

NRE No.1 Colliery Project Application (09_0013)

Environmental Assessment

Gujarat NRE Coking Coal Pty Ltd

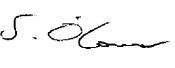
February 2013

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Environmental Assessment

Approved by:	Steve O'Connor
Position:	Technical Director
Signed:	
Date:	8 February 2013

Environmental Resources Management Australia Pty Ltd Quality System

Gujarat NRE Coking Coal Limited

February 2013

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SUBMISSION OF ENVIRONMENTAL ASSESSMENT REPORT

PREPARED UNDER THE ENVIRONMENTAL PLANNING AND ASSESSMENT
ACT 1979 - SECTION 75

EA PREPARED BY ERM

Names:

Steve O'Connor

Qualifications:

BTP (Hons), MSc (Hons)

FPIA

Address:

53 Bonville Avenue, THORNTON NSW, 2322

PROPOSED DEVELOPMENT

Gujarat NRE Coking Coal Ltd (NRE) seeks approval to establish new mining domains at NRE No.1 Colliery in the Southern Coalfield, and where necessary, upgrade associated surface facilities (the 'Project'). The Project includes:

- *increased coal production up to 3 million tonnes per annum with a projected mine life of 18 years.*
- *continued westward development of the existing 'Wonga Mains' driveage;*
- *longwall mining of the Wongawilli seam in the 'Wonga East' and 'Wonga West' areas and first workings in the Bulli and Balgownie seams in the 'Wonga West';*
- *further upgrading of existing mine infrastructure and services;*
- *continuing use of No.4 Shaft and essential maintenance and refurbishment of existing ventilation shafts and power and water supply arrangements;*
- *upgrading of site water management;*
- *continuing road haulage of ROM coal to Port Kembla Coal Terminal; and*
- *ongoing geological and geotechnical investigations.*

PROJECT APPLICATION

Applicant Name:

Gujarat NRE Coking Coal Limited

Applicant Address:

PO Box 281

Fairy Meadow NSW 2519

Land to be developed:

Property description of land to be developed is contained in the EA

ENVIRONMENTAL ASSESSMENT

An Environmental Assessment is attached which addresses all matters listed under Part 3A of the Environmental Planning and Assessment Act 1979.

CERTIFICATE

I certify that I have prepared the contents of this EA and to the best of my knowledge:

- *it contains all available information that is relevant to the environmental assessment of the development to which this statement relates; and*
- *it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.*

Name:

Steve O'Connor

Signature:



Date:

8 February 2013

Gujarat NRE Coking Coal Limited

NRE No.1 Colliery Stage 2
Environmental Assessment

February 2013

Reference: 0079383RP01

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ABBREVIATIONS

	Definition
A1	Area 1
AEMR	Annual Environmental Management Report
AERMOD	AMS/EPA Regulatory Model
AHD	Australian Height Datum
AHIMS	Aboriginal Heritage Information Management System
ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Annual Recurrence Interval
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AWS	Automatic Weather Station
BACI	Before/After, Control/Impact
BCUS	Bellambi Creek Upland Swamp
BFMC	Bush Fire Management Committee
BOD	Biochemical Oxygen Demand
BoM	Bureau of Meteorology
BSO	Bulli Seam Operations Project (Illawarra Coal Holdings Pty Ltd)
CC	Cataract Creek
CCC	Community Consultative Committee
CCD	Census Collection Districts
CCUS	Cataract Creek Upland Swamp
CCL	Consolidated Coal Lease
CEMP	Construction Environment Management Plan
CMP	Conservation Management Plan
CO ₂	Carbon Dioxide
CO ₂ -e	Carbon Dioxide Equivalent
COD	Chemical Oxygen Demand
CPRS	Carbon Pollution Reduction Scheme
CRUS	Cataract River Upland Swamp
CSG	Coal Seam Gas
dB	Decibels
DCC	Department of Climate Change
DECCW	Department of Environment , Climate Change and Water
DEWHA	Department of Environment, Water, Heritage and the Arts
DGRs	Director-General's requirements
DKH	D'harawal Knowledge Holders
DLEP 2009	Draft Wollondilly Local Environmental Plan 2009
DO	Dissolved Oxygen
DoP	Department of Planning
DP	Deposited Plan
DPI	Department of Primary Industries
DP&I	Department of Planning and Infrastructure

	Definition
DRE	NSW Department of Trade and Investment, Division of Resources and Energy
DSC	Dam Safety Committee
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (Commonwealth)
DWCREP	Drinking Water Catchments Regional Environmental Plan No. 1
EA	Environmental Assessment
EAR	Environmental Assessment Report
EC	Electrical Conductivity
ECRTN	Environmental Criteria for Road Traffic Noise
EEC	Endangered Ecological Communities
EMP	Environmental Management Plan
ENCM	Environmental Noise Control Manual
EPA	Environmental Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPIs	Environmental Planning Instruments
EPL	Environmental Protection Licence
ERM	Environmental Resources Management Australia Pty Ltd
EWG	Executive Working Group
FMEA	Failure Mode and Risk and Effect Analysis
GDE	groundwater dependent ecosystem
GFS	Groundwater flow system
GHG	Greenhouse Gas
GIS	global information system
GJ	Gigajoules
GML	Godden Mackay Logan
GPS	Global positioning system
ha	hectare
ICNC	Interim Construction Noise Guidelines
ILALC	Illawarra Local Aboriginal Land Council
INP	NSW Industrial Noise Policy 2000
IREP	Illawarra Regional Environmental Plan No.1
KL	kilolitres
km	kilometre
kV	kiloVolt
kW	kiloWatt
LC	Lizard Creek
LCUS	Lizard Creek Upland Swamp
LCT1	Lizard Creek Tributary 1
LDP	Licence Discharge Point
LEP	Local Environmental Plan
LEP 1991	Wollondilly Local Environmental Plan 1991
LGA	Local Government Area

	Definition
LW	Longwall
m	metre
mm	millimetre
MD	Major Development
ML	Mining lease
MOP	Mining Operation Plan
MP	Major Project
MPL	Mining Purposes Lease
Mtpa	Million tonnes per annum
MWh	Megawatt hours
NES	National environmental significance
NEPM	National Environment Protection Measures
NGA	National Greenhouse Accounts
NGER Act	<i>National Greenhouse and Energy Reporting Act 2007</i>
NIAC	Northern Illawarra Aboriginal Collective
NMP	Noise Management Plan
NOW	NSW Office of Water
NPWS	National Parks and Wildlife Service
NRE	Gujarat NRE Coking Coal Limited
OEH	Office of Environment and Heritage
OCG	Olsen Consulting Group
PAA	Project Application Area
PAC	Planning Assessment Commission
PEA	Preliminary Environmental Assessment
PKCT	Port Kembla Coal Terminal
PM	particulate matter
PM ₁₀	Particulate matter less than 10 microns in size
POEO Act	<i>Protection of the Environment and Operations Act 1997</i>
PRP	Pollution Reduction Programs
PSNL	Project Specific Noise Levels
PWP	Preliminary Works Project
RBL	Rating Background Noise Level
REPs	Regional Environmental Plans
RL	reduced level
RMS	Roads and Maritime Services
RMZ	Risk Management Zone
RNE	Register of the National Estate
ROM	Run of Mine
RoTAP	Rare or Threatened Australian Plants
RTA	Roads and Traffic Authority (now Roads and Maritime Services)
RVEA	Russell Vale emplacement area
SASPoM	Sydney Catchment Authority Special Areas Strategic Plan of Management 2007
SCA	Sydney Catchment Authority

	Definition
SCI	Southern Coalfield Inquiry
SD	Statistical Division
SDPS	Subsidence Deformation Prediction System
SEPP	State Environmental Planning Policy
SEPP MD	State Environmental Planning Policy (Major Development) 2005
SMP	Subsidence Management Plan
SP	Stockpile
SSD	State Significant Development
SWCD	stormwater control dam
SWL	Sound Power Levels
tCO ₂ -e	Tonnes of carbon dioxide equivalent
TSC Act	<i>Threatened Species Conservation Act 1995</i>
TSP	total suspended particulates
UNFCCC	United Nations Framework Convention on Climate Change
VENM	virgin excavated natural material
WCC	Wollongong City Council
WC	Wallandoola Creek
WCUS	Wallandoola Creek Upland Swamp
WLEP	Wollongong Local Environmental Plan 2009
WM Act	<i>Water Management Act 2000</i>
%	percent
° C	degree Celsius

DEFINITIONS

Term	Definition
309 Panel	The last panel in the Bulli seam at the eastern end of T and W Mains.
angle of draw	The angle between the vertical and the line joining the edge of the mining void with the limit of vertical subsidence, usually taken as 20 millimetres.
aquifer	A permeable body of rock or regolith that both stores and transmits groundwater.
base flow	The flow of water entering stream channels not attributable to direct runoff from rainfall and usually from groundwater or related sources.
Bellambi Gully Creek	Watercourse that flows through the Russell Vale site.
Bellambi Gully Creek bypass channel	New open channel to be constructed to conduct water flowing through Bellambi Gully Creek around the stockpile area.
Bulli West	Area of first workings west of existing workings.
cliff	A continuous rockface having a minimum height of 10 m and a minimum slope of 2 to 1.
coal clearance system	A system used to transfer coal from the working faces to the surface.
coking coal	Coking coal is coal that can be used in the production of coke which in turn is used in the blast furnace in the production of pig iron. Ash content of less than 10% and volatile matter of 21-23%.
continuous miner	A remote-controlled, tracked, electrically powered coal cutting and loading machine used to form mine roadways and extract coal pillars.
conveyor	Fixed mechanical apparatus consisting of a continuous moving belt used to transport coal from one place to another.
day	The period from 7am to 6pm Monday to Saturday, and 8am to 6pm on Sundays and Public Holidays.
depth of cover	The depth of the roof of the coal seam from the ground measured in metres.
Director-General	Director-General of Department of Planning and Infrastructure, or delegate.
driveage	A horizontal or inclined heading or roadway in the process of construction. The road way will be used to access a new mining area within the lease.
dyke	A sheet like vertical intrusion of igneous rock cutting across the strata of older rocks.
ecological community	An assemblage of native species that inhabits a particular area.
ephemeral stream	Stream that may or may not have a well-defined channel, generally with unpredictable flow, only during and immediately after rain.
endangered	A species, population or ecological community that is likely to become extinct or is in immediate danger of extinction.
endangered ecological community	Ecological community specified as endangered under Part 3 of Schedule 1 of the Threatened Species Conservation Act 1995 or under the Environment Protection and Biodiversity Conservation Act 1999.
endangered population	Population identified as endangered under Part 2 of Schedule 1 of the Threatened Species Conservation Act 1995.

Term	Definition
endangered species	Species identified in Part 1 of Schedule 1 of the Threatened Species Conservation Act 1995 or under the Environment Protection and Biodiversity Conservation Act 1999.
evening	The period from 6pm to 10pm.
faulting (normal)	Major fracture of the earth's crust caused by the relative movement of the rock masses on either side.
first workings	Involves the development headings or roadways which will provide access to the coal resource. They are developed using continuous miners with integrated roof and rib bolting rigs. First workings leave the coal pillars intact and the overlying strata fully supported resulting in 'zero' subsidence.
gate roads (maingates and tailgates)	An underground access roadways that provides access to a working longwall face for continuous mining or connects the longwall working face with the main roadway.
goaf (or goafing)	The space left following extraction of the coal seam where the roof material is allowed to collapse.
Greenhouse gases	Gases with potential to cause climate change (eg methane, carbon dioxide and non-methane volatile organic compounds). Usually expressed in terms of carbon dioxide equivalent.
groundwater	Water that occurs beneath the surface of the ground in the saturated zone.
groundwater dependent ecosystem	Ecosystems which have their species composition and their natural ecological processes determined by groundwater.
headwater swamp	Headwater swamps are freshwater wetlands situated in areas high in the catchment near catchment divides, located in areas of shallow, impervious substrate formed by either sandstone or clay horizons. Headwater swamps are likely to have perched watertables within the sediments that are independent of the water table in the Hawkesbury sandstone, dependent upon rainfall and surface runoff.
intermittent stream	Stream with a well-defined channel that carries water for at least part of the year, but ceases to flow occasionally or seasonally because bed seepage and evapotranspiration exceed the available water supply.
iron oxidizing bacteria	Bacteria that derive energy by converting iron in the ferrous form to the ferric form, which then combines with oxygen to produce iron oxide, often appearing as a rusty red or orange 'fluffy' clumps or stains in the stream. Reaction is dependent on oxygen presence and is more likely to be found where oxygen-poor groundwater is reaching the surface of the stream.
key threatening process	Threatening process identified as such in Schedule 3 of the <i>Threatened Species Conservation Act 1995</i> or under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
longwall mining	A high capacity underground mining method which utilises a mechanical shearer to cut the coal. The loosened coal falls onto a conveyor for removal from the mine to the surface. As the coal is cut away (a 'shear') both the longwall machine (known as the 'shearer') and the hydraulic roof supports advance forward along the panel, ready for the next shear.
longwall panel	A large contiguous block of coal, typically suitable for longwall extraction.
main roadways	Roadways that are used as the means of primary access/egress, to supply materials, provide ventilation and enable coal to be conveyed to the surface.
Metropolitan Special Area	An area categorised as Restricted Access under Schedule 1 of the Sydney Water Catchment Management Act 1998. It is managed by the Sydney Catchment Authority.

Term	Definition
Mining Lease	Title granted under the Mining Act 1992 that provides rights to mine a coal resource.
mitigation	Activities associated with reducing the impacts of the project prior to or during those impacts occurring.
negligible	Small and unimportant, such as to be not worth considering.
night	The period from 10pm to 7am Monday to Saturday, 10pm to 8am on Sundays and Public Holidays.
No.4 Shaft	Main downcast shaft for men and materials.
offset (biodiversity)	One or more appropriate actions put in place in an appropriate location to counterbalance or offset an impact on biodiversity values.
perennial stream	Stream with a well-defined channel that flows continuously all year during a year of normal rainfall with the aquatic bed located below the water table for most of the year.
pillar extraction panel	A continuous miner system of mining whereby coal pillars are systematically extracted.
pillar run	A large scale progressive collapse of coal pillars in a short period of time.
portal	Entry point on the Escarpment into the coal seam.
Preliminary Works Project	Stage 1 works to allow for continuation of mining and ancillary operations at NRE No 1 Colliery as approved by DP&I (MP 10_0046).
Project Application Area	Area to which this Project applies.
relic	Any deposit, artefact, object or material evidence that: (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and (b) is of State or local heritage significance.
riffle	A section of a stream with shallow, fast-flowing water with a distinctly disturbed surface and usually with a gravel or pebble base.
risk management zone	An identified area containing significant natural features as defined by DoP (2008), delineated from the outside extremity of the surface feature, either by a 40° angle from the vertical down to the coal seam which is proposed to be extracted, or by a surface lateral distance of 400 m, whichever is the greater.
run-of-mine	Raw coal as mined that has not undergone any screening, crushing or washing.
Russell Vale site	Location of main surface infrastructure, including stock pile area, offices etc.
second workings	Extraction of coal by pillar extraction methods.
shaft	A vertical or inclined excavation used for the purpose of opening or servicing a mine.
South Bulli Colliery	Previous name for the NRE No.1 Colliery.
special areas	Areas surrounding SCA's dams which are subject to additional management measures to protect the quality of drinking water. These areas are declared under the <i>Sydney Water Catchment Management Act 1998</i> for their value in protecting the quality of the raw water used to provide drinking water to greater Sydney and for their ecological integrity.

