SOUTH32
Illawarra Coal
Figure: 1-1b
Regional Location Inclusive of Historical Mine Workings
Version 4 28 April 2019
0 2 4 6 8
Kilometres


Upper Nepean SCA
Cordeaux Pit Top
Picton Road
Cataract Dam
Cordeaux Dam
Area 3C
CCL768
Area 3B
Area 3A
Dendrobium Nos 2 & 3 Shafts
Avon Dam
Area 2
Area 1
Illawarra Escarpment SCA
Dendrobium No 1 Shaft
Kemira Valley Coal Loading Facility
Wollongong
Dendrobium Pit Top
Kemira Valley Rail Line
Port Kembla Coal Terminal
Dendrobium CPP
Legend
Highways
Main Roads
Railway Lines
DSC Notification Areas
Surface Locations
Dendrobium Mine Mining Areas
Dendrobium Mining Lease
State Conservation Area
N
DENDROBIUM MINE
Figure: 1-2
General Arrangement of the Approved Dendrobium Mine
SOUTH32
Illawarra Coal
Version 5
21 April 2019
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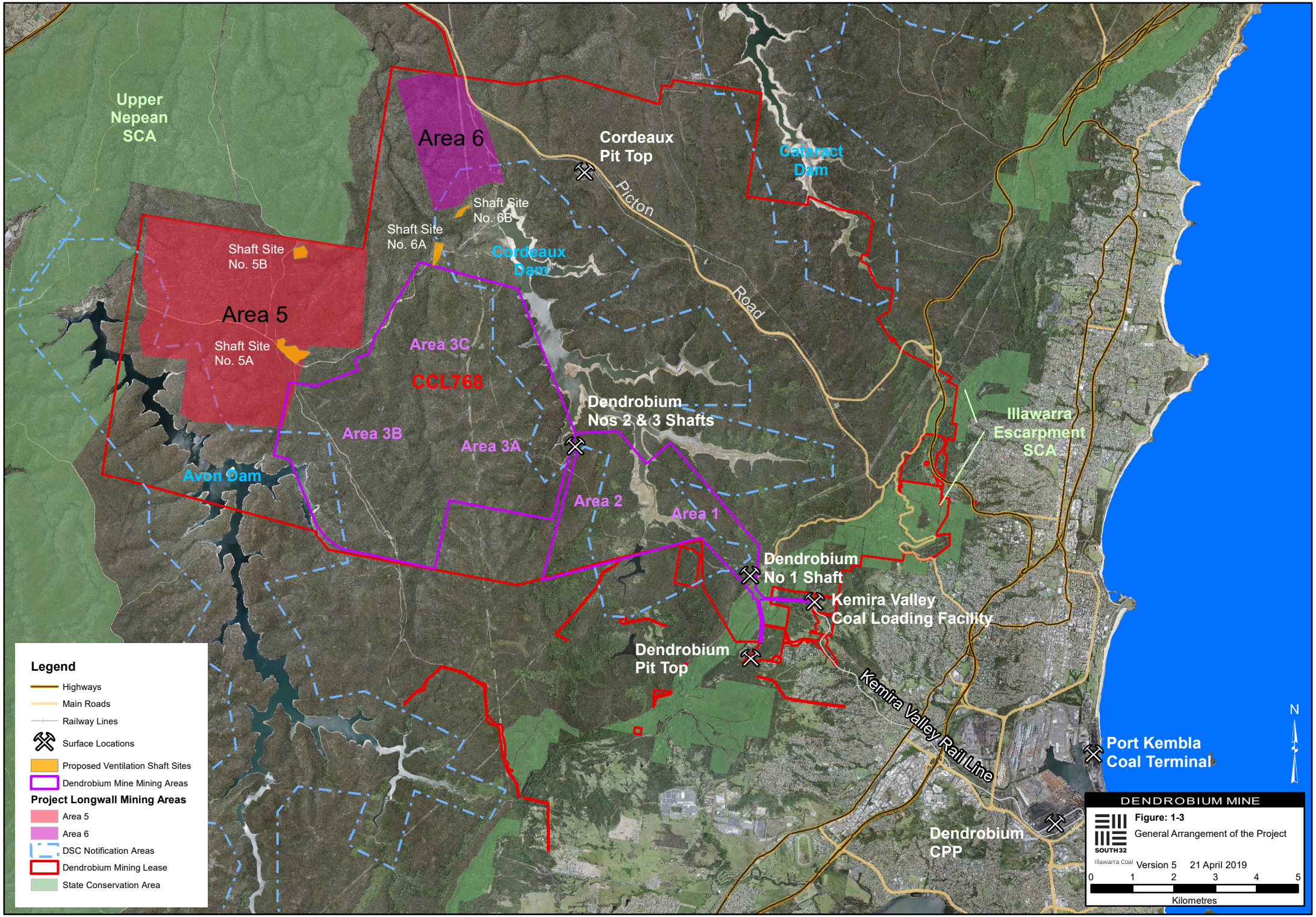
Kilometres


Upper Nepean SCA
Area 6
Cordeaux Pit Top
Cataract Dam
Shaft Site No. 6B
Shaft Site No. 6A
Picton Road
Cordeaux Dam
Shaft Site No. 5B
Area 5
Shaft Site No. 5A
Area 3C
CCL768
Dendrobium Nos 2 & 3 Shafts
Illawarra Escarpment SCA
Area 3B
Area 3A
Avon Dam
Area 2
Area 1
Dendrobium No 1 Shaft
Kemira Valley Coal Loading Facility
Dendrobium Pit Top
Kemira Valley Rail Line
Port Kembla Coal Terminal
Dendrobium CPP
N
Legend
Highways
Main Roads
Railway Lines
Surface Locations
Proposed Ventilation Shaft Sites
Dendrobium Mine Mining Areas
Project Longwall Mining Areas
Area 5
Area 6
DSC Notification Areas
Dendrobium Mining Lease
State Conservation Area
DENDROBIUM MINE
Figure: 1-3
General Arrangement of the Project
SOUTH32
Illawarra Coal
Version 5
21 April 2019
0 1 2 3 4 5
Kilometres

The proposed action to extend underground mining and processing operations at the Dendrobium Mine was referred to the Federal Minister for the Environment and Energy in December 2016 (EPBC 2017/7855) (the proposed action). A delegate of the Federal Minister determined on 6 March 2017 that the proposed action is a "controlled action" and therefore the action also requires approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

The proposed action is to be assessed pursuant to the agreement between the Commonwealth of Australia and the State of New South Wales relating to Environmental Assessment Department of the Environment dated 26 February 2015. Therefore, this EIS provides an assessment of potential impacts on the following controlling provisions considered by the Federal Minister to be relevant to the action:

- threatened species and communities listed under the EPBC Act; and
- water resources.

A summary, indicating where supplementary SEARs that relate to the controlling provisions have been addressed in the EIS, is provided in Attachment 2.

1.1.3 Project Objectives

The Project would support the extraction of approximately 78 million tonnes (Mt) of ROM coal. This ROM coal would be processed at the existing Dendrobium CPP to primarily produce coking coal products for use in steelmaking.

Due to gas constraints identified in some approved mining areas at the Dendrobium Mine (Section 2) the Project would also provide an opportunity to safely drain this gas before the approved Area 3C is mined.