Term	Definition
special significance status	Special significance status is based on an assessment of a natural feature that determines the feature to be so special that it warrants a level of consideration (and possibly protection) well beyond that accorded to others of its kind. It may be based on a rigorous assessment of scientific importance, archaeological and cultural importance, uniqueness, meeting a statutory threshold or some other identifiable value or combination of values (PAC 2009).
strain	The change in the horizontal distance between two points divided by the original horizontal distance between the points.
Stage 1	Preliminary Works Project – production continuing at current rates of 1Mtpa.
Stage 2	Major Expansion Project – production increasing to 3Mtpa.
steep slope	An area of land having a gradient between 1 in 3 and 2 in 1.
subsidence	The totality of subsidence effects and impacts and their associated environmental consequences.
subsidence effects	The deformation of the ground mass due to the mining activity, including both vertical and horizontal displacement, tilt, strain and curvature.
subsidence impacts	The physical changes to the ground and its surface caused by subsidence effects. These impacts are principally tensile and shear cracking of the rock mass and localised buckling of strata caused by valley closure and upsidence but also include subsidence depressions or troughs.
surface facilities sites	The Russell Vale site; all ventilation shaft sites; sites used for gas drainage or for other mining purposes infrastructure; and any other site subject to existing or proposed surface disturbance associated with the project.
T and W Mains	Current extraction action area west of the 309 Panel.
The Project	The consolidation of its existing operations and an expansion of operations and upgrade of associated surface facilities at NRE No. 1 Colliery in the Southern Coalfield.
threatened species	A plant or animal identified in the <i>Threatened Species Conservation Act 1995</i> or <i>Environment Protection and Biodiversity Conservation Act 1999</i> as extinct, critically endangered, endangered, or vulnerable. This term may be extended to encompass threatened species, populations or ecological communities.
threatening process	A process that threatens, or may threaten the survival, abundance or evolutionary development of species, populations or ecological communities.
tilt	The difference in subsidence between two points divided by the horizontal distance between the points.
upland swamp	Upland swamps are vegetated freshwater wetlands occurring in shallow basins located in low hills, plateaus of mountains.
upsidence	Relative upward movement, or uplift, created by the horizontal compression and buckling behaviour of the rock strata in the vicinity of a valley floor.
valley closure	A phenomenon whereby one or both sides of a valley move horizontally towards the valley centreline, due to changed stress conditions beneath the valley and its confining land masses.
valley infill swamp	Valley infill swamps form on the floor of incised second or third order stream valleys on sediment deposited possibly as a result of channel blockage such as a log jam (DoP 2008). Valley infill swamps are likely to have direct connection to regional water table and may receive water from multiple sources including rainfall, streamflow and groundwater seepage (PAC 2010).
vertical subsidence	Vertical downward movements of the ground surface caused by underground coal mining.
V-Mains	A current extraction area in Bulli seam between earlier longwalls to the south of

Term	Definition
	Wonga West.
vulnerable	A species, population or ecological community that is likely to become extinct or is in immediate danger of extinction.
Wonga East	The eastern area of proposed Stage 2 workings.
Wonga Mains	Main driveage through the Wongawilli seam.
Wonga West	The western area of proposed Stage 2 workings.
zero subsidence	Defined by DRE as vertical downward movement of the ground surface that is less than or equal to 20 mm.

EXECUTIVE SUMMARY

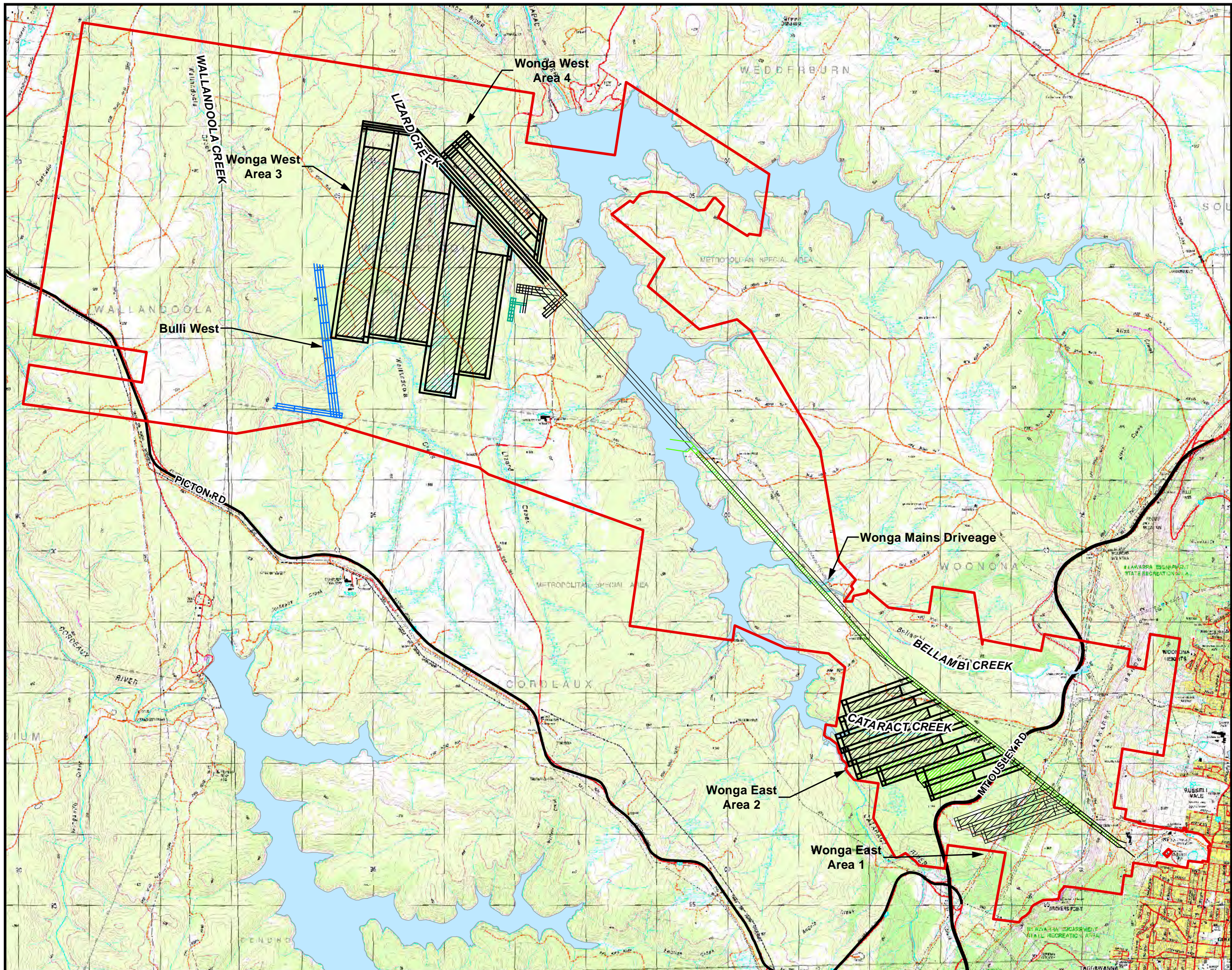
Gujarat NRE Coking Coal Ltd (NRE) seeks approval to establish new mining domains at NRE No.1 Colliery in the Southern Coalfield, and where necessary, upgrade associated surface facilities (the 'Project'). This is 'Stage 2' of a proposed expansion of the Colliery.

The Project will increase coal production up to 3 million tonnes per annum (Mtpa) with a projected mine life of 18 years. The Project includes:

- continued westward development of the existing 'Wonga Mains' driveage from Russell Vale for ventilation and to access underground working areas;
- longwall mining of the Wongawilli seam in the 'Wonga East' area, beneath previously mined Balgownie and Bulli seam workings;
- longwall mining of the Wongawilli seam in the 'Wonga West' area beneath the previously mined Bulli seam workings;
- first workings in the Bulli seam in the 'Bulli West' area (anticipated to have no direct subsidence impacts);
- Balgownie seam mining, limited to first workings only, beneath overlying Bulli seam workings (anticipated to have no direct subsidence impacts);
- further upgrading of existing mine infrastructure and services at Russell Vale, including surface conveyors and coal handling infrastructure, coal sizing, screening, and load-out facilities, site noise and dust controls, a stockpile for run-of-mine (ROM) coal;
- continuing use of No.4 Shaft for mine access (personnel and materials), bathhouse, offices and parking areas;
- essential maintenance and refurbishment of existing ventilation shafts and power and water supply arrangements to ensure they comply with current day operational and safety requirements;
- upgrading of site water management including, but not limited to, mine water and stormwater controls;
- continuing road haulage of ROM coal to Port Kembla Coal Terminal (PKCT) for export, using the existing haulage route;
- trucking fleet upgrades in line with current standards with suitable braking systems and covers for all loads; and
- ongoing geological and geotechnical investigations to validate coal quality and geophysical characteristics utilising drilling and related exploration techniques.

The proposed mine plan is illustrated in *Figure E.1* with proposed surface facility upgrades illustrated in *Figure E.2*.

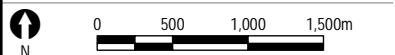
A separate application for Stage 1, the Preliminary Works Project (MP 10_0046), was submitted to the Department of Planning (DoP) in June 2010 and approved in October 2011 and was modified on 24 December 2012.



- Legend**
- Project Application Area
 - Proposed Longwalls
 - Approved Workings (MP10_0046)
 - Proposed Balgownie Seam First Workings
 - Proposed Bulli Seam First Workings
 - Major Road

Figure E.1
Proposed Mine Plan

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EARPA2012_G026_R0.mxd		
Date:	13/11/2012	Drawing size:	A3
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A Subsidence Management Plan (SMP) has been approved by NSW Department of Trade and Investment, Division of Resources and Energy for extraction of Area 2 Longwall 4 (A2 LW4) in the Wonga East domain with A2 LW4 extraction completed.

Risk Management

This Environmental Assessment Report (EAR) has been prepared to meet the requirements provided by the Director-General of the Department of Planning and Infrastructure (DP&I) and to address issues raised by the relevant government authorities and other stakeholders. The assessment has focussed on issues with the potential to impact the environment as identified by the environmental risk assessment undertaken for the Project. The assessment has considered the findings of the Metropolitan Colliery and Bulli Seams Operations Planning Assessment Commissions and the findings of the Southern Coalfield Inquiry.

Identification of environmental risk was a key preliminary step in the mine planning and assessment process. The principal risks associated with the Project are the subsidence consequences from mining on natural and built features within the Project Application Area (PAA) and potential amenity impacts to residents in the vicinity of the Russell Vale surface facilities. Assessments of subsidence, surface and groundwater, noise and vibration, air quality, visual impacts, greenhouse gas emissions, upland swamps, terrestrial and aquatic ecology, heritage, traffic and transport, waste and socio-economic impacts were undertaken.

Subsidence

Maximum subsidence is predicted to range up to 1.2m in the Wonga East catchment and up to 2.55m at Wonga West.

The focus of mine planning was to eliminate subsidence risks where possible, by avoiding significant natural and built features. In developing the preferred mine plan, NRE adopted an iterative approach involving ongoing examination of longwall options in light of constraints imposed by significant features including ecologically significant sites, significant Aboriginal sites, 3rd order and above streams, upland swamps, cliffs and Cataract Reservoir.

As a result, the proposed mine plan has been developed to avoid significant natural and built features as far as possible.

The proposed mine plan has achieved the following:

- no longwall mining directly under the main channel of Wallandoola or Lizard Creek, in Wonga West;
- mining under Cataract Creek and the Dam Safety Committee (DSC) Notification Area in Wonga East has been designed with narrow longwalls and wide chain pillars which are predicted to be stable in comparison to wider pillars;
- no longwall mining is proposed under and within 100m of Mount Ousley Road where the road is above previous Bulli seam extraction; and
- no longwall mining is proposed within one kilometre of the Cataract Reservoir Dam wall.

Subsidence impacts are predicted for certain features of special significance. Subsidence monitoring data will be used to validate predictions prior to mining under features of special significance. Engineering controls such as alternate layouts and altered start and end lines will be implemented where it cannot be demonstrated that only acceptable impacts on these features are likely to occur during secondary extraction.

All management procedures form part of the Statement of Commitments as outlined in *Chapter 29* and will form part of any approval conditions for this Project.

Surface Water

Surface water features in the Study Area consist of:

- 1st to 3rd order streams of Wallandoola Creek that drain into the Cataract River downstream of the Cataract dam wall;
- 1st to 4th order streams of Lizard Creek that drain into the Cataract River downstream of the Cataract dam wall;
- 1st to 4th order streams of Cataract Creek and Cataract River that flow into Cataract Reservoir;
- 1st and 2nd order tributaries of Cataract River and Bellambi Creek (upstream of the reservoir) which will not be undermined by the Wonga East workings;
- Cataract Reservoir, which will not be undermined by the Wonga East workings, although the western end of Longwall Panel A2 LW10 extends into the reservoir high water mark in Cataract Creek;
- thirty nine (39) swamps within 600m of the proposed workings at Wonga East that meet the definition of the Coastal Upland Swamp Endangered Ecological Community (EEC) as listed under the *Threatened Species Conservation Act 1995* (TSC Act), 14 of which lie within the predicted 20mm subsidence zone. Of those 14, seven are assessed to be of 'special significance' according to the NSW Office of Environment and Heritage criteria (OEH, 2012), and of those, five are predicted to be at risk of greater than negligible environmental consequences from subsidence (Biosis 2012); and
- forty five (45) swamps within 600m of the proposed workings at Wonga West that meet the definition of the Coastal Upland Swamp EEC. Of these, 36 lie within the predicted 20mm subsidence zone. Of those 36, eight are assessed to be of 'special significance' according to the NSW Office of Environment and Heritage criteria (OEH, 2012), and of those, seven are predicted to be at risk of negative environmental consequences from subsidence (Biosis 2012).

All surface water features in the study area are contained within the Sydney Catchment Authority controlled Metropolitan Special Area. A summary of the potential effects, impacts and consequences of the proposed mining on surface water features follows.

Cataract Creek and Cataract River

Due to the proposed mine plan which incorporates narrow longwalls with wide pillars and commitment to adaptive management, the proposed mining at Wonga East is not anticipated to be a significant risk to either Cataract Creek or Cataract River in regard to stream flow, stream pools, water quality or aquatic ecosystems.

Wallandoola Creek

Due to the designed set back from the main channel of Wallandoola Creek (and the associated lack of subsidence and uplift) the proposed Wongawilli seam mine layout is anticipated to avoid potential adverse effects on the main channel of Wallandoola Creek. Localised potential risk to the integrity of stream flow and connectivity in Wallandoola Creek may be present in the area to the south of Longwalls A3 LW3 and A3 LW4 that may potentially undergo up to 6mm/m of tensile strain and up to 0.5m of subsidence.

The pool water holding capacity in Wallandoola Creek or its tributaries is not anticipated to be adversely affected due to the low predicted tilts. The valley infill swamps along Wallandoola Creek are also not anticipated to be adversely affected due to the predicted subsidence tilts and strains.

Lizard Creek

Due to the designed set back from the main channel of Lizard Creek (and the associated lack of subsidence and uplift), the proposed Wongawilli seam mine layout is anticipated to avoid potential adverse effects on the main channel of Lizard Creek, including the deemed 'special significance' section at Waterfall L1.

Localised low potential risk to the integrity of stream flow and connectivity in Lizard Creek may be present in the area that may potentially undergo 6 to 7mm/m of tensile strain to the north of Longwall A3 LW2 and south of the northern end of Longwall A4 LW5. .

The 3rd order tributary stream bed and banks of LCT2A is anticipated to have a low to minor potential risk of adverse effects due to extraction of Longwall A3 LW5.

Lizard Creek Tributary 1 (LCT1) is anticipated to have a potential risk of adverse effects due to extraction of Longwall A3 LW3.

The pool water holding capacity in Lizard Creek or its tributaries is not anticipated to be adversely affected due to the low predicted tilts and steep gradients in the incised sections of the creek catchment.

The valley infill swamps in the flatter gradient section along Lizard Creek are also not anticipated to be adversely affected due to the lack of predicted subsidence in those areas.

Cataract Reservoir

No reduction in the water quality of Cataract Reservoir is anticipated from the Cataract Creek, Cataract River or Bellambi Creek catchment outflows.