Therefore, the Project would maintain continuity of longwall operations and facilitate the continuation of benefits derived from the existing approved Dendrobium Mine subject to an extension to the life of Development Consent DA 60-03-2001 (subject to separate approval).

The extraction of underground coal from the Dendrobium Mine provides benefits at national, state and local levels. South32 provides approximately 60 per cent (%) of BlueScope Steel (AIS) Pty Ltd's (BlueScope) coking coal requirements.

A number of alternatives to the Project have been considered by South32 (Section 9.2). This EIS presents and assesses South32's preferred indicative design and staging for the Project and how this would be integrated with the extraction of the approved Dendrobium Mine Areas 3B and 3C under Development Consent DA 60-03-2001.

Details of how the Project addresses the principles of Ecologically Sustainable Development (ESD) are provided in Section 9.

1.1.4 Project Summary

The Project would include the following development:

- longwall mining of the Bulli Seam in a new underground mining area (Area 5);
- longwall mining of the Wongawilli Seam in a new underground mining area (Area 6);
- development of underground roadways within the Bulli Seam, Wongawilli Seam and other strata required to access Project mining areas;
- use of existing underground roadways and drifts for personnel and materials access, ventilation, dewatering and other ancillary activities related to Areas 5 and 6;
- development of surface infrastructure associated with mine ventilation and gas management and abatement, and other ancillary infrastructure;
- handling and processing of up to 5.2 Mtpa of ROM coal;
- use of the existing Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Dendrobium CPP and Dendrobium Shafts with minor upgrades and extensions;
- use of the Cordeaux Pit Top for mining support activities;
- augmentation of mine access arrangements, including upgrades to, and the use of, the Cordeaux Pit Top;
- transport of sized ROM coal from the Kemira Valley Coal Loading Facility to the Dendrobium CPP via the Kemira Valley Rail Line;
- delivery of product coal from the Dendrobium CPP to the Port Kembla Steelworks for domestic use or to the Port Kembla Coal Terminal for transport to Liberty Primary Steel Whyalla Steelworks or export;

- transport of coal wash by road to customers for engineering purposes (e.g. civil construction fill), for other beneficial uses and/or for emplacement at the West Cliff Stage 3 and Stage 4 Coal Wash Emplacement;
- development and rehabilitation of the West Cliff Stage 3 Coal Wash Emplacement;
- progressive development of sumps, pumps, pipelines, water storages and other water management infrastructure;
- controlled release of excess water in accordance with the conditions of Environmental Protection Licence (EPL) 3241 and/or beneficial industrial re-use;
- monitoring, rehabilitation and remediation of subsidence and other mining effects; and
- other associated infrastructure, plant, equipment and activities.

An indicative Project general arrangement showing the underground mining areas is provided on Figure 1-3.

Table 1-1 provides a comparative summary of activities associated with the Project compared to the approved Dendrobium Mine.

1.1.5 Site Location and Tenure

The Project Development Application Area includes those lands listed in the real property description provided in support of the Development Application (Attachment 3).

The Project is located in the Wollongong, Wingecarribee and Wollondilly Local Government Areas (LGAs) (Figure 1-1a). A description of land zoning in the Project Development Application area under the relevant local environmental plans (LEPs) for these LGAs is provided in Attachment 6.

The Project underground mining areas are located within the catchments of the Avon and Cordeaux Rivers, which are part of Greater Sydney's water supply system. These catchments are included within the Metropolitan Special Area (a WaterNSW Special Area) declared under the *Water NSW Act, 2014* (Figure 1-4). There has been a long history of underground longwall coal mining in these water catchments (Section 2.1).

Relevant land ownership information for land parcels within the immediate vicinity of the Project is provided in Attachment 4.

The Project underground mining areas would be located wholly within CCL 768. No additional mining tenements are required for the proposed underground mining associated with the Project.

Similarly, no additional mining tenements are required for the continued use of the Dendrobium Mine surface facilities for the Project.

1.1.6 Applicant

Illawarra Coal Holdings Pty Ltd (ABN 69 093 857 286) is the applicant for the Project[2]. Illawarra Coal Holdings Pty Ltd is a wholly owned subsidiary of South32 Ltd. Throughout this EIS Illawarra Coal Holdings Pty Ltd is referred to as South32. The contact details for Illawarra Coal Holdings Pty Ltd are:

Illawarra Coal Holdings Pty Ltd
Level 35
108 St Georges Terrace
PERTH WESTERN AUSTRALIA 6000
Phone: (02) 4286 3000

The Illawarra Coal website is:

https://www.south32.net/what-we-do/places-we-work/illawarra-metallurgical-coal

The Dendrobium Mine is located at Cordeaux Road, Mount Kembla NSW 2526.

1.1.7 Interaction with the Approved Dendrobium Mine

Approved Dendrobium Mine

The existing operations at the Dendrobium Mine are undertaken in accordance with Development Consent DA 60-03-2001 (as modified), as well as the Approval Decision (EPBC 2001/214) under the EPBC Act.

[2] At all relevant times in relation to the Project, Illawarra Coal Holdings Pty Ltd will be acting as agent for and on behalf of Dendrobium Coal Pty Ltd in respect of all mining and exploration tenements held by Dendrobium Coal Pty Ltd.

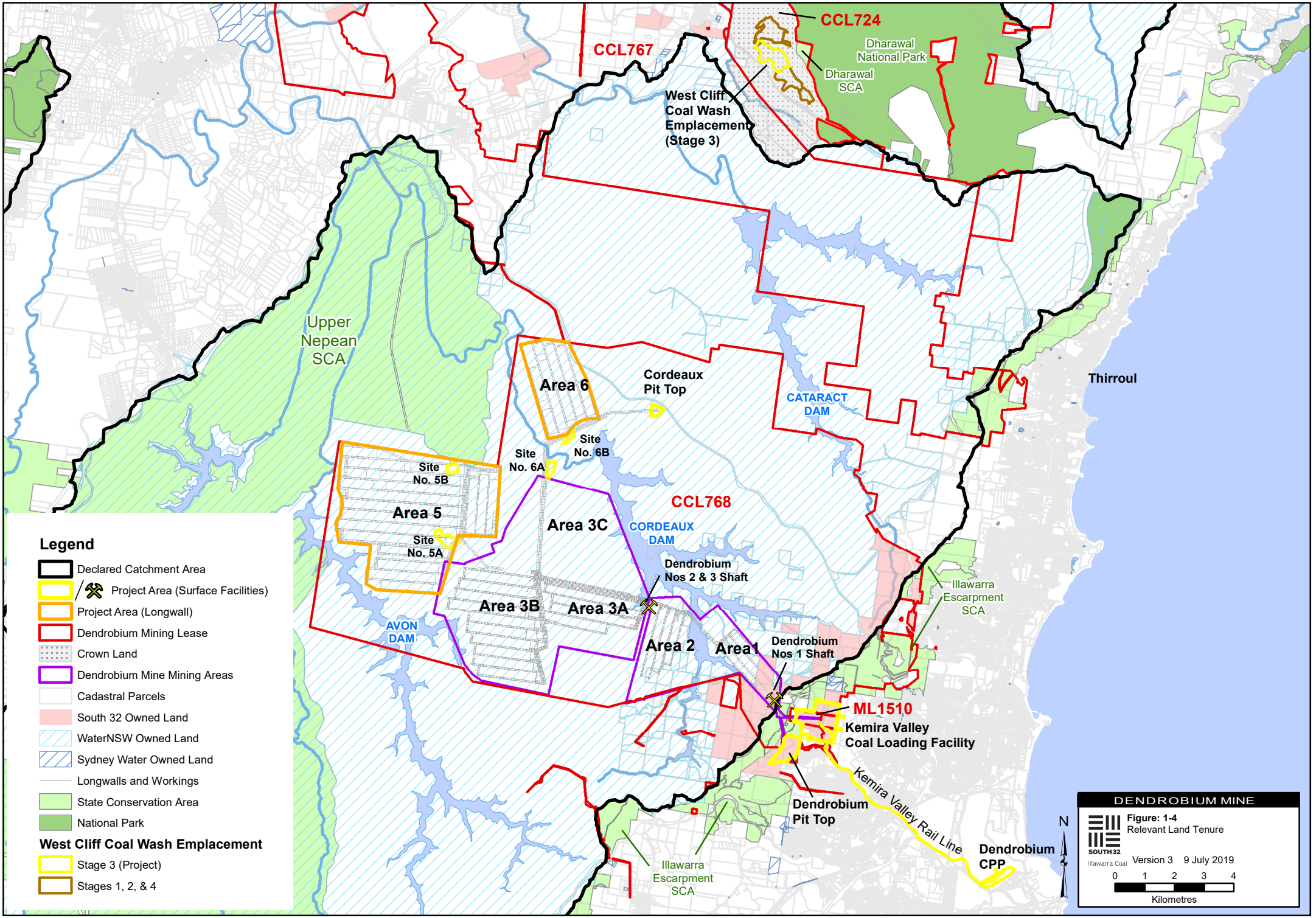

CCL724
Dharawal National Park
Dharawal SCA
CCL767
West Cliff Coal Wash Emplacement (Stage 3)
Upper Nepean SCA
Area 6
Cordeaux Pit Top
CATARACT DAM
Thirroul
Site No. 6B
Site No. 6A
Site No. 5B
Area 5
Site No. 5A
CCL768
Area 3C
CORDEAUX DAM
Dendrobium Nos 2 & 3 Shaft
Area 3B
Area 3A
AVON DAM
Area 2
Area1
Dendrobium Nos 1 Shaft
Illawarra Escarpment SCA
ML1510
Kemira Valley Coal Loading Facility
Kemira Valley Rail Line
Dendrobium Pit Top
Dendrobium CPP
Illawarra Escarpment SCA
Legend
Declared Catchment Area
Project Area (Surface Facilities)
Project Area (Longwall)
Dendrobium Mining Lease
Crown Land
Dendrobium Mine Mining Areas
Cadastral Parcels
South 32 Owned Land
WaterNSW Owned Land
Sydney Water Owned Land
Longwalls and Workings
State Conservation Area
National Park
West Cliff Coal Wash Emplacement
Stage 3 (Project)
Stages 1, 2, & 4
DENDROBIUM MINE
Figure: 1-4
Relevant Land Tenure
SOUTH32
Illawarra Coal
Version 3 9 July 2019
0 1 2 3 4
Kilometres
N

Table 1-1
Summary Comparison of the Approved Dendrobium Mine and the Project

Component	Approved Dendrobium Mine (DA 60-03-2001)	Project
Mine Life	Until 31 December 2030.	Until 31 December 2048.
Mining Method	Underground extraction using longwall mining methods.	No change.
Resource	Mining of the Wongawilli Seam in Areas 1, 2, 3A, 3B and 3C within CCL 768.	Additional mining of the Bulli Seam in Area 5 and the Wongawilli Seam in Area 6 within CCL 768.
Annual Production	Handling and processing of up to 5.2 Mtpa of ROM coal.	No change.
Resource to be Recovered	At 1 July 2019, it is estimated that approximately 35 Mt of ROM coal will remain.	Approximately 78 Mt of additional ROM coal.
Coal Handling and Processing	Transport of coal from underground workings to the Kemira Valley Coal Loading Facility via an underground conveyor network. Sizing and stockpiling of coal at the Kemira Valley Coal Loading Facility prior to transport to the Dendrobium CPP via the Kemira Valley Rail Line, in accordance with the approved hours of operation. Processing of up to 5.2 Mtpa of sized ROM coal at the Dendrobium CPP.	No change.
Management of Mining Waste	Transportation of up to approximately 1.1 Mtpa of coal wash by road from the Dendrobium CPP to the West Cliff Stage 3 and Stage 4[1] Coal Wash Emplacement. Development and rehabilitation of the West Cliff Stage 3 Coal Wash Emplacement. Supply of coal wash to customers for engineering purposes (e.g. civil construction fill) or for other beneficial uses.	Transportation of up to approximately 1.6 Mtpa of coal wash by road from the Dendrobium CPP to the West Cliff Stage 3 and Stage 4 Coal Wash Emplacement. No change. No change.
General Infrastructure	• Dendrobium Pit Top. • Kemira Valley Coal Loading Facility. • Kemira Valley Rail Line. • Dendrobium CPP. • Dendrobium Shafts Nos 1, 2 and 3.	Continued use of existing infrastructure with minor upgrades and extensions. Use of the Cordeaux Pit Top for mining support activities. Augmentation of mine access arrangements, including upgrades to, and the use of, the Cordeaux Pit Top. Development of surface infrastructure associated with mine ventilation and gas management and abatement, and other ancillary infrastructure.
Product Transport	Delivery of product coal from the Dendrobium CPP to the BlueScope Port Kembla Steelworks (BlueScope Steelworks) or to Port Kembla Coal Terminal for transport to Liberty Primary Steel Whyalla Steelworks or for export.	No change.
Water Management	Water management infrastructure to separate clean, oily and dirty water. Use of a combination of recycled treated mine water and potable water purchased from Sydney Water in underground and surface operations. Release of water in accordance with the conditions of EPL 3241.	Augmentations and extensions to existing water management infrastructure (including use of existing infrastructure). Continued use of a combination of recycled treated mine water and potable water purchased from Sydney Water in underground and surface operations. Continued release of water in accordance with the conditions of EPL 3241. Release volumes and release infrastructure to be modified as required based on Project mine inflow rates. Beneficial re-use of excess Project water by industrial users, where practicable.

Table 1-1 (Continued)
Summary Comparison of the Approved Dendrobium Mine and the Project

Component	Approved Dendrobium Mine (DA 60-03-2001)	Project
Workforce	Current workforce of approximately 400 personnel (including South32 staff and on-site contractor personnel).	At full development, employment in the order of 500 operational personnel (including South32 staff and on-site contractor personnel). Up to approximately 200 contractor personnel would also be required for construction and development activities.
Hours of Operation	Operated on a continuous basis, 24 hours per day, seven days per week. Trains do not travel on the Kemira Valley Rail Line between 11.00 pm and 6.00 am, unless written approval is obtained from the NSW Environment Protection Authority (EPA) for emergency use of the rail line.	No change.

[1] Development and rehabilitation of the West Cliff Stage 4 Coal Wash Emplacement would continue to be conducted in accordance with Project Approval 08_0150 for the Bulli Seam Operations.