It has been assessed that there is a negligible risk of reduced water yield to Cataract Reservoir, and surface water and groundwater modelling indicates a low risk of potential change to the water holding capacity of, or loss of water from Cataract Reservoir.

The structural integrity of the Cataract dam wall and Cataract Reservoir will not be affected by the proposed mining. Further, the proposed workings have been positioned at sufficient distance from the Cataract Reservoir and there are no known geological structures which could cause a mining induced hydraulic connection between the workings and the base of the reservoir.

Broughtons Pass Weir

As the potential adverse subsidence impacts on stream flow, pool holding capacity and stream water quality in Lizard Creek and Wallandoola Creek are anticipated to be localised, if they occur at all, then the discharge out of the two creeks into the Cataract River is not anticipated to cause any adverse impacts on the water quality in Broughtons Pass Weir. The Cataract dam wall is located approximately five kilometres upstream of the Lizard Creek junction and 10.5km upstream of the Wallandoola Creek junction, whilst Broughtons Pass Weir is located approximately 1.2km downstream of Wallandoola Creek.

Groundwater

A groundwater model has been developed that represent the aquifers and to predict potential impacts. Within the limitations and constraints of the model, it is predicted that the proposed mining could depressurise the overburden up to the upper Bulgo Sandstone. However, it is predicted that the Bald Hill Claystone will remain intact and retain its semi-confining properties, maintaining hydraulic separation between the Hawkesbury Sandstone and Quaternary alluvial aquifers from the Bulgo Sandstone and deeper systems.

Mine water seepage is predicted to rise from the current 1.1mL/day (402mL/year) to 3.1mL/day (1131mL/year) at the end of mining (for total inflow at Wonga East and Wonga West).

Changes to inflow into Cataract Reservoir and to stream baseflow within the Lizard, Wallandoola and Cataract creeks have been predicted; however, these are anticipated to be minor.

A monitoring regime, as well as adaptive management and the development of contingency measures has been developed to monitor changes to the groundwater system and implement management measures should unexpected impacts occur, or are likely to occur based on ongoing monitoring and updated predictions due to mining.

Aquatic Ecology

Aquatic ecology surveys have been undertaken in Cataract Creek, Cataract River, Lizard Creek and Wallandoola Creek for three years from Spring 2008 till Spring 2011. Surveys have confirmed that the Study Area supports the threatened Macquarie Perch and Silver Perch within the lower reaches of Cataract Creek in Wonga East mining domain and has identified a freshwater cod (possibly the threatened Trout Cod or threatened Murray Cod or a hybrid of both). All of these species have been translocated into the Cataract Dam.

The potential impacts of longwall mining on the aquatic ecology of the Study Area have largely been mitigated through the design of the proposed longwall layout that avoids longwall mining under Wallandoola Creek, Lizard Creek and Cataract River as well as adaptive management measures proposed to restrict subsidence effects to below 250mm in Cataract Creek.

Ongoing monitoring of water quality, aquatic habitat, macro invertebrates and fish during the same seasons as used for the baseline study, throughout and after mining will inform identification of impacts and refinement of management measures. This will provide best practice environmental monitoring of aquatic ecology and allow statistically powerful analysis of the nature and extent of mine subsidence impacts, if any.

Terrestrial Ecology

The Study Area supports a number of threatened species, endangered ecological communities, regionally significant species and Rare or Threatened Australian Plants (ROTAPs).

There are extensive areas of habitat suitable for threatened species within the upland swamps and streams that are in good condition and the area is well connected to surrounding habitat.

Elimination of many potential impacts on terrestrial ecology has been achieved by:

- realigning the longwall panel layouts to avoid sensitive areas identified by ERM in 2007 and the subsequent Failure Mode and Effects Analysis (FMEA) (Olsen, 2009);
- abandoning plans for longwall panels underneath the main channels of Lizard Creek and Wallandoola Creek;
- abandoning plans for longwall panels underneath Lizard Creek valley infill swamps and much of the Wallandoola Creek valley infill swamps;
- locating the fully supported driveage underneath Lizard Creek; and
- realigning and reducing the width of longwall panels in Wonga East.

Despite this approach, there remains a risk to a number of the ecological values of the Study Area.

Significant impact assessments under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) found that there is potential for significant impacts for the Giant Burrowing Frog (*Heleioporous australiacus*), and that disruption to the breeding cycle of Heath Frog (*Litoria littlejohni*) may occur. While the assessments determined that the proposed mine plans have the potential to impact local populations of these species, the Project is not predicted to interfere substantially with the recovery of any of these species as a whole.

The significant impact assessment for the Large-eared Pied Bat concluded that, while the Project has the potential to disrupt the breeding cycle of an important population, if present in the cliff habitat along Lizard Creek, there is a negligible to low risk that the Project could modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

The Project was found to be unlikely to significantly impact an endangered ecological community or any species listed as migratory on the EPBC Act. A referral of the proposal to the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities (SEWPaC) is being prepared.

The Project has also been assessed in accordance with the Threatened Species Conservation Act (TSC Act). The assessments concluded that the Project was likely to have a significant impact on habitat for local populations of the Red-crowned Toadlet and Giant Burrowing Frog, specifically in the tributaries of Lizard Creek in the Wonga West area. Two species, which may occur in the Study Area: Large-eared Pied Bat and Heath Frog, also have the potential to be impacted by the Project. The Project is predicted to have an adverse effect on potential breeding habitat for the Heath Frog associated with upland swamps and associated streams. If a population is present within the affected

areas, the Project would accordingly have an effect on the life cycle of this species such that the local populations may be placed at risk of extinction.

The assessment for the Large-eared Pied Bat and other cave-dependent bats including the Large-footed Myotis and Eastern Bentwing-bat concluded that there is a negligible to low risk that the action could modify, destroy, remove or isolate or decrease the availability or quality of breeding habitat associated with the cliffs and/or steep slope habitat in the Study Area.

The upland swamps are representative of the Coastal Upland Swamp EEC as listed under the TSC Act. The Project will not directly clear any areas of the EEC. However, the proposed longwall mining may result in subsidence and alter hydrological processes of the swamps, in particular the headwater swamps, as the mine plan has been revised to avoid the more sensitive valley infill upland swamps along Lizard Creek and Wallandoola Creek in Wonga West.

The Proposal involves progressive extraction of longwalls starting at the lower risk Wonga East domain, before moving to extraction from the wider longwalls of Wonga West. An ongoing monitoring regime of areas of special significance will be implemented with the objective to identify subsidence impacts as early as possible; identify other areas that are vulnerable to similar impacts; and provide recommendations to alter the mine plan to reduce the risk of subsidence impacts affecting similar values.

Swamps

There is potential for impacts to swamps of special significance CRUS1, CCUS1, CCUS4, CCUS5 and CCUS10 in Wonga East; and LCUS8, WCUS4, WCUS7 and WCUS11 in Wonga West. Commitments to ongoing monitoring and the preparation and implementation of adaptive management measures for these swamps have been made to reduce as far as economically viable the impacts on these swamps.

Some of the swamps are considered swamps of special significance on a national level based on the presence of nationally listed threatened species that are unable to withstand loss of habitat or population or individuals. Nationally significant species on the Woronora Plateau (as identified in DECCW 2011) recorded or predicted to occur in upland swamps of the Study Area include the Giant Burrowing Frog, Heath Frog (also known as Littlejohn's Tree Frog) and Prickly Bush-pea (*Pultenaea aristata*).

Aboriginal Archaeology

The approach to mine planning has enabled the majority of significant Aboriginal sites to be avoided, particularly those sites located adjacent to Cataract Dam.

A suite of monitoring measures will be implemented for the remaining 21 sites that are within the potential subsidence footprint. Four sites are of high archaeological significance. Where high or moderately significant sites have a moderate impact risk or higher, they will be actively managed. This will involve relocation (revisiting), regular monitoring and photographic archival recording. For sites of lower significance and/or risk, mitigation measures will include relocation and monitoring pre and post mining.

Historic Heritage

No items of historic heritage items are predicted to be impacted by the Project. However, the following measures will be implemented to mitigate potential impacts arising from the Project:

- no heritage items will be demolished as part of this Project;
- a revised Conservation Management Plan (CMP) will be prepared to reflect the future need of the site as a continuing mine;
- procedures will be developed for the discovery of unanticipated 'Relics';
- a photographic recording of the site will be undertaken including the 1887 portal; and
- items of moveable heritage will be retained at their current location on site and documented.

Russell Vale Water

Expansion of mining operations to include the Wongawilli seam will cause fluctuations in mine water flows. At end of the Project, the water production from mining operations is expected to increase to 3.1mL/day.

At start of mining in the Wongawilli seam, water produced from mining operations will not be enough to meet demand and additional water will need to be provided to supplement the site's water requirements.

It is anticipated that discharge into Bellambi Gully will be in line with current practice, and as such the existing licence will still be applicable for the increased mining operations.

It is proposed that the sludge from the existing thickener tank be diverted from Dam 1. Instead, the sludge will be dewatered. This will improve the efficiency and economy of the treatment processes and the solids output.

Air Quality

The improvement to surface facilities, including the new stockpile, coal handling facilities and truck loader will have a positive impact on the long term dust deposition, annual average PM₁₀ and TSP when compared to the existing operating conditions. While a maximum of one exceedance of the OEH short-term air quality criteria (maximum PM₁₀ 24 hour average concentration) of 50 µg/m³ is predicted, this is within the allowable five day exceedance limit and it is predicted that the Project would not have a significant impact on local air quality.

Concentration contours show that the highest impacts are centred on the Russell Vale site, with the predicted concentrations decreasing rapidly beyond the site boundary, with minimal impacts predicted beyond 1000m.

The potential for dust to be generated along the sealed Bellambi Lane as a result of entrainment by haulage vehicles will be managed through improvements to onsite truck loading and management facilities.

Greenhouse Gas

In this assessment, total emissions over the lifetime of the Project (direct and indirect) have been calculated as being 165 971 970tCO₂-e. Annual emissions are anticipated to peak in 2015, contributing 9 220 665tCO₂-e to the atmosphere.

Peak year direct greenhouse gases emissions (Scope 1 and 2) are estimated to be approximately 2 548 453tCO₂-e/annum in 2015, meaning that the greenhouse intensity of the Project will equate to approximately 0.85tCO₂-e for each tonne of ROM coal material extracted. Total direct emissions over the operational lifetime of the project are estimated at 45 872 154tCO₂-e.

Noise

Minor exceedances of less than 2dB(A) may occur at two receivers during the evening period. Noise levels of this magnitude would typically be indiscernible to the human ear, and further noise reduction may be achievable. These predicted noise levels would be confirmed upon the commencement of operations.

Traffic noise along Bellambi Lane has been assessed and the Project would result in an increase in L_{Aeq,1hr} noise levels of less than 2dB(A) compared to existing road traffic noise levels. Therefore, the predicted traffic noise generation would comply with the ECRTN.

Traffic

The average number of coal trucks operating in 2019 (modelled peak traffic movements) is projected to generate between 512 and 682 vehicle trips per day, which is an increase of 126% to 202% over current rates. A detailed traffic assessment including consideration of peak flows and intersection functioning has determined that the Project is not predicted to impact on the safety and performance of the road network along the transport corridor. Potential safety issues associated with increase traffic flows on the local road network interacting with coal haulage trucks will be managed through enforcing a driver code of conduct in conjunction with the trucking contractor.

Social

A number of perceived and actual social and economic impacts will occur as a result of the Project, and will be managed by a range of prevention and mitigation processes. These impacts may include the following:

- potential noise associated with site operations and coal haulage which will be managed by construction of additional noise barriers, appropriate acoustic mitigation to equipment and continuing noise monitoring;
- potential safety issues associated with increase traffic flows on the local road network associated with coal haulage trucks which will be managed through enforcing a driver code of conduct;
- potential dust impacts associated with coal haulage to be managed by truck washing, improved load out facilities and improved dust controls on conveyors and stockpile facilities;
- potential expansion of businesses with increased local spending on goods and services;

- ensuring ongoing employment in the mining sector across NRE operations in the Illawarra;
- significant flow-on effects into the local, regional, state and national economy;
- improved environmental efficiencies including improved air quality, noise and site management; and
- maintaining NRE's ongoing contribution to community development.

Economic

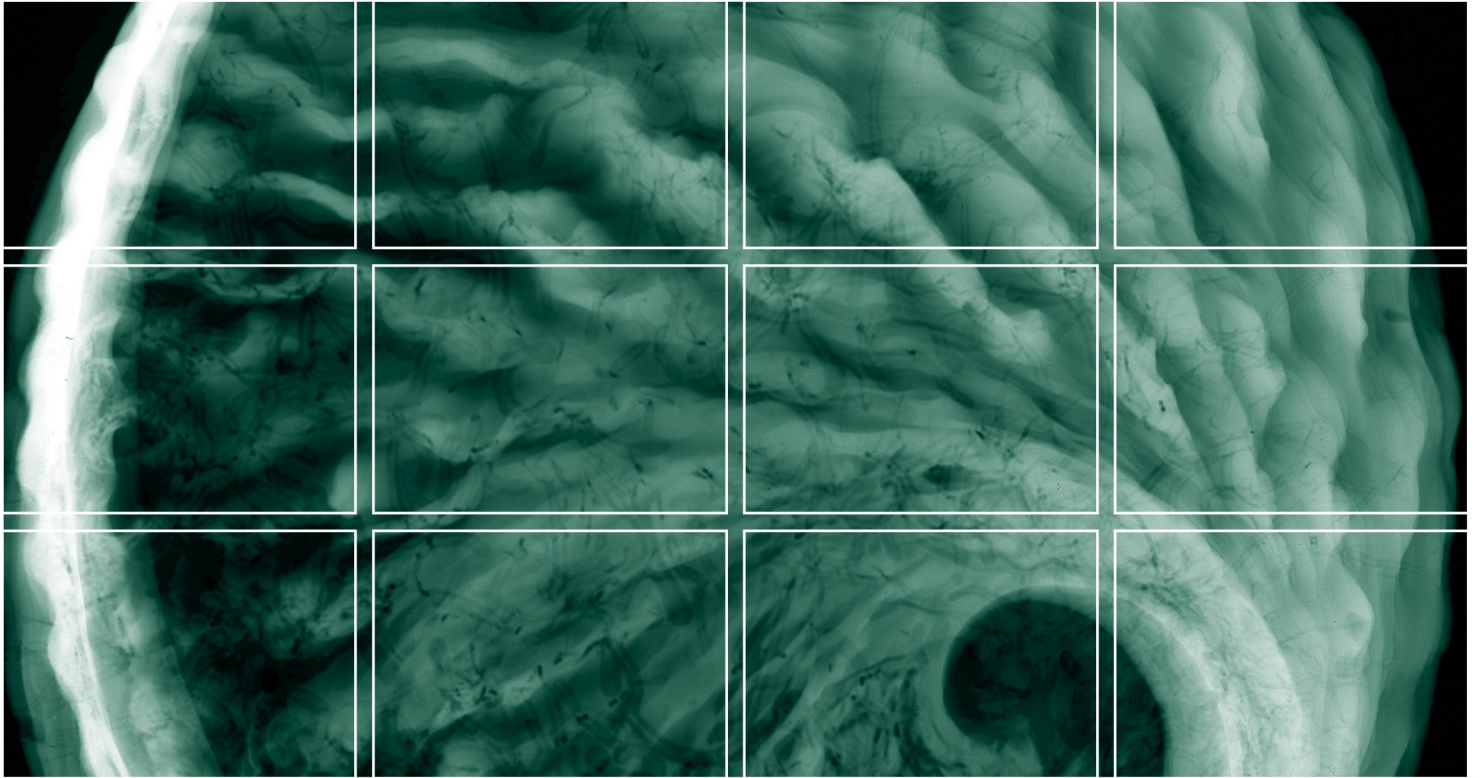
Compared to the "No Project" scenario, the Project will have a significant positive economic impact on the economy. Over the 18-year lifespan, in present value terms, it is estimated that the Project will generate an additional:

- Net Present Value (NPV) of \$609 million;
- expenditure of \$1,638m, of which \$1,083m will be to the regional economy, (equivalent to an average of \$60m per year);
- total direct and indirect regional economic impact of \$3,631m on total output, \$1,981m on incomes;
- 409 regional jobs per year and indirect creation of a total of 2,137 regional jobs;
- \$576m to Government revenues; and
- foreign exchange revenue of \$4,961m (not discounted).