The Project does not include the approved underground mining operations in the Wongawilli Seam in Areas 1, 2, 3A, 3B and 3C at the Dendrobium Mine and associated surface activities (such as monitoring and remediation). These underground mining operations would continue to operate in accordance with Development Consent DA 60-03-2001 (as modified).

However, a number of other existing activities and works currently approved at the Dendrobium Mine would be covered by the development consent for the Project (if granted). These activities and works are described in Section 3.

It is proposed that if development consent is granted for the Project, surface facilities and underground roadways used by the Project would be operated in accordance with only the conditions of the Development Consent for the Project rather than DA 60-03-2001.

During the life of the Project it is proposed that the extraction of Project Areas 5 and 6 would be integrated with the extraction of approved Dendrobium Mine Areas 3B and 3C (Section 3.5). Mining could occur within the approved Area 3C concurrently with Area 3B. Extraction within Area 3C would also likely occur between mining within Area 5 and Area 6 and would occur after the current approved duration of Dendrobium Mine operational activities (2030), although first workings for these areas may occur prior to this.

The necessary extension to the operational life of Dendrobium Mine under Development Consent DA 60-03-2001 would be subject to a separate application and approval.

Coal Wash Management

Coal wash produced at the Dendrobium CPP as part of the Project would be transported by road to the West Cliff Stage 3 and Stage 4 Coal Wash Emplacement.

The West Cliff Stage 3 Coal Wash Emplacement is currently approved under the Dendrobium Mine Development Consent DA 60-03-2001, although it is proposed that the new development consent for the Project would prevail to the extent of any inconsistency with Development Consent DA 60-03-2001 (e.g. with respect to the Project life).

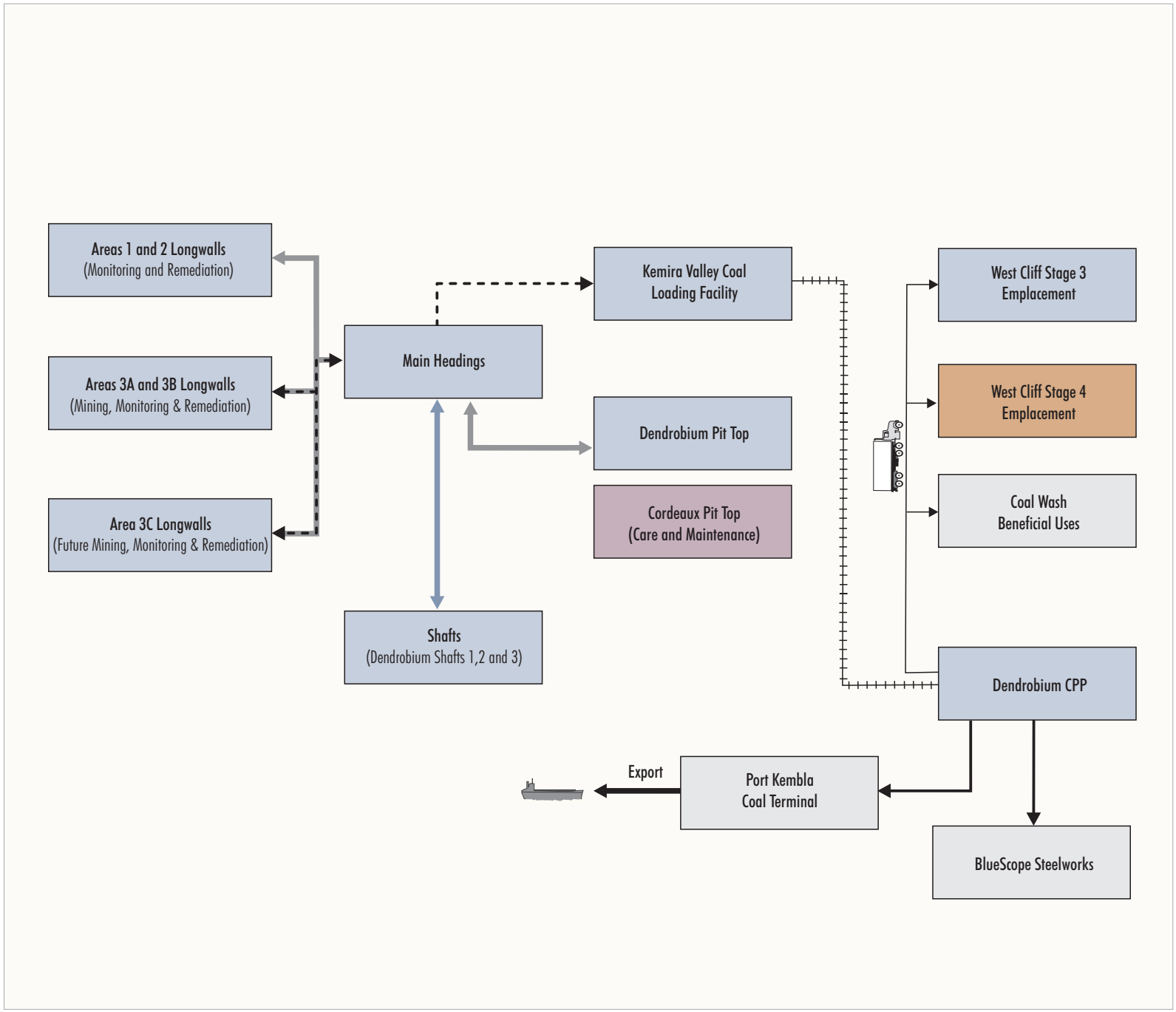
Table 1-2 and Figures 1-5 and 1-6 provide a summary of the interaction of the Project with the approved Dendrobium Mine.

1.1.8 Interaction with the Approved Bulli Seam Operations

Coal Wash Management

Development and rehabilitation of the West Cliff Stage 4 Coal Wash Emplacement would continue to be conducted in accordance with Project Approval 08_0150 for the Bulli Seam Operations.

For the Project to proceed to its full extent, an extension of Project Approval 08_0150 from 31 December 2041 to 31 December 2048 would be required to allow for the continued use of the West Cliff Stage 4 Coal Wash Emplacement. This would be subject to a separate application and approval.



LEGEND

- DA 60-03-2001 (Until 31 December 2030)
- DA 74/134
- Project Approval 08_0150 (Until 31 December 2041)
- Road Transport - Surface
- Rail Transport - Surface
- Coal Clearance
- Men & Materials - Underground
- Air Flow
- Product Coal