Economic

Compared to the “No Project” scenario, the Project will have a significant positive economic impact on the economy. Over the 18-year lifespan, in present value terms, it is estimated that the Project will generate an additional:

- Net Present Value (NPV) of \$609 million;
- expenditure of \$1,638m, of which \$1,083m will be to the regional economy, (equivalent to an average of \$60m per year);
- total direct and indirect regional economic impact of \$3,631m on total output, \$1,981m on incomes;
- 409 regional jobs per year and indirect creation of a total of 2,137 regional jobs;
- \$576m to Government revenues; and
- foreign exchange revenue of \$4,961m (not discounted).



PART A

INTRODUCTION

1 BACKGROUND

This chapter introduces and provides a background to the Project, including its historical context and geographical setting. A description of the purpose and structure of this Environmental Assessment Report is also provided.

1.1 INTRODUCTION

Gujarat NRE Coking Coal Limited (NRE) is seeking approval to establish new mining domains at NRE No.1 Colliery in the Southern Coalfield and where necessary, upgrade associated surface facilities (the 'Project'). This is 'Stage 2' of a proposed expansion of the Colliery (see *Section 1.1.2*).

NRE No. 1 Colliery is located at Russell Vale, to the west of Bellambi, in the Illawarra region of New South Wales (NSW). A locality map is presented as *Figure 1.1* and the Project Application Area (PAA) is shown in *Figure 1.2*. The PAA represents the colliery holding, which includes a number of sub leases between NRE and surrounding mine operators. Surface lease areas are shown in *Figure 1.3*.

The PAA comprises Consolidated Coal Lease (CCL) 745, Mining Purposes Lease (MPL) 271 and Mining Lease (ML) 1575 and covers a total area of approximately 6,973 hectares (ha).

Extensive underground mining has been undertaken within the PAA, dating from the late nineteenth century however, a substantial volume of high quality coking coal resources remains along with some potential thermal coal resources. NRE is currently mining coal in the Bulli and Wongawilli coal seams.

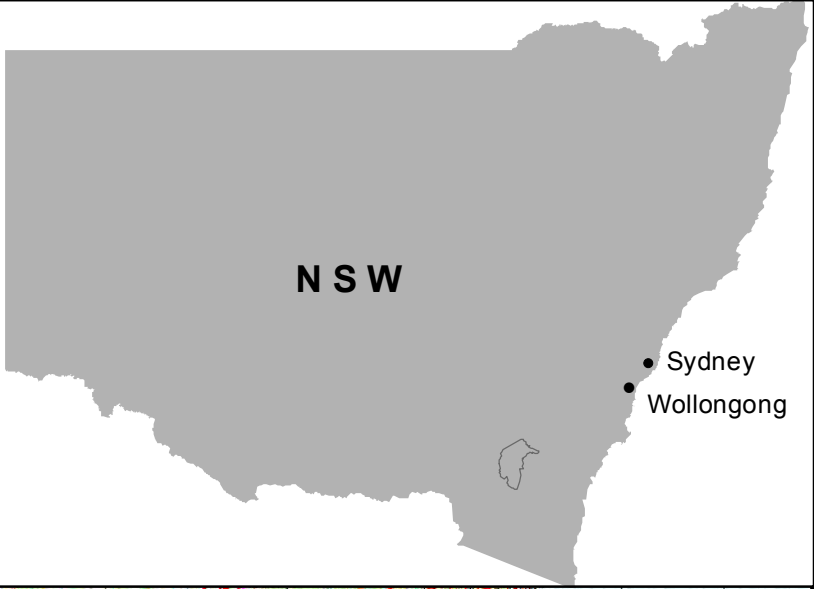
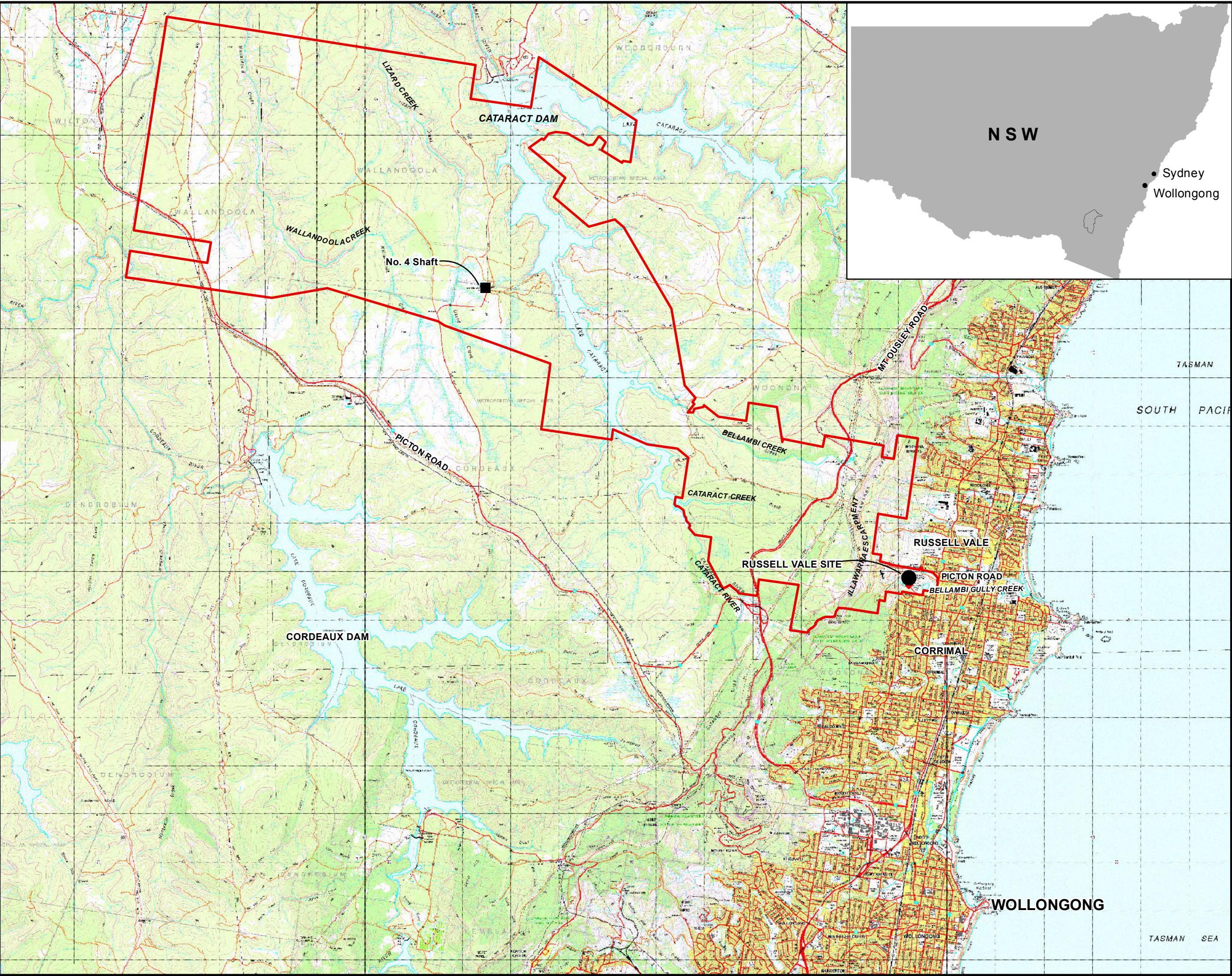
Pursuant to the provisions of *State Environmental Planning Policy – Major Projects 2005*, the Project requires approval under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The proposed mining may also potentially impact on threatened species listed under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A referral to the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities is being prepared.

Environmental Resources Management Australia Pty Ltd (ERM) has been commissioned by NRE to undertake this Environmental Assessment Report (EAR).

1.1.1 Project Overview

The Project will have an estimated capital investment value of \$250 million and will increase coal production up to 3 million tonnes per annum (Mtpa) with a proposed mine life of at least 18 years. This Project will involve:

- continued westward development of the existing 'Wonga Mains' driveage from Russell Vale for ventilation and to access underground working areas;
- longwall mining of the Wongawilli seam in the 'Wonga East' area, beneath previously mined Balgownie and Bulli seam workings;



Legend

Project Application Area

Figure 1.1
Locality Map

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
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Date:	21/11/2012	Drawing Size:	A3
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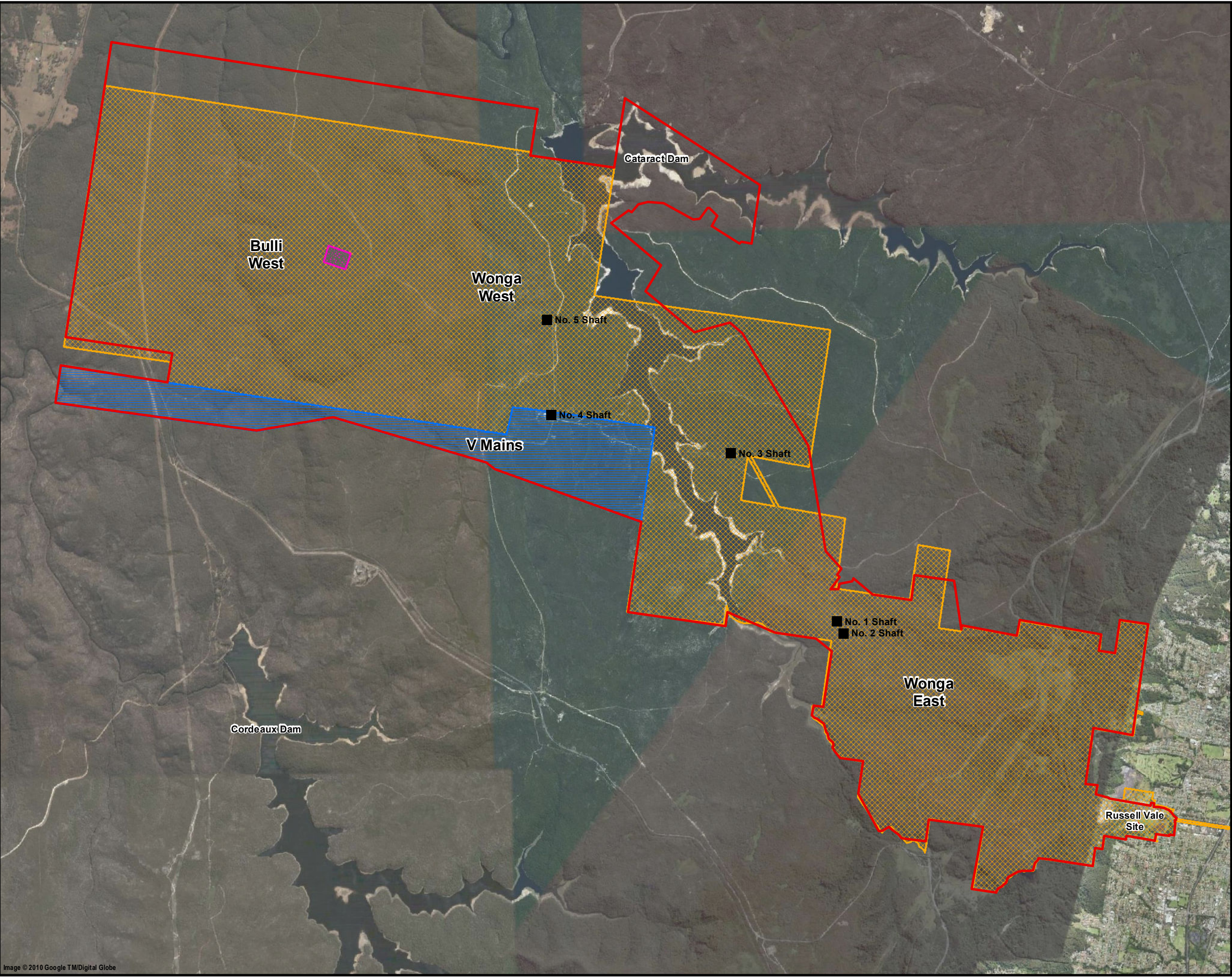


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Legend

PAA_072010

Lease Boundaries

CCL745

ML1575

MPL271

Figure 1.2**Project Application Area and Mining Tenements**

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EA_GIS002_R0.mxd		
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1,500m

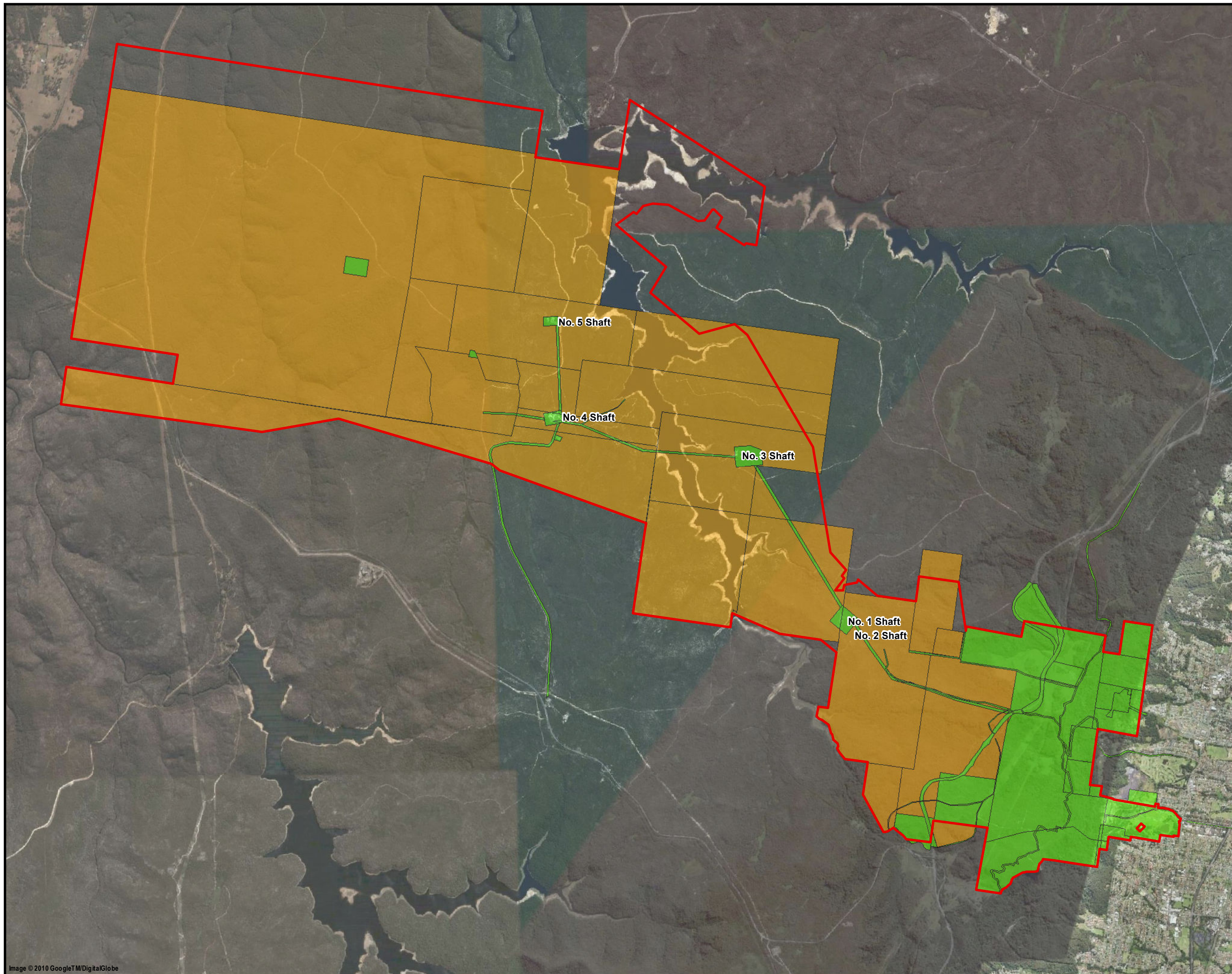
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ERM



Legend

- Project Application Area
- Surface Lease
- Underground Lease

Figure 1.3

Surface Lease Areas

Client: Gujarat NRE Coking Coal Limited

Project: NRE No.1 Colliery
Environmental Assessment

Drawing No: 0079383s_EA_GIS012_R0.mxd

Date: 22/09/2010 Drawing size: A3

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- longwall mining of the Wongawilli seam in the 'Wonga West' area beneath the previously mined Bulli seam workings;
- first workings in the Bulli seam in the 'Bulli West' area (anticipated to have no direct subsidence impacts);
- Balgownie seam mining, limited to first workings only, beneath overlying Bulli seam workings (anticipated to have no direct subsidence impacts);
- further upgrading of existing mine infrastructure and services at Russell Vale, including surface conveyors and coal handling infrastructure, coal sizing, screening, and load-out facilities, site noise and dust controls, a stockpile for run-of-mine (ROM) coal;
- continuing use of No.4 Shaft for mine access (men and materials), bathhouse, offices and parking areas;
- essential maintenance and refurbishment of existing ventilation shafts and power and water supply arrangements to ensure they comply with current day operational and safety requirements;
- upgrading of site water management including, but not limited to, mine water and stormwater controls;
- continuing road haulage of ROM coal to Port Kembla Coal Terminal (PKCT) for export, using the existing haulage route;
- trucking fleet upgrades in line with current standards with suitable braking systems and covers for all loads; and
- ongoing geological and geotechnical investigations to validate coal quality and geophysical characteristics utilising drilling and related exploration techniques.