SOUTH32
Illawarra Coal

DENDROBIUM MINE

Approved Dendrobium Mine

Figure 1-5

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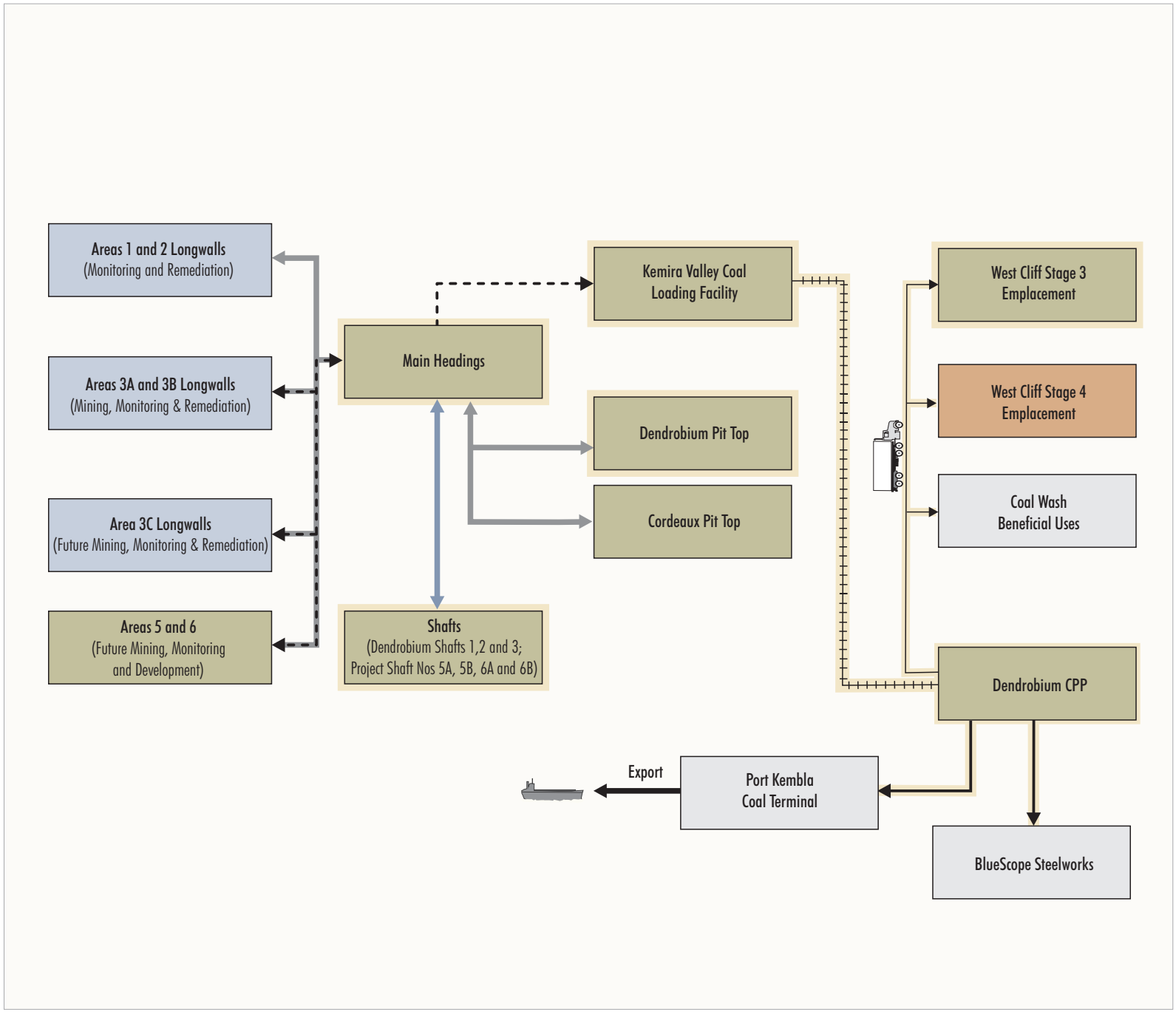


SOUTH32
Illawarra Coal

DENDROBIUM MINE

Interaction of Existing and
Proposed Approvals

Figure 1-6

STH-16-02_EIS_002A

Table 1-2
Interaction of Existing and Proposed Approvals

Operations	Existing Approval / Consent	Proposed Approval	Current Status / Comments
Underground Mining			
Areas 1, 2 and 3A	DA 60-03-2001	Continuation of DA 60-03-2001	Currently approved development – mining has occurred in these domains.
Area 3B	DA 60-03-2001	Continuation of DA 60-03-2001	Currently approved development – currently mining in this area.
Area 3C	DA 60-03-2001	Continuation of DA 60-03-2001 with modification	Currently approved development – mining delayed due to high gas content identified, therefore, modification to DA 60-03-2001 would be required to allow mining post-2030 subject to a separate application and approval.
Area 5	-	SSD 8194	New development for the Project – new mining domain.
Area 6	-	SSD 8194	New development for the Project – new mining domain.
Surface Facilities			
Dendrobium Shafts 1, 2 and 3	DA 60-03-2001	SSD 8194	Currently approved development – to be used by the Project.
Dendrobium Pit Top	DA 60-03-2001	SSD 8194	Currently approved development – to be used by the Project.
Kemira Valley Coal Loading Facility	DA 60-03-2001	SSD 8194	Currently approved development – to be used by the Project.
Kemira Valley Rail Line	DA 60-03-2001	SSD 8194	Currently approved development – to be used by the Project.
Dendrobium Coal Preparation Plant (CPP)	DA 60-03-2001	SSD 8194	Currently approved development – to be used by the Project.
West Cliff Stage 1 and Stage 2 Coal Wash Emplacement	PA 08_0150 for Bulli Seam Operations	PA 08_0150 for Bulli Seam Operations	Currently approved development under PA 08_0150.
West Cliff Stage 3 Coal Wash Emplacement	DA 60-03-2001	SSD 8194	Currently approved development – to be used by the Project.
West Cliff Stage 4 Coal Wash Emplacement	PA 08_0150 for Bulli Seam Operations	Continuation and modification of PA 08_0150 for Bulli Seam Operations	Currently approved development – extension to life of Project Approval 08_0150 from 31 December 2041 to 31 December 2048 required to facilitate ongoing emplacement for the Project.
Shafts Nos 5A, 5B, 6A and 6B	-	SSD 8194	New development for the Project – new ventilation shafts.
Cordeaux Pit Top	D74/134 issued by Wollongong Council in 1974	SSD 8194	Currently approved development – to be used by the Project.

The environmental impacts of the West Cliff Coal Wash Emplacement have been previously assessed as part of the *Application for Further Approval of West Cliff Emplacement Stage 3* (Cardno Forbes Rigby, 2007) and the *Bulli Seam Operations Environmental Assessment* (Illawarra Coal, 2009). The currently approved West Cliff Coal Wash Emplacement has sufficient capacity for the Project and other South32 operations (Section 3). This is partly due to South32's supply of coal wash for engineering purposes (e.g. civil construction fill) or for other beneficial uses, reducing the quantity of coal wash required to be emplaced at the West Cliff Coal Wash Emplacement.

Therefore, there is no proposed change to the capacity, extent, height, final landform or rehabilitation of the West Cliff Stage 3 and Stage 4 Coal Wash Emplacement required for the Project.

Processing of Bulli Seam Operations Coal

ROM coal from the Bulli Seam Operations would continue to be transported to the Dendrobium CPP for processing (consistent with Project Approval 08_0150).

Table 1-2 provides a summary of the interaction of the Project with the approved Bulli Seam Operations.

1.1.9 Interaction with BlueScope Steelworks

BlueScope owns and operates the BlueScope Steelworks at Port Kembla in the Wollongong LGA. The steelworks are located on approximately 742 hectares (ha) of land adjacent to Port Kembla Harbour (Figure 1-7) and operate under a number of approvals.

The Dendrobium CPP is located within the steelworks and is integrated with its operations.

Coal from the Project that is sold to BlueScope for steelmaking would continue to be transported to operations (e.g. Pulverised Coal Injection [PCI] Facility) within the steelworks via infrastructure operated by BlueScope. The handling and use of Project coal at BlueScope's operations beyond the Dendrobium CPP would occur in accordance with the approvals for the steelworks, and these activities are not part of the Project.