1.1.2 *Related Projects*

This Project represents Stage 2 of the Colliery upgrade (MP 09_0013). A separate application for Stage 1, the Preliminary Works Project (MP 10_0046) was submitted to the Department of Planning (DoP) in June 2010 and was approved on 13 October 2011.

Stage 1 involves continuing operation of the Colliery including:

- augmenting, upgrading and using the existing infrastructure;
- extracting up to 1Mtpa of ROM coal from remnant coal reserves within existing mining areas; and
- transporting ROM coal from the mine via truck haulage.

A separate application to modify the Preliminary Work Project (MP 10_0046) was prepared by Cardno (2012) and lodged with the Department of Planning and Infrastructure (DP&I) in August 2012.

The modification application was approved on 24 December 2012 for mining of Longwalls 4 and 5 in Wonga East and, development of the main gate for panel 6.

NRE lodged a Subsidence Management Plan application for the extraction of Longwalls 4 and 5 in Wonga East with the Department of Trade and Investment Division of Resources and Energy (DRE) in March 2012. Approval for Longwall (LW) 4 was granted on 26 March 2012.

1.2 *COMPANY PROFILE*

NRE is a public company, which was listed on the Australian Stock Exchange (ASX code: GNM) on 10 July 2007. NRE owns and operates NRE No. 1 Colliery and NRE Wongawilli.

NRE is a subsidiary company of Indian based, Gujarat NRE Coke Limited. The core business of Gujarat NRE Coke Limited is processing and marketing metallurgical coke. It is India's largest independent manufacturer of low ash metallurgical coke and one of the world's largest and fastest growing merchant coke producers. In addition to its interests in NRE No. 1 Colliery, Gujarat NRE Coke Ltd:

- owns and operates NRE Wongawilli Colliery (formerly Elouera and Avondale Collieries), in the Illawarra region, to the south of the PAA;
- operates the Bhachau coal coking plant in Gujarat, India, which imports coking coal from its Australian coal mines and manufactures coke for the high demand Indian and western markets;
- has investments in resource prospecting companies involved in base metal exploration, including for coal, gold, magnetite and iron-ore;
- operates a steel mini-mill in Gujarat that recycles steel scrap for the production of steel reinforcing bars;
- plans to set up a new coking plant in Karnataka, India;
- plans to set up power plants adjacent to its Bhachau facility, that will utilise the waste heat generated by the coking ovens; and
- operates a number of wind turbines in India to generate 'green' power.

1.3 *HISTORY OF NRE NO.1 COLLIERY*

The South Bulli Coal Mining Company commenced mining on the slopes of the Illawarra Escarpment at NRE No. 1 Colliery (formerly the South Bulli Mine) in the late-19th Century. Continuous mining has been a feature of the PAA since 1887 and surface facilities have operated at the Russell Vale site since this time.

With the advent of more sophisticated mining methods in the 1960s, workings progressed further west of the Illawarra Escarpment. Subsequently, four ventilation shafts (Shaft Numbers 1, 2, 3 and 5) and a shaft to provide personnel and materials access to the workings (No. 4 Shaft) were sunk to the west of the escarpment. Mining commenced in the early 1990's beneath the catchment and stored waters of Cataract Dam.

In August 2004, production temporarily ceased and the mine was placed on care and maintenance until 3 December 2004 when it was sold to NRE by Bellpac Pty Ltd. Mining recommenced at NRE No.1 Colliery in July 2005. The coal washery at Russell Vale ceased operation in March 2003, and all ROM coal is now transported unwashed to PKCT for shipment to India.

NRE recently mined the Bulli seam in areas known as 310, 312 and 'P' panels, as well as in the Wongawilli seam in an area known as Wonga Mains and LW 4 in Wonga East. Current coal production is approximately 1Mtpa.

1.4 **PROJECT APPLICATION AREA**

1.4.1 **Description**

The Project Application Area (PAA) is approximately eight kilometres (km) north of Wollongong and 70km south of Sydney, within the local government areas (LGAs) of Wollongong and Wollondilly in the Illawarra region of NSW.

Part of the eastern portion of the lease is located on the Illawarra Escarpment. Within the PAA, the lip of the Escarpment reaches up to 400 metres (m) Australian Height Datum (AHD) and slopes steeply down to the foothills at approximately 30m AHD. The steep slopes of the escarpment are heavily vegetated.

The Russell Vale site is located on the lower slopes and foothills of the Escarpment at approximately 140m AHD. The Russell Vale site is bounded by the Princes Highway to the east, with residential areas of Russell Vale and Corrimal to the east and south, respectively.

The majority of the PAA comprises an extensive underground lease area, which lies under the Woronora Plateau west of the escarpment. The surface of the plateau is covered by native bushland, waters of Cataract Dam, streams and upland swamps. Cataract Dam is one of metropolitan Sydney's potable water supplies. Consequently, a large part of the PAA (which lies within its catchment) is designated as a *Schedule 1 Restricted Access Area (Metropolitan Special Area)* under the *Sydney Water Catchment Management Act 1998*. It is managed by the Sydney Catchment Authority (SCA). In accordance with the *SCA Special Areas Strategic Plan of Management 2007*, this land is managed with the aim of protecting water quality and providing high quality raw water in reservoirs, by protecting ecological integrity and natural and cultural values.

In addition to the Russell Vale site, NRE has surface leases and one access shaft (No.4 Shaft) and four ventilation shaft sites (No. 1, 2, 3 and 5 Shafts) across the PAA. A brief description of surface sites is provided in *Section 2.1* and their locations are indicated on *Figure 1.3*.

1.4.2 **Leases**

The PAA covers approximately 6,973ha, encompassing CCL 745, MPL 271 and ML 1575. An aerial photograph showing the PAA and mining tenements is presented in *Figure 1.2*. Areas of mining tenements that have been sub-let to other mining companies are not included in the boundary of the PAA. Areas of the colliery holding which have been sub-leased from other mining companies are included in the PAA.

CCL 745 is the largest lease and makes up the majority of the PAA. It covers approximately 6,420ha, from the Russell Vale site over the escarpment and west across the Woronora Plateau (see *Figure 1.2*). The proposed mining areas Wonga East, Wonga West and the Wonga Mains are located within this lease. Proposed surface facility upgrades will also take place within this lease area.

MPL 271 is a small surface lease covering 8.7ha within the centre of the western portion of the PAA. It is located within the Metropolitan Special Area and is covered in bushland. Initially identified as the location for No. 6 Shaft, this MPL is currently unused and there is no infrastructure located at the site. There are no works proposed within this lease.

ML 1575 makes up the southern portion of the western part of the PAA and is approximately 544ha.

1.4.3 *Infrastructure*

Infrastructure above the proposed mining areas includes a Telstra fibre optic cable, electrical transmission lines and roads, sealed and unsealed (see *Figure 1.4*).

An optical fibre cable crosses the PAA north to south from Picton Road following Fire Trail No. 8. This optical fibre cable is the Melbourne-Sydney No.3 optical fibre identified by Telstra as F HOME 2005 48 fibre.

In addition to the power supply to the colliery and its shafts, there are a number of other electrical transmission lines that cross the PAA including a 330kV transmission line and a number of sub-transmission lines owned by Integral Energy (one 132kV line and three 33kV lines) that generally follow Mount Ousley Road and the alignment of the escarpment.

The Southern Freeway (Mount Ousley Road) crosses the PAA to the west of the Russell Vale site. This is a State road managed by the Roads and Maritime Services (RMS). Picton Road crosses the western portion of the PAA in a northwest to southeast direction. It is a major road managed by RMS.

There are a number of unsealed fire trails across the PAA, the main ones being Fire Trail No.7 and Fire Trail No.8. Fire trails within the Metropolitan Special Area are maintained by the SCA. The remaining fire trails are maintained by the NSW Rural Fire Service.

There are a number of old quarry sites on the lease, previously used to supply material for maintaining the unsealed fire trails, but none are included in the current or planned future operations.

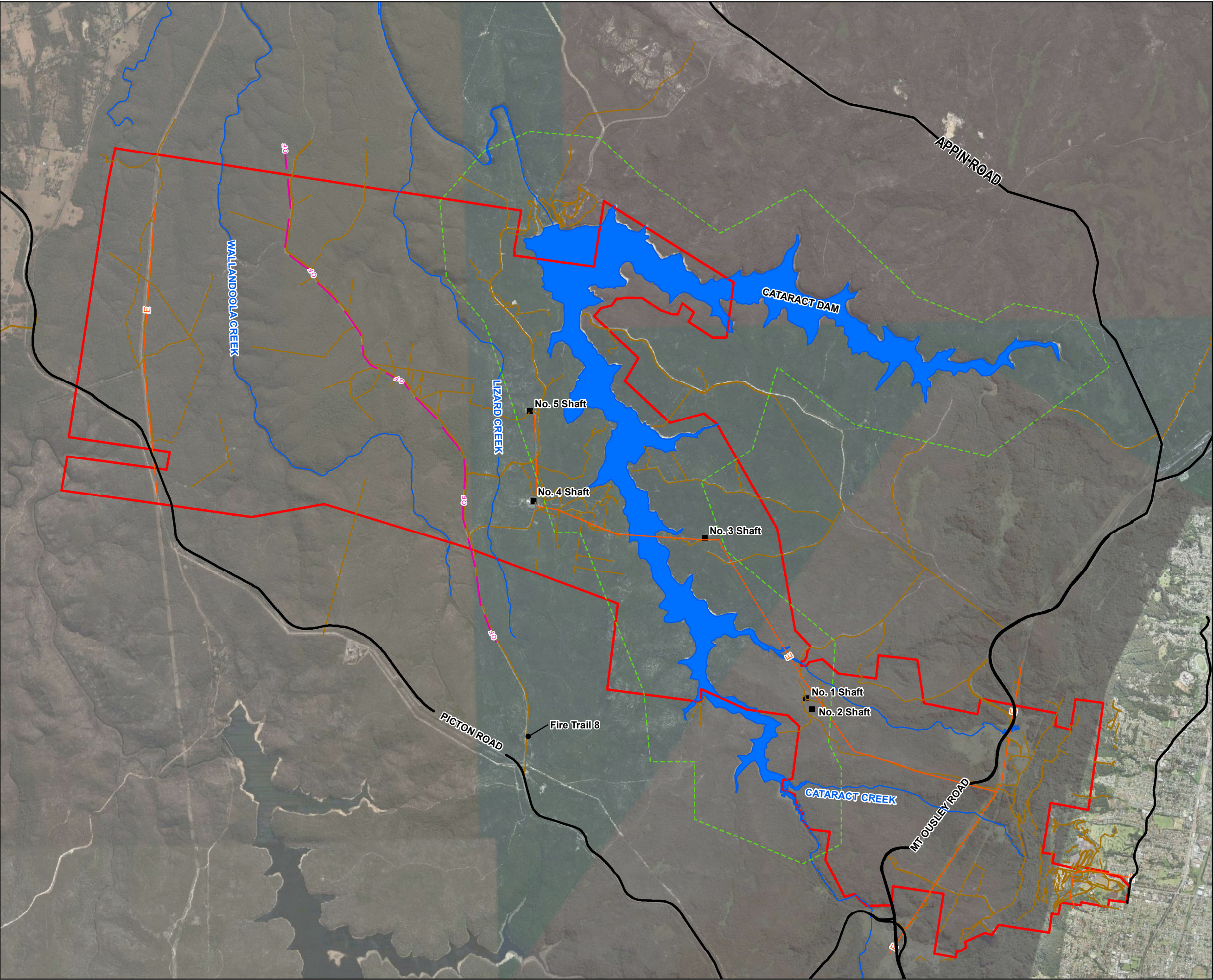
1.4.4 *Mining Tenements and Land Ownership*

The PAA encompasses three mining leases, CCL 745, MPL 271 and ML 1575. CCL 745 remains valid until 30 December 2023, MPL 271 until 9 May 2033 and ML 1575 until 7 October 2029. Surface and underground leases are shown on *Figure 1.3*.

The majority of the surface land within the PAA is owned by the SCA. Relevant tenure and land ownership information is presented in *Table 1.1* and *Figure 1.5*.