1.1.10 Interaction with Port Kembla Coal Terminal

The Port Kembla Coal Terminal (Figure 1-7) operates in accordance with Project Approval 08_0009. It receives coal from a number of operations in the region via a combination of public and private roads and rail.

Coal from the Project to be sold for export would be transported to the Port Kembla Coal Terminal via private road within the steelworks, where it would be stockpiled for transport to Liberty Primary Steel Whyalla Steelworks or for export. The handling and stockpiling of Project coal at the Port Kembla Coal Terminal would occur in accordance with the approvals for the Port Kembla Coal Terminal, and these activities are not part of the Project.

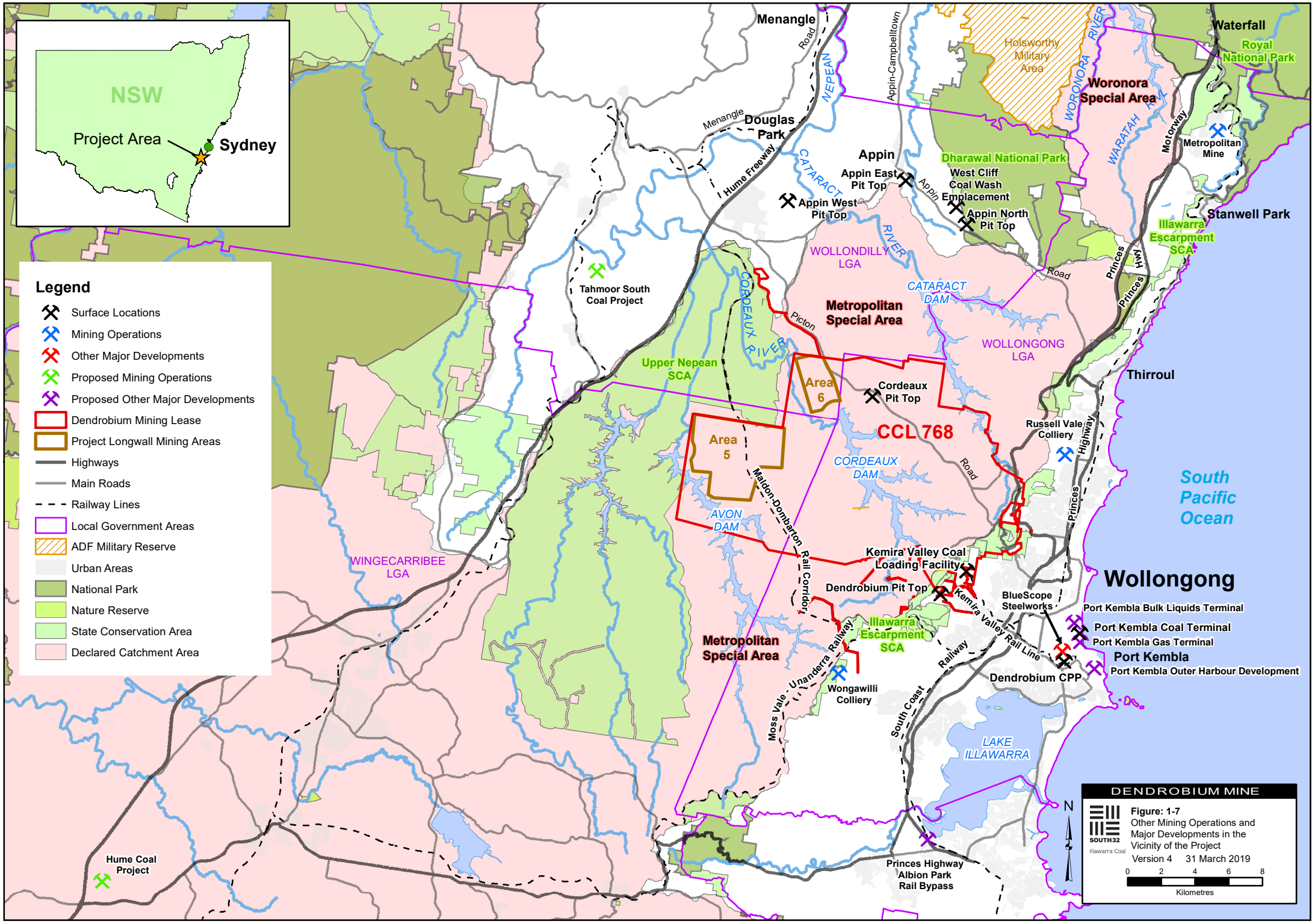
1.2 POTENTIAL CUMULATIVE INTERACTIONS WITH OTHER PROJECTS

This section describes the potential interaction between the Project and other major projects in the Wollongong LGA and other adjacent LGAs that may be of potential relevance to the environmental assessment of the Project.

Key proposed or approved projects (in addition to those described above) that may potentially interact with, or have potential cumulative impacts with the Project include:

- Port Kembla Outer Harbour Development;
- Port Kembla Gas Terminal;
- Port Kembla Bulk Liquids Terminal;
- Princes Highway Albion Park Rail Bypass;
- Hume Coal Project;
- Tahmoor South Coal Project;
- Cordeaux Colliery (South32-owned, under care and maintenance);
- Russell Vale Colliery (under care and maintenance);
- Wongawilli Colliery; and
- Metropolitan Mine.

Figure 1-7 shows the locations of these other major developments relative to the Project.


NSW
Project Area
Sydney
Legend
Surface Locations
Mining Operations
Other Major Developments
Proposed Mining Operations
Proposed Other Major Developments
Dendrobium Mining Lease
Project Longwall Mining Areas
Highways
Main Roads
Railway Lines
Local Government Areas
ADF Military Reserve
Urban Areas
National Park
Nature Reserve
State Conservation Area
Declared Catchment Area
Menangle
Douglas Park
Appin
Appin East Pit Top
Appin West Pit Top
Appin North Pit Top
West Cliff Coal Wash Emplacement
Dharawal National Park
Holsworthy Military Area
Woronora Special Area
Waterfall
Royal National Park
Metropolitan Mine
Stanwell Park
Illawarra Escarpment SCA
Tahmoor South Coal Project
WOLLONDILLY LGA
WOLLONGONG LGA
Metropolitan Special Area
Upper Nepean SCA
Area 6
Area 5
Cordeaux Pit Top
CCL 768
Thirroul
Russell Vale Colliery
South Pacific Ocean
Wollongong
Port Kembla Bulk Liquids Terminal
Port Kembla Coal Terminal
Port Kembla Gas Terminal
Port Kembla
Port Kembla Outer Harbour Development
Kemira Valley Coal Loading Facility
Dendrobium Pit Top
BlueScope Steelworks
Dendrobium CPP
Wongawilli Colliery
WINGECARRIBEE LGA
Hume Coal Project
LAKE ILLAWARRA
Princes Highway Albion Park Rail Bypass
Hume Freeway
Menangle Road
Appin-Campbelltown Road
Picton Road
Princes Hwy
Maldon-Dombarton Rail Corridor
Moss Vale - Unanderra Railway
South Coast Railway
Kemira Valley Rail Line
Motorway
NEPEAN RIVER
CATARACT RIVER
CORDEAUX RIVER
WORONORA RIVER
WARATAH RIVER
CATARACT DAM
CORDEAUX DAM
AVON DAM
DENDROBIUM MINE
Figure: 1-7
Other Mining Operations and Major Developments in the Vicinity of the Project
Version 4 31 March 2019
SOUTH32
Illawarra Coal
N
0 2 4 6 8
Kilometres

Port Kembla Outer Harbour Development

The Port Kembla Outer Harbour Development was approved in 2011 and would involve the development of additional portside and landside facilities for a project life of 27 years (AECOM, 2010).