Table 1.1 Land Ownership Information

Property ID/ Lot Number	DP Plan Number	Owner
Auto Consol 1833-110		Gujarat NRE Coking Coal Ltd
Auto Consol 1644-66		Gujarat NRE Coking Coal Ltd
Auto consol 5333-243 includes:		Gujarat NRE Coking Coal Ltd
Lot 3	DP 60975	Gujarat NRE Coking Coal Ltd
Lot 30 to 32	DP 751301	Gujarat NRE Coking Coal Ltd
Lot 63&68 -71	DP 751301	Gujarat NRE Coking Coal Ltd
Lot 1-2	DP 1046069	Gujarat NRE Coking Coal Ltd
Lot 1	DP 1046070	Gujarat NRE Coking Coal Ltd
Lot 130	DP 751301	Gujarat NRE Coking Coal Ltd
Lot 31	DP 1006012	Gujarat NRE Coking Coal Ltd
Lot 1	DP 630761	Gujarat NRE Coking Coal Ltd
Lot 1	DP 986675	Gujarat NRE Coking Coal Ltd
Lot 1	DP 986676	Gujarat NRE Coking Coal Ltd
Lot 1	DP 534522	Gujarat NRE Coking Coal Ltd
Lot 95 to 96	DP 4414	Gujarat NRE Coking Coal Ltd
Lot 97	DP 4414	The Council of the City of Wollongong
Lots 1 to 4	DP 225021	Gujarat NRE Coking Coal Ltd
Lot 34	DP 751301	Gujarat NRE Coking Coal Ltd
Lot 6	DP 793358	Gujarat NRE Coking Coal Ltd
Lot 66	DP 751301	Gujarat NRE Coking Coal Ltd
Lot 67	DP 751301	Gujarat NRE Coking Coal Ltd
Lot 1	DP 652833	Gujarat NRE Coking Coal Ltd
Lot 6001	DP 1077301	Gujarat NRE Coking Coal Ltd
Lot 1	DP 77407	Gujarat NRE Coking Coal Ltd
Lot 1	DP 1052074	Gujarat NRE Coking Coal Ltd
Lot 2	DP 1052074	Gujarat NRE Coking Coal Ltd
Part Lot 6000	DP 1077301	Illawarra Land Pty Ltd
Lot 6500	DP 1083715	Illawarra Land Pty Ltd
Lot 6502	DP 1083715	Ronald Edward Devitt & Jane Wilson
Part Lot 6501	DP 1083715	Barbara Jean Williams
Lot 12	DP 736121	Integral Energy Australia
Lot 32	DP 1138149	Sydney Catchment Authority



Legend

- Project Application Area
- Dam
- Shaft Locations
- Cataract Dam Notification Area
- Telstra Optic Fibre
- Transmission Lines
- Fire Trails & Access Tracks
- Waterway
- Major Roads
- Minor Roads

Figure 1.4
Surface Infrastructure

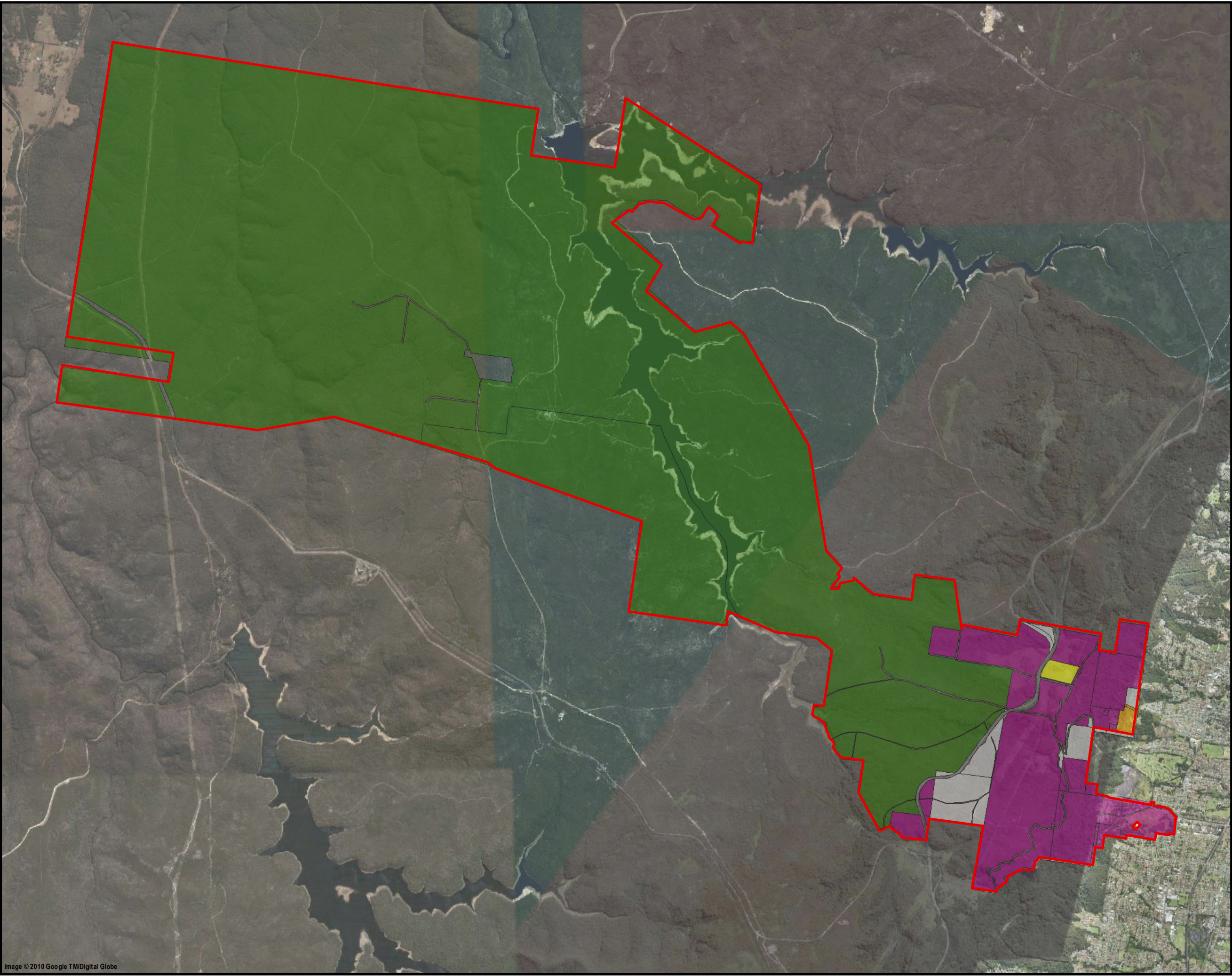
Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EARPA2012_G002_R0.mxd		
Date:	22/11/2012	Drawing size:	A3
Drawn by:	KB	Reviewed by:	MK
Scale:	Refer to Scale Bar		

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Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch,
Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney





Legend

Project Application Area

Land Ownership

Bellpac Pty Ltd

Illawarra Land Pty Ltd

Integral Energy Australia

Private Land

Sydney Catchment Authority

Figure 1.5**Land Ownership**

Client:Gujarat NRE Coking Coal Limited

Project:NRE No.1 Colliery Environmental Assesment

Drawing No: 00079383s_EA_GIS013_R0.mxd

Date: 22/09/2010Drawing size: A3

Drawn by: NSReviewed by: MK

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Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

1.5 DIRECTOR GENERAL'S REQUIREMENTS

The Project was determined to be a Major Project to which Part 3A of the EP&A Act applies. Director General's Requirements (DGRs) were issued on 18th August 2009 and are presented in *Table 1.2*. The DGRs are provided in *Annex A*.

Table 1.2 Director General Requirements

Description	Relevant Section in Environmental Assessment Report
General Requirements:	
The Environmental Assessment Report must include:	
• An executive summary;	<i>Executive Summary</i>
• A detailed description of the following within NRE No.1 Colliery holdings and any associated reject disposal areas:	
• Historical mining operations	<i>Section 1.3</i>
• Existing and approved mining operations/ facilities, including any statutory approvals that apply to these operations/ facilities; and	<i>Chapter 2 and Section 4.7</i>
• The existing environmental management and monitoring regime;	<i>Chapter 2 and Section 4.7</i>
• A detailed description of the project including the:	
• Need for the project;	<i>Section 1.6</i>
• Alternatives considered, including a justification for the proposed mine plan/s and coal rejects disposal strategy on economic, social and environmental grounds ;	<i>Chapter 3</i>
• Likely staging of the project	<i>Section 3.7 and 3.8</i>
• Plans of any proposed building works;	<i>Annex C</i>
• A risk assessment of the potential environmental impacts of the project, identifying the key issues for further assessment;	<i>Chapter 6 and Annex F</i>
• A detailed assessment of the key issues specified below, and any other significant issues identified in the general overview of environmental impacts of the project (see above), which includes:	<i>Chapters 8 to 28 and Annex B to V</i>
• A description of the existing environment using sufficient baseline data;	<i>Chapters 8 to 28 and Annex B to V</i>
• An assessment of the potential impacts of all stages of the project including any cumulative impacts, taking into consideration any relevant guidelines, policies, plans and statutory provisions (see below) and the findings and recommendations of the recent Southern Coalfield inquiry;	<i>Chapters 8 to 28 and Annex B to V</i>
• A description of the measures that would be implemented to avoid, minimise and mitigate, rehabilitate/remediate, monitor and offset the potential impacts of the project, including detailed contingency plans for managing any potentially significant risks to the environment;	<i>Chapters 8 to 28 and Annex B to V</i>
• A Statement of Commitments, outlining all the proposed environmental management and monitoring measures;	<i>Chapter 29</i>
• A conclusion justifying the project on economic, environmental and social grounds, taking into consideration whether the project is consistent with the objectives of the <i>Environmental Planning and Assessment Act 1979</i> ;	<i>Chapter 30</i>
• A signed statement from the author of the Environmental Assessment certifying that the information contained within the documents is neither false nor misleading.	<i>Signature page</i>

Description	Relevant Section in Environmental Assessment Report
Key Issues:	
<ul style="list-style-type: none"> Subsidence – including: <ul style="list-style-type: none"> Accurate prediction of the potential subsidence effects of the proposed mine plan/s, and a sensitivity analysis of these predictions; and A detailed assessment of the potential impacts and environmental consequences of these subsidence effects on both the natural and built environment, paying particular attention to significant natural features, Sydney Catchment Authority Assets and Mount Ousley Road; 	<p><i>Chapter 18 and Annex M</i></p> <p><i>Chapter 18 to 19 and Annex M to V</i></p>
<ul style="list-style-type: none"> Soil and Water - including: <ul style="list-style-type: none"> A detailed assessment of the potential impacts of the project on the quantity, quality and long term integrity of the surface and ground water resources in the project area, paying particular attention to the upper Nepean River Sub-catchment (Metropolitan Special Area), the discharge of mine water, and surface run off into Bellambi Gully Creek and Bellambi Lagoon; A site water balance including a detailed description of the measures that would be implemented on site to minimise the water use of the project; 	<p><i>Chapter 8, 20 and 21, Annex B, O and P</i></p>
<ul style="list-style-type: none"> Biodiversity – including: <ul style="list-style-type: none"> Accurate estimate of any vegetation clearing or other impacts; A detailed assessment of the potential impacts of the project on any terrestrial and aquatic threatened species, populations, ecological communities or their habitats; and A detailed description of the measure that would be implemented to maintain or improve the biodiversity values of the surrounding region in the medium to long term; 	<p><i>Chapter 22 to 24, Annex Q, R, S and T</i></p>
<ul style="list-style-type: none"> Heritage – including the potential Aboriginal and non-Aboriginal heritage impacts of the project, both within the surface infrastructure areas and proposed mining area; 	<p><i>Chapter 14 and 17 and Annex L and U</i></p>
<ul style="list-style-type: none"> Noise – including on-site construction and operational noise and off site road noise and vibrations from the haulage of coal along the coal transport corridor to Port Kembla Coal Terminal; 	<p><i>Chapter 9 and Annex H</i></p>
<ul style="list-style-type: none"> Air Quality - including a consideration of the impacts that surface infrastructure operations and coal haulage by trucks, could have in the local air shed and in areas along the coal transport corridor; 	<p><i>Chapter 10 and Annex I</i></p>
<ul style="list-style-type: none"> Greenhouse Gas – including: <ul style="list-style-type: none"> A quantitative assessment of the potential scope 1, 2 and 3 greenhouse gas emissions of the project, and qualitative assessment of the potential impacts of these emissions on the environment; A detailed description of the measures that would be implemented on site to ensure that the project is energy efficient; and Possible alternatives for the use or combustion of methane, rather than directly venting to the atmosphere; 	<p><i>Chapter 11</i></p>
<ul style="list-style-type: none"> Transport - including a detailed assessment of the potential impacts of the project on the safety and performance of the road network specifically along the coal transport corridor; 	<p><i>Chapter 12 and Annex J</i></p>
<ul style="list-style-type: none"> Waste – including: <ul style="list-style-type: none"> estimates of the quantity and potential nature of the waste streams of the project, including detail on any wastewater management systems; a detailed description of the measures that would be implemented to minimise, reuse, recycle and dispose of any waste produced on site; 	<p><i>Chapter 15</i></p>
<ul style="list-style-type: none"> Hazards – paying particular attention to public safety; 	<p><i>Section 7.6</i></p>
<ul style="list-style-type: none"> Rehabilitation - including a detailed description of the proposed rehabilitation strategy for the mine, taking into consideration any relevant strategic land use planning or resource management plans or policies; and 	<p><i>Chapter 16</i></p>

Description	Relevant Section in Environmental Assessment Report
<ul style="list-style-type: none"> • Social and Economic – including the cost of rehabilitation remediation and repair. 	Chapter 27 and 28
<p>During the Preparation of the Environmental Assessment, you should consult relevant local, State, or Commonwealth Government authorities, service providers, community groups or affected landowners.</p> <p>In particular you should consult with the:</p> <ul style="list-style-type: none"> • Department of Environment, Climate Change and Water; • Industry and Investment NSW; • Sydney Catchment Authority; • Dam Safety Committee; • Mine Subsidence Board; • Roads and Traffic Authority; • Department of Lands; and • Wollongong and Wollondilly Council. <p>The consultation process and the issues raised during this process must be described in the Environmental Assessment.</p>	Chapter 5

1.6 NEED FOR THE PROJECT

This Project is required to ensure the continuation and operation of the Colliery. The Wongawilli seam provides a substantial resource. The proposed works will allow a continuation of mining as well as improve the operational efficiency of the Colliery.

The Project will have environmental, social and economic benefits including:

- improved environmental efficiency through stormwater and mine water management systems upgrades and better management of noise and air quality at the Russell Vale site by upgrading infrastructure;
- upgraded coal handling infrastructure with the potential to better manage noise and dust management for the site;
- provision of employment and training;
- economic benefits to the Wollongong community via capital injection and value added spending through wages and provision of mining related services by contractors;
- enhancement of the economic position of NRE which in turn will fuel investment in other projects;
- extraction of a valuable mineral resource before the site reverts to other uses, thus preventing the potential sterilisation of the resource;

- extension of the life of mining at the Colliery ensuring continued provision of government royalties; and
- preservation of the historical heritage of the site for future generations.

1.7 *PURPOSE OF THE EAR*

This environmental assessment report (EAR) has been prepared to:

- provide relevant background information and describe the key components of the proposal;
- outline the legislative framework under which the proposal will be assessed;
- detail the consultation process undertaken for the Project and demonstrate how issues raised have been addressed in the assessment;
- assess the potential environmental impacts of the Project;
- identify measures to mitigate or negate potential adverse impacts through a Statement of Project Commitments;
- provide justification for the Project;
- provide sufficient information for the relevant agencies to make an informed decision on the matters raised by the DGRs; and
- support the Project Application to be determined, under Clause 75(F) of the EP&A Act, by the Minister of Planning.

1.8 *STRUCTURE OF THE EAR*

This EAR contains four volumes with the main environmental assessment being contained within Volume I and the supporting technical assessments in Volume II to VI.

Volume I has been prepared to ensure that the existing activities and proposed changes are described adequately, the potential environmental impacts are properly assessed and existing mitigation and proposed additional measures are detailed.

Within **Volume I** information has been presented in 4 Parts:

- **Part A Introduction** provides an introduction to the existing operations, the Project, an outline statutory requirements and consideration of matters pertaining to the overall Project;
- **Part B Surface Facilities** provides a description of surface facility upgrades and all environmental assessment matters relevant to surface operations;
- **Part C Longwall Mining** provides a description of the proposed Wonga East and Wonga West Longwall operation and all relevant environmental assessment matters;
- **Part D Conclusion** summarises environmental assessment findings and provides Social Impact Assessment, Economic Assessment, sustainability assessment and draft Statement of Commitments.

Volume II to VI contains 21 annexes as follows:

<i>Annex A</i>	Director-General's Requirements;
<i>Annex B</i>	Water Management Report Gujarat NRE No. 1 Colliery Major Works Part 3A;
<i>Annex C</i>	Surface Layout and Building Plans;
<i>Annex D</i>	NRE No 1 Colliery Russell Vale Site Stage 2 of Upgrade to Surface Facilities and On-site Traffic Report;
<i>Annex E</i>	NRE Community Engagement Strategy;
<i>Annex F</i>	NRE No 1 Colliery Wongawilli East and West Mining Areas Failure Mode and Effects Analysis Report 2012;
<i>Annex G</i>	The Potential for a Pillar Run in the Balgownie and Bulli Seams following the Extraction of the Wongawilli East Longwall Panels
<i>Annex H</i>	NRE No.1 Colliery Noise Assessment Major Works Project;
<i>Annex I</i>	NRE No.1 Colliery Air Quality Assessment;
<i>Annex J</i>	Gujarat NRE No.1 Mine Traffic Study;
<i>Annex K</i>	Visual Assessment Photo Montage;
<i>Annex L</i>	NRE No.1 Colliery Historic Heritage Assessment;
<i>Annex M</i>	NRE No.1 Colliery Management of Subsidence Risks Associated with Wongawilli Seam Extraction;
<i>Annex N</i>	Review of Subsidence and Related Facets of the NRE No 1 Colliery Underground Expansion Project Draft Environmental Assessment;
<i>Annex O</i>	NRE No.1 Colliery Stream Assessment;
<i>Annex P</i>	NRE No.1 Colliery Groundwater Assessment;
<i>Annex Q</i>	NRE No. 1 Colliery Major Expansion Upland Swamp Assessment;
<i>Annex R</i>	NRE No 1 Colliery Assessment of Mine Subsidence Impacts on Aquatic Habitat and Biota;
<i>Annex S</i>	NRE No.1 Colliery Stage 2 Terrestrial Flora and Fauna Assessment;
<i>Annex T</i>	NRE No. 1 Colliery Matters of National Environmental Significance;
<i>Annex U</i>	NRE No.1 Colliery Aboriginal Heritage Assessment; and
<i>Annex V</i>	NRE No. 1 Colliery Cliffs and Steep Slopes Assessment.

1.9 PROJECT SUMMARY

NRE seeks approval to continue its underground coal mining operation at NRE No. 1 Colliery, and to increase coal production to a maximum of 3Mtpa over a period of up to 18 years. The unwashed coal will be trucked to PKCT for export. Project components are described in *Chapter 2*, and a summary is provided in *Table 1.3*. The Stage 1 of the Project involved preliminary works for the preparation of the site to accommodate the commencement of Stage 2 works.

Table 1.3 Project Summary

Project Component	Existing Operations	Proposal
Underground Mining	<i>Bulli seam</i> : pillar extraction in the T and W mains and first workings in the 'P' panel area, which will move into the V Mains. <i>Balgownie seam</i> : no current production. <i>Wongawilli seam</i> : ongoing driveage of Wonga Mains from Russell Vale site and longwall mining of A2 LW4 under approved Subsidence Management Plan.	<i>Bulli seam</i> : first workings in the 'Bulli West' area. <i>Balgownie seam</i> : limited to first workings only, beneath overlying Bulli seam workings <i>Wongawilli seam</i> : longwall mining in Wonga East and Wonga West.
ROM Coal Production	Approximately 1Mtpa.	Increase to a maximum of 3Mtpa.
Coal Handling	ROM coal is conveyed from underground to the surface stockpile area, reclaimed for sizing and conveyed to bins for truck load-out. Balgownie decline conveyor is to be replaced with new Wongawilli decline conveyor in Stage 1. The Bulli decline conveyor will be decommissioned in late 2012.	Continue to use new Wongawilli decline conveyor. Progressive phase out existing conveyors and infrastructure using new facilities to replace old. Construction of new truck loading facilities.
Product Coal Transport	Trucked to PKCT for shipment to India.	Continue trucking to PKCT along existing haul route, for shipment to India.
Surface Stockpiles	ROM coal stockpile.	Construction of new coal stockpiles.
Coal Reject Management	Waste rock is re-used on-site eg. as landscaping, road surface and as a clean structural fill material.	No coal washing is proposed therefore no fines will be generated as a result. Any waste rock, as it is sized and screened, will be used on site.
Water Management - Russell Vale Site	On-site water storages and treatment systems for stormwater and mine water. Water demand is met by town water, and/ or treated water recycled from mine dewatering and captured stormwater runoff. Off-site discharge to Bellambi Gully Creek from the Russell Vale site in accordance with Environment Protection License (EPL) No. 12040. Improvements and realignment of Bellambi Creek Gully channel to be undertaken in Stage 1.	A new 6ML dam is to be constructed to enhance sediment control. Water balance indicates mine will be a net water user in early stages with water demand to be met through raw water purchased from SCA. During the latter stages of mining there will be an overall surplus of water due to mine water production being in excess of water demand.

Project Component	Existing Operations	Proposal
Water Management - No.4 Shaft	Historically fresh water demands at No. 4 Shaft have been met by raw water purchased from SCA. Recycled water from the roofs and grey water from the bathhouse is used for underground mining operations. Black water from the bathhouse is managed using spray irrigation.	Continued use of existing water management infrastructure. Improved management of grey and black water discharge.
Staff	Operation: 287 permanent staff, 10 contractors (approx.)	Operation: 381 staff (approx.) and 40 contractors (approx.). Construction: 65 (short-term).
Hours of Operation	Underground operations 24 hours. Coal Haulage to PKCT: 7.00am to 10.00pm (Mon-Fri) and 8.00am to 6.00pm (Sat, Sun and Public Holidays)	Continue existing operations.

2 **EXISTING OPERATIONS**

This chapter describes the existing activities and management systems currently in operation in the PAA.

2.1 **SURFACE LEASES**

2.1.1 **Russell Vale Site**

The Russell Vale site occupies approximately 100ha at the eastern extent of CCL 745, east of Mount Ousley Road. It is on freehold and leasehold land on the lower slopes of the Illawarra Escarpment. Site access is via a private driveway westward from the Princes Highway, at a signalised intersection with Bellambi Lane. Surface infrastructure at the Russell Vale site is shown in

Figure 2.1 and includes:



- administration offices and amenities;
- maintenance workshops;
- car parking areas and internal sealed and unsealed roads;
- two portal entries located at the level of the Balgownie seam, one for personnel and materials and another for the belt road which conveys coal to the surface;
- three recently constructed portal entries one in the Wongawilli seam and the other two in the Balgownie seam. These being access for a new high capacity coal conveyor system, a rubber tyre vehicle transport road and a track road for rail mounted transports, respectively;
- run-of-mine (ROM) coal stockpile area and reclaim tunnel;
- two decline belt conveyors from the belt portal to the ROM coal stockpile area;
- breaker building and conveyor leading to the truck load-out bins;
- truck load-out facilities;
- vehicle wash;
- weigh bridge;
- water treatment and management facilities;
- fuel storage facilities; and
- oil storage facilities.

The natural escarpment slopes and steep side slopes of the valley areas within the elevated parts of the Russell Vale site have been modified significantly by filling and excavations in the past, particularly above the central valley area uphill of the ROM coal stockpile.



Legend
Project Application Area

Figure 2.1
Russell Vale Site

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EA_GIS014_R0.mxd		
Date:	22/09/2010	Drawing size:	A3
Drawn by:	NS	Reviewed by:	MK
Scale:	Refer to Scale Bar		
 N			
Maps and figures contained within this document may be based on third party data, may not be to scale and is intended for use as a guide only. ERM does not warrant the accuracy of any such maps or figures.			
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Emplacement Area

The Russell Vale Emplacement Area (RVEA) land is jointly owned by Wollongong City Council (WCC) and Gujarat NRE Coking Coal Ltd and lies north of the Russell Vale site. All but a small section of the RVEA is located outside the lease area and outside the PAA. The RVEA operates under a development consent from Wollongong Council, which allows refuse to be emplaced on the site from the workings of the NRE No.1 Colliery (see *Section 4.7.1*). Since 1986, a section of the RVEA has been used as a golf course. The long term intention of this area, as reflected in the current Development Consent D89/839, is that the entire freehold area will be eventually used for recreational purposes as a golf course.

There is no intention to use this emplacement area as part of this Project.

2.1.2 Shafts

There are five shafts within the PAA, as shown on *Figure 1.4*. Four are exclusively ventilation shafts and one a shaft for men and materials and ventilation.

No.1 Shaft

No.1 Shaft is located on a surface lease approximately five kilometres north east of the Russell Vale site. It is surrounded by native bushland within the SCA Metropolitan Special Area and is accessed via one of the SCA owned fire trails leading off Mount Ousley Road. No.1 Shaft is an upcast ventilation shaft, which allows waste air to be removed from underground workings (see *Photograph 2.1*). The fan at No.1 Shaft has a capacity air flow rate of 90 cubic metres per second. It provides effective ventilation for selected sections of the mine and complements the other upcast No.5 Shaft located on the lease further to the west.

An NRE owned substation is located about 50m north of No.1 Shaft. At this location, the 33kV power supply from Russell Vale enters the switchyard to the transformer and the power is reduced to 6.6kV. This 6.6kV supply is then cabled to a transformer at No. 1 Shaft where the power is used to drive one of two 185kW motors. These motors are used to drive the fan with one of the motors available on standby. The switchyard and shaft are located on or within a part of CCL 745, which includes the surface lands.

No.2 Shaft

No.2 Shaft is an old ventilation shaft, which has been, decommissioned (see *Photograph 2.2*). The shaft has not been used for ventilation purposes for over 40 years.

No.2 Shaft is located on a surface lease approximately 70m from the currently operating upcast No.1 Shaft. The site consists of an empty brick building and an old vent fan.

Also in the area, located between the two shafts is the remains of a building, parts of a now disused belt driven air compressor and compressed air vessel. Parts of the shaft evase and fan are also present, along with a disused electrical switch yard and concrete block building.

No.3 Shaft

No.3 Shaft is currently a downcast ventilation shaft providing clean air to the underground workings (see *Photograph 2.3*). It is surrounded by native bushland within the SCA Metropolitan Special Area and is accessed via a fire trails. The site consists of a 33kV power supply corridor with some lines and poles and a concrete slab that previously was the base for a disused switch yard. *Photograph 2.3* also shows the cable trenches in the slab and the nearby concrete evase and associated buildings. The actual shaft has a steel mesh sheet across the top of it and is surrounded by a chain wire fence and low vegetation regrowth.

No. 4 Shaft

The No.4 Shaft and associated facilities are located on a part of CCL 745 that includes the surface land. No. 4 Shaft is approximately 10km north-west of the Russell Vale site and is surrounded by native bushland within the SCA Metropolitan Special Area (see *Photograph 2.4* and *Figure 2.2*). The site is accessed by Fire Trail No.8 north of Picton Road.

The No.4 Shaft is used for moving men and materials between the underground workings and surface facilities. Site facilities include a winder, offices, bath-house, stores, workshop, a car parking area, water management facility, sewage treatment plant, electrical sub-station and explosives magazine.

No.5 Shaft

No.5 Shaft is an upcast ventilation shaft allowing waste air to be removed from the underground workings (see *Photograph 2.5*). The No.5 Shaft site includes a compressed air facility, and power and water delivery pipeline to underground.

The site is accessed via a fire trail leading from No.4 Shaft and is located on a part of CCL 745 that includes the surface land, approximately 11km north-west of the Russell Vale site. It is surrounded by native bushland within the SCA Metropolitan Special Area.



Photograph 2.1 **No.1 Shaft**



Photograph 2.2 **No.2 Shaft**



Photograph 2.3 **No.3 Shaft**



Photograph 2.4 **No.4 Shaft**



Photograph 2.5 No.5 Shaft

2.2 UNDERGROUND MINING

Previous workings date back to the 1880s and involve a combination of old hand workings in the Bulli seam using the Welsh Bord and Pillar mining method, involving pit ponies and later a steam-powered endless rope haulage system. As mining progressed to the west and techniques and technology changed, the mine was progressively modernised with the use of continuous miners, shuttle cars and conveyors. Longwall mining was trialled and successfully introduced in the late 1960s. Longwall extraction was undertaken in the Balgownie seam. In the 1970's a new man access facility was established at No.4 shaft.

Current approvals allow workings to be undertaken in the Bulli seam including pillar extraction in the 'T and W Mains' and 'V Mains' areas; first workings in the 'P' Panel in the central portion of the site (between Wonga East and West); the 'P and R' drifts driveage to the east of the 200 longwall series.

There are no current mining operations in the Balgownie seam.

Current approvals allow workings to be undertaken in the Wongawilli seam that constitute the Wonga Mains driveage. The development of these roadways commenced at the Russell Vale site in 2007 and will connect the proposed Wonga East and Wonga West longwall areas. With approval of the SMP in March 2012, longwall mining of panel 4 in Wonga East mining domain commenced in mid-2012.

Figure 2.3 shows the previous and current workings at NRE No.1 Colliery including the workings recently approved by the Stage 1 Preliminary Works Project.

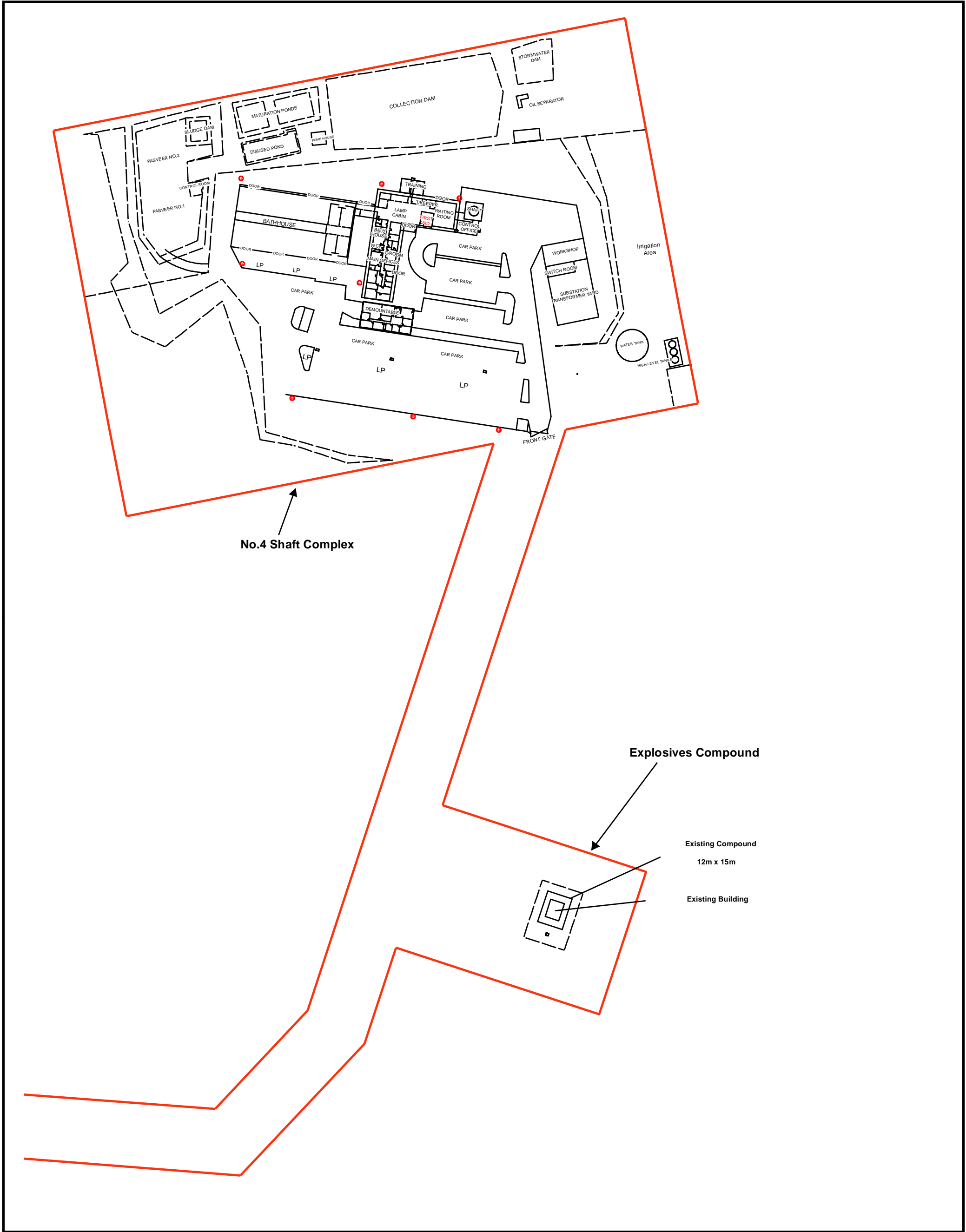


Figure 2.2
No. 4 Shaft

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Client:	NRE Coking Coal Limited	
Project:	NRE No. 1 Colliery Environmental Assessment	
Drawing No:		
Date:	7/02/2013	Drawing Size: A3
Drawn By:	NS	Reviewed By: MK
Projection:	GDA 1994 MGA Zone 56	
Scale:	Refer to scale bar	

Table 2.1 lists underground equipment used.