Construction of the Port Kembla Outer Harbour Development is predicted to take place in intervals over a 20 to 30 year time frame, with the first stage of the construction phase commencing in 2013 (NSW Ports, n.d.).

The Port Kembla Outer Harbour Development is located proximal to the Dendrobium CPP in Port Kembla and the traffic generated during the construction phases is, therefore, expected to utilise some of the same roads as the Project (AECOM, 2010). Potential cumulative traffic impacts have been considered in the Road Transport Assessment for the Project (Appendix H).

Port Kembla Gas Terminal Project

The Port Kembla Gas Terminal Project is proposed by Australian Industrial Energy (AIE) and the Development Application was approved in April 2019. The Port Kembla Gas Terminal Project would involve the development of a liquefied natural gas import terminal at Port Kembla with a project life of 10 to 15 years. Construction is scheduled for commencement in 2019, with the construction period predicted to take some 10 to 12 months (GHD, 2018a).

The proposed construction workforce is 150 personnel, with a peak operational workforce of 50 personnel (GHD, 2018a).

The Port Kembla Gas Terminal Project is located proximal to the Dendrobium CPP in Port Kembla, therefore traffic generated during the construction of the Port Kembla Gas Terminal Project is predicted to utilise some of the same roads as the Project (GHD, 2018b). Potential cumulative traffic impacts have been considered in the Road Transport Assessment for the Project (Appendix H).

Port Kembla Bulk Liquids Terminal

The Port Kembla Bulk Liquids Terminal was approved in 2016 to develop a fuel and ethanol import terminal, located approximately 0.8 km north of the Port Kembla wharf facilities (Cardno, 2015a), however, construction of the Port Kembla Bulk Liquids Terminal has not yet commenced.

The construction workforce would be approximately 140 personnel, with an operational workforce of 5 to 12 personnel (Cardno, 2015a).

The traffic generated during the construction of the Port Kembla Bulk Liquids Terminal is expected to utilise some of the same roads as those used by the Project (Cardno, 2015b), therefore, potential cumulative traffic impacts have been considered in the Road Transport Assessment for the Project (Appendix H).

Princes Highway Albion Park Rail Bypass

An extension to the Princes Motorway, between Yallah and Oaks Flats to bypass the Albion Park Rail was approved in January 2018, with construction expected to commence in 2019. The extension to the Princes Motorway will span a distance of 9.8 km and will be developed by the Roads and Maritime Services (RMS).

The construction period is expected to occur for a three year period and involve a construction workforce of approximately 550 personnel (Cardno, 2015c).

Consideration of the potential cumulative workforce and temporary accommodation demands of the Princes Highway Albion Park Rail Bypass project have been included in the Social Impact Assessment for the Project (Appendix K).

Hume Coal Project

The proposed Hume Coal Project is located approximately 35 km south-west of the Project underground mining areas.

The Hume Coal Project is seeking to develop an underground coal mine and associated infrastructure to support the mining operations, and is expected to have a construction life of two years and a project life of 23 years, with an operational workforce of 300 personnel (EMM, 2017).

In December 2018, the DPE recommended refusal for the Hume Coal Project (DPE, 2018a). Notwithstanding, the potential cumulative workforce demand for the Hume Coal Project is considered in the Social Impact Assessment for the Project (Appendix K).

Tahmoor South Coal Project

The Tahmoor South Coal Project is located approximately 80 km south-west of Sydney and approximately 6 km north-west of the Project underground mining areas. The Tahmoor South Coal Project is seeking an extension to underground longwall mining and associated activities, with coal extraction up to 5 Mtpa as well as an extension of the current mine life by 15 years. All coal processing and handling would occur at the existing Tahmoor Colliery Coal Handling Preparation Plant.

The existing operations at the Tahmoor Colliery currently employs approximately 400 personnel across its operations, and the potential for cumulative workforce impacts on the Project if this workforce were to continue at the Tahmoor South Coal Project is considered in the Social Impact Assessment for the Project (Appendix K). Groundwater modelling for the Project (Appendix B) has considered the Tahmoor South Coal Project.

Other Regional Operations

Potential interactions with other major developments in the region are usually limited to shared use of supporting contractors, contributions to regional traffic movements and socio-economic effects on the region.

Petroleum and Gas Projects

The Camden Gas Project is located throughout the Macarthur region of NSW and operates within Campbelltown and Wollondilly LGAs, approximately 65 km south-west of Sydney (AGL Upstream Investments, 2017).

It is unlikely that any material cumulative impacts would arise for the Project from the gas extraction and production activities being undertaken by the Camden Gas Project.

1.3 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The SEARs for the Project were originally issued by the DPE on 6 February 2017, with supplementary SEARs issued on 9 May 2017 (EPBC Act requirements). The SEARs were reissued for the Project, with the final SEARs (Attachment 1) dated 18 September 2018.

A summary of the SEARs is provided in Tables 1-3 and 1-4, as well as in the relevant section of the EIS where the SEARs are addressed.

A summary indicating where the supplementary SEARs (relating to EPBC Act requirements) have been addressed in the EIS is provided in Attachment 2.

1.4 PROJECT CONSULTANTS

This EIS was prepared by South32 and Resource Strategies Pty Ltd with specialist input provided by the following organisations:

- South32 (*project design, alternatives and justification, baseline data, stream mapping, geographical information system management, land tenure, resource economics, geological structure review, consultation, preliminary hazard analysis, rehabilitation and environmental management and monitoring*);
- Mine Subsidence Engineering Consultants (MSEC) (*subsidence predictions and impact assessment*);
- HydroSimulations (*groundwater assessment and numerical groundwater modelling*);
- Watershed HydroGeo (*hydrogeological data review*);
- Hydro Engineering & Consulting Pty Ltd (HEC) (*surface water assessment and site water balance*);
- Niche Environment and Heritage (Niche) (*baseline flora and fauna surveys, biodiversity assessment report and biodiversity offset strategy, Aboriginal cultural heritage assessment, historical heritage assessment*);
- GTA Consultants (*road transport assessment*);
- Ramboll Australia Pty Ltd (Ramboll) (*air quality and greenhouse gas assessment*);
- Renzo Tonin & Associates (*noise and blasting assessment*);
- Elliott Whiteing (*social impact assessment*);
- Cadence Economics (*economic assessment*);
- JBS&G Australia Pty Ltd (JBS&G) (*land contamination assessment*);
- AXYS Consulting Pty Ltd (*facilitation of environmental risk assessment*); and
- Minter Ellison (*legal review*).

Table 1-3
Secretary's Environmental Assessment Requirements – Reference Summary[1]

Summary of EIS Requirements	EIS Reference
General Requirements	
The EIS must include:	
• Form requirements in clause 6 of Schedule 2 of the EP&A Regulation.	Front of EIS and Attachment 3
• Content requirements in clause 7 of Schedule 2 of the EP&A Regulation.	Refer to Table 1-4
• An executive summary.	Executive Summary
• Description of the Project, including:	
– historical mining operations at the Dendrobium Mine and in the region;	Section 2
– resource to be extracted;	Section 3
– mine layout and scheduling;	Section 3
– minerals processing and transportation;	Section 3
– infrastructure and facilities; and	Section 3
– interaction of the Project with the Dendrobium Mine and other existing, approved and proposed mining operations.	Sections 1.1.7 and 1.1.8
• A list of approvals that must be obtained before the Project can commence.	Section 4
• A risk assessment of the potential environmental impacts, identifying key issues.	Section 6.1 and Appendix M
• A description of the existing environment.	Section 6
• An assessment of the likely impacts of all stages of the Project, including appropriate worst-case scenarios and consideration of any cumulative impacts.	Section 6
• A description of the measures that would be implemented to mitigate and/or offset the likely impacts of the Project, and an assessment of: – whether these measures are consistent with industry best practice and represent the full range of reasonable and feasible mitigation measures that could be implemented; – the likely effectiveness of these measures, including performance measures where relevant; and – whether contingency measures (including Trigger Action Response Plans) would be necessary to manage any residual risk.	Sections 6, 7 and 8
• A description of the measures that would be implemented to monitor and report on the environmental performance of the development if it is approved.	Sections 6, 7 and 8
• Consideration of alternatives, including development of the Area 3C and Area 4 mining domains, the development of a mine plan that avoids key sensitive surface features, including swamps and water storage infrastructure, and the "do nothing" option.	Section 9.2
• Consideration of the Project against relevant environmental planning instruments.	Section 4 and Attachment 6
• Justification of the Project, taking into consideration alternatives, the suitability of the site for the Project, the economic, social, biophysical and environmental impacts of the project as a whole, and whether the Project is consistent with the objects of the EP&A Act.	Section 9
• A signed statement from the author of the EIS, certifying that the information contained within this document is neither false nor misleading.	Front of EIS
• An accurate estimate of the capital investment value of the Project.	Attachment 8
• An accurate estimate of the jobs that would be created during each stage of the Project.	Attachment 8

Table 1-3 (Continued)
Secretary's Environmental Assessment Requirements – Reference Summary[1]

Summary of EIS Requirements	EIS Reference
Specific Issues	
• Subsidence.	Sections 6.3 to 6.11 and Appendices A to G
• Water.	Sections 6.5 to 6.9 and Appendices B to E
• Noise.	Sections 6.13 to 6.15 and Appendix J
• Air.	Sections 6.17 and 6.21 and Appendix I
• Biodiversity.	Sections 6.7 to 6.9 and Appendices D and E
• Land.	Section 6.4 and Attachment 6
• Rehabilitation and Final Landform.	Section 7
• Heritage.	Sections 6.10 and 6.11 and Appendices F and G
• Transport.	Sections 6.12 and Appendix H
• Visual.	Section 6.18
• Hazards.	Section 6.22 and Appendix N
• Waste.	Section 3.11
• Social and Economic.	Sections 6.19 and 6.20 and Appendices K and L
Consultation	
• Description of the consultation that was carried out, identification of the issues raised during this consultation and explanation of how these issues have been addressed in the EIS.	Section 5

1 The complete version of the SEARs is presented in Attachment 1.

Table 1-4
Content Requirements of an EIS – Clause 7 of Schedule 2 of the EP&A Regulation

Summary of Clause 7 of Schedule 2 of the EP&A Regulation	EIS Reference
The EIS must include:	
• Summary of the EIS.	Executive Summary
• Objectives of the Project.	Sections 1.1.3 and 9
• Analysis of any feasible alternatives to the Project, including the consequences of not carrying out the Project.	Section 9
• Description of the Project.	Section 3
• Description of the environment likely to be affected by the Project.	Section 6
• The likely impacts on the environment of the Project.	Section 6
• Description of the measures proposed to mitigate any adverse effects of the Project on the environment.	Sections 6, 7 and 8
• A list of any approvals that must be obtained under any other Act or law before the Project may lawfully be carried out.	Section 4
• Compilation (in a single section of the EIS) of the measures proposed to mitigate any adverse effects of the Project on the environment.	Section 8
• The reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ESD.	Section 9

In addition to the above, peer review was undertaken by the following specialists (Attachment 5):

- Dr Frans Kalf (*groundwater*); and
- Emeritus Professor Thomas McMahon (*surface water*).

1.5 DOCUMENT STRUCTURE

This EIS comprises a main text component and supporting studies, which include Appendices A through to P. An overview of the main text is presented below:

Section 1	Provides an introduction to the Project and this EIS.
Section 2	Describes the history and components of the approved Dendrobium Mine and the Cordeaux Colliery.
Section 3	Describes the various components and stages of the Project.
Section 4	Outlines the strategic planning context and statutory provisions relevant to the Project.
Section 5	Describes the consultation and engagement undertaken in relation to the EIS and ongoing community involvement.
Section 6	Details the environmental assessment of the Project, including a description of the existing environment, an assessment of potential impacts and a description of measures that would be implemented to avoid, minimise, mitigate, offset, manage and/or monitor the potential impacts of the Project.
Section 7	Describes rehabilitation of the Project and mine closure.
Section 8	Provides a summary of the proposed environmental management, mitigation, monitoring and reporting in relation to the Project.
Section 9	Describes how the project (when compared with other alternatives) is in the public interest and balances impacts, strategic needs, and benefits.
Section 10	Lists the documents referenced in Sections 1 to 9 of this EIS.
Section 11	Defines abbreviations, acronyms and terms used in Sections 1 to 9 of this EIS.

Attachments to the main text are also provided as follows:

Attachment 1	Secretary's Environmental Assessment Requirements.
Attachment 2	Cross Reference to Assessment Requirements Relevant to the EPBC Act.
Attachment 3	Development Application Area and Real Property Descriptions.
Attachment 4	Land Ownership and Landholder Key.
Attachment 5	Peer Review Letters.
Attachment 6	Relevant Environmental Planning Instruments and Government Policies.
Attachment 7	Aquifer Interference Policy Considerations and Water Licensing Addendum.
Attachment 8	Capital Investment Value Estimate Report.
Attachment 9	Community Information.
Attachment 10	JORC Statement.

Appendices A to P contain supporting information, including a number of specialist reports:

Appendix A	Subsidence Assessment.
Appendix B	Groundwater Assessment.
Appendix C	Surface Water Assessment.
Appendix D	Biodiversity Assessment Report and Biodiversity Offset Strategy.
Appendix E	Aquatic Ecology Assessment.
Appendix F	Aboriginal Cultural Heritage Assessment.
Appendix G	Historical Heritage Assessment.
Appendix H	Road Transport Assessment.
Appendix I	Air Quality and Greenhouse Gas Assessment.
Appendix J	Noise and Blasting Assessment.
Appendix K	Social Impact Assessment.
Appendix L	Economic Assessment.

Appendix M	Environmental Risk Assessment.
Appendix N	Preliminary Hazard Analysis.
Appendix O	Land Contamination Assessment.
Appendix P	Geological Structure Review.