Table 2.1 *Underground Equipment*

Quantity	Equipment Make & Model	Equipment Type
1	Joy Longwall	Longwall mining equipment
1	Joy Shearer	Longwall mining equipment
2	12CM3 wide Head 4.8m	Coal Cutting Machine
2	Dash 3 Continuous Miners	Coal Cutting Machine
1	Joy 12CM 15 Continuous Miner	Coal Cutting Machine
1	Joy 12CM11 Continuous Miner	Coal Cutting Machine
1	Joy 12CM3 Continuous Miner	Coal Cutting Machine
2	Fletcher Bolters	Crawler Mounted Bolter
1	Ramtrack Bolter	Crawler Mounted Bolter
1	Sig Bolter	Crawler Mounted Bolter
1	Bobcat	Diesel Loader
3	Eimco 913 Loaders	Diesel Operated Loader
1	Eimco BW5 Loader	Diesel Operated Loader
3	Klockner Becorit Feeder	Feeder Breaker
6	Breaker Line Supports	Hydraulic Chock Support
4	Diesel Loco MLD 03 25 tonne	Track Mounted Diesel Loco
4	Baldwin DPC	Track Mounted Diesel Man Car
2	Fox diesel Personnel Car	Track Mounted Diesel Man Car
3	Mancar DPC	Track Mounted Diesel Man Car
9	Joy 15 Shuttle Cars	Tyre Mounted Loading Machine
2	Narco Shuttle Cars	Tyre Mounted Loading Machine
2	Wagner	Tyre Mounted Material Transporter
1	People Transporter	Tyre Mounted People Transporter

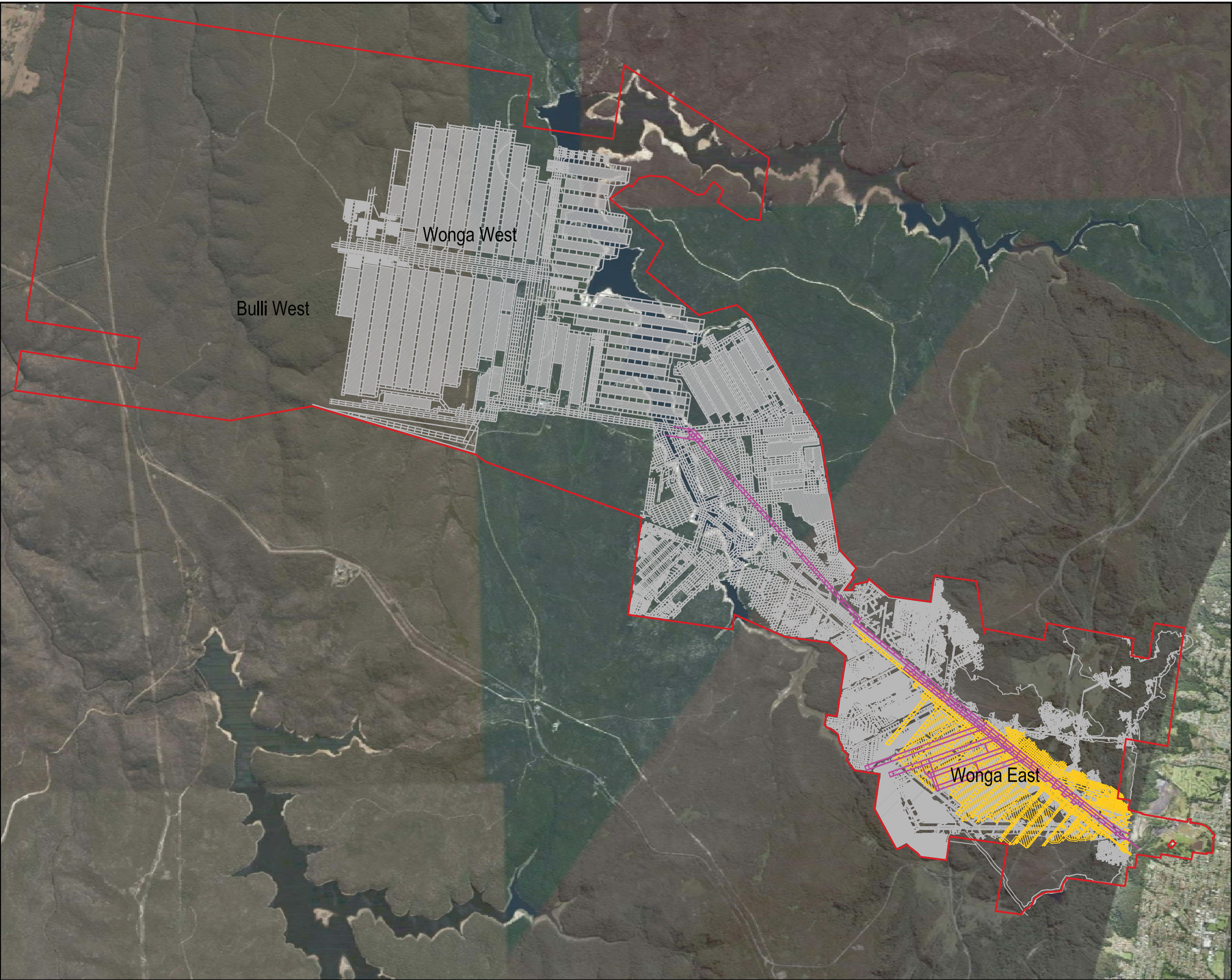
2.3 **ROM COAL PRODUCTION AND HANDLING**

Current production at NRE No.1 Colliery is approximately 1Mtpa. Coal handling facilities are situated at the Russell Vale site (see *Figure 2.4*).

ROM coal is transported from the working face to the surface via an underground belt conveyor/ vibrating feeder system. There are two decline conveyors, which transport coal from the portal to the stockpile area at the Russell Vale site. These belts are referred to as the Bulli decline belt and the Balgownie decline belt.

The existing Bulli decline belt will be decommissioned and demolished as part of the Preliminary Works Project upon completion of the new driveage. Coal from the Bulli decline belt is deposited into a coal bin at the base of the decline. Clearance holes in the bin allow the coal to be deposited on the ground. Coal is then managed using a dozer to shape the stockpile. The stockpile area has a capacity of up to 80 000 tonne (t). From the stockpile, coal is then loaded through a vibrating screen sizer using a front end loader. The coal is processed through the vibrating screen sizer and deposited onto the C5 conveyor in the reclaim tunnel, which delivers coal to the Bradford Breaker.

Commencing in 2011, the Balgownie belt and storage bin will be removed and replaced with a newly designed Wongawilli decline belt on a similar alignment as part of the Preliminary Works Project.

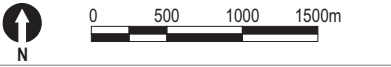


Legend

- Project Application Area
- Bulli Seam Workings
- Balgownie Seam Workings
- Wongawilli Seam Workings

Figure 2.3
Existing and Current Workings

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383h_EA_CAD009_R1.cdr		
Date:	07/02/13	Drawing size:	A3
Drawn by:	JD	Reviewed by:	NB
Source:	-		
Scale:	Refer to Scale Bar		

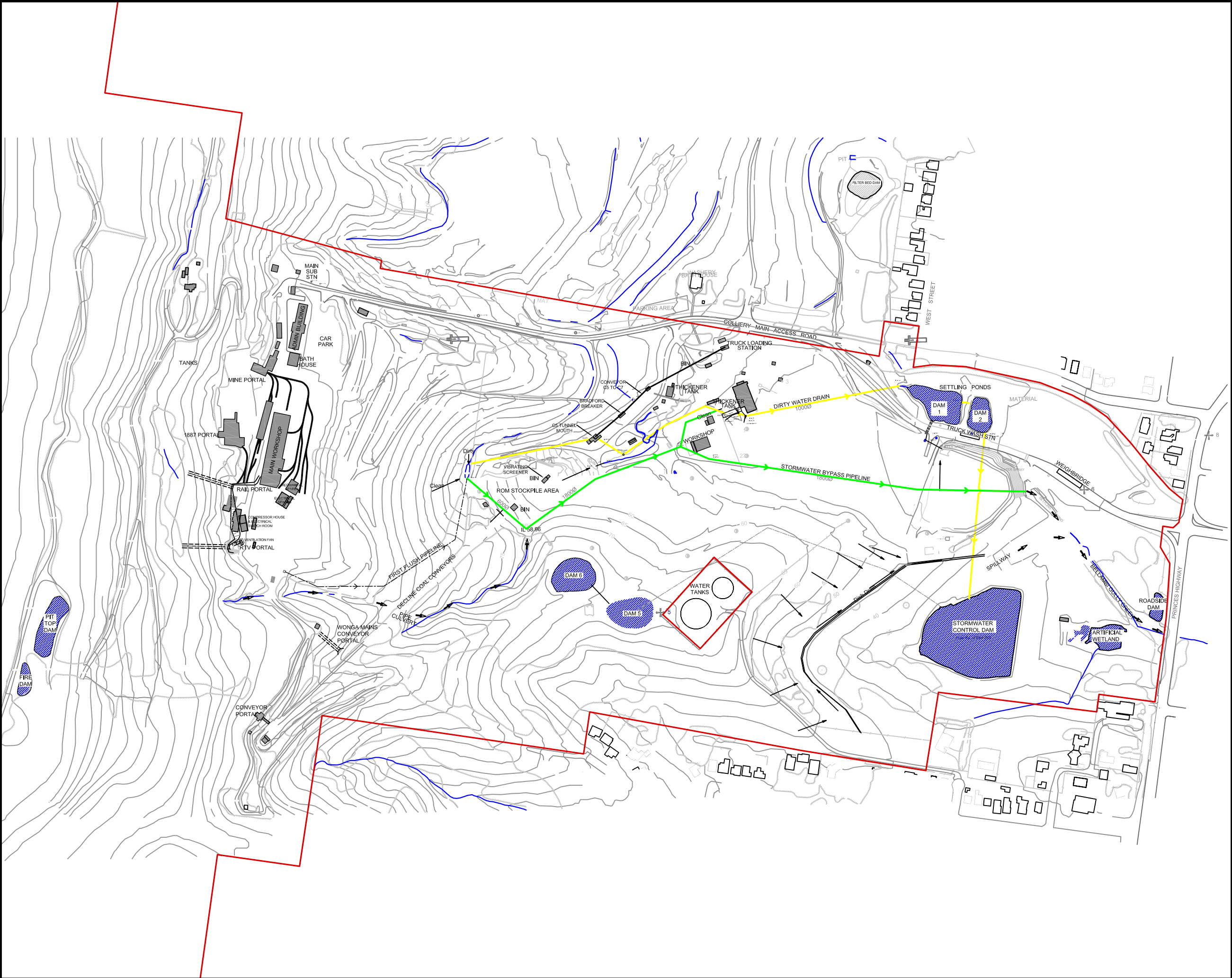


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Legend

- Project Application Area
- Dam
- Buildings
- Waterway
- Dirty Water Flows
- Clean Water Flows

Figure 2.4
Existing Coal Handling Facilities Layout

Client:	Gujarat Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EA_CAD008_R0.dwg		
Date:	10/01/2011	Drawing Size:	A3
Drawn By:	NS	Reviewed By:	MK
Source:	Olsen Environmental Consulting Ref: DP-3673.dwg		
Scale:	Refer to scale bar		



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The conveyor will be fully enclosed to mitigate dust emissions. The new Wongawilli decline belt will deliver Wongawilli seam coal proposed to be extracted as part of the Major Works Project.

The Bradford Breaker was originally designed to screen down to minus 150mm, but was re-configured to screen to minus 65mm. It is not currently being used, therefore the deck plates have been removed to allow coal to bypass the breaker. It is proposed that a new screening and sizing station is being constructed as part of the Preliminary Works Project at the end of the decline just before the existing Bulli bin. Coal will be transferred from the sizing station to both the Bulli bin stockpile and the Wongawilli stockpile via a decline belt and tripper arrangement.

From the Bradford Breaker, coal travels along the C6 conveyor to the top of a 600 tonne bin. The 600 tonne bin is in line to provide surge capacity to the reclaim system. A 'Hornet' vibrating feeder at the base of the bin deposits the coal onto the C7 conveyor, which transports coal to the truck loading bins.

The truck loading bin consists of three separate bins, of which only one is currently used. The second bin is filled via overflow from the first bin, and the third bin is currently unable to be filled.

Existing truck loading facilities will continue to be used for day time loading, however, a new internal haul road is proposed, with access from the Colliery main access road to the stockpile area. In the Preliminary Works Project this will be used for evening trucking when required, where trucks will be loaded directly from the stockpile.

This is a temporary arrangement pending the construction of a new truck loading facility, which forms part of this Major Works Project. The majority of the new internal haul route will be unsealed from the main access road and past the stockpile. The last section of the road will be sealed. Water trucks and dust suppression sprays will be used on the unsealed portion of the road.

Dust suppression at the Russell Vale site is managed using a number of means according to weather and operational demands. These include:

- an automatically controlled fixed stockpile spray system around the ROM stockpile area;
- a mobile water truck that is used throughout the site;
- roadside sprays;
- truck washing facilities that are used for all heavy vehicles prior to departure from site;
- a skidsteer (bobcat) loader mounted road sweeper that can be used on all sealed surfaces; and
- fixed water sprays at selected points on a number of surface and underground conveyor systems.

Water used for these purposes is supplied from recycled water sources including mine water and treated stormwater. Sprays are used daily across the site and where required, depending on demands.

Oversized waste rock averages approximately 2% of current production. This material is mechanically screened and re-used on-site eg as road surface and as a clean structural fill material. Alternate re-use strategies will be investigated through the term of this Project.

A temporary stockpile located to the east of the ROM stockpile has been used for the storage of high ash coal. This coal is being extracted from the Wonga Mains driveage in the Wongawilli seam and relates to local geological conditions. This temporary stockpile is being progressively removed from the site and in future any higher ash coal, when it occurs will be stored and blended underground.

2.4 *PRODUCT COAL TRANSPORT*

Coal is currently transported, unwashed, by truck from NRE No.1 Colliery to PKCT for shipment to India. Coal transport trucks operate between the hours of 7.00am and 10.00pm five days per week (Monday to Friday) and 8.00am to 6.00pm on Saturdays, Sundays and public holidays. Average current truck capacity is 34 tonnes with up to 134 loaded trucks leaving the site each day.

Trucks leave the site travelling east via Bellambi Lane to the Northern Distributor. Trucks then travel south along the Northern Distributor and on to the Southern Freeway. From the freeway trucks travel east along Masters Road and Springhill Road to PKCT. The transport route from NRE No.1 Colliery to PKCT is shown on *Figure 2.5*. The contractor Brindles Transport operates the majority of trucks.

2.5 *WATER MANAGEMENT*

2.5.1 *Potable Water Supply*

Russell Vale

Potable water demands at the Russell Vale site are met by connection to Wollongong's reticulated water supply. Potable water is generally supplied to the administration building, bath houses, part of the truck washer, workshop and amenities. While infrequently used, potable water may also be required to supply the underground mine operations, if process water becomes unavailable (Beca 2011).

No.4 Shaft

Water demands at No. 4 Shaft are met by raw water purchased from SCA. Historically water has been pumped directly via a pipeline from the SCA's Cataract Dam to the No. 4 Shaft, or brought in by water tanker at a rate of approximately three 25 kilolitre (kl) tanker loads per week. Water is stored in elevated reservoirs on site, which allows gravity feed from the storage tanks to the bathhouse and offices.

2.5.2 *Process Water*

Russell Vale

Process water is a combination of:

- clean raw water from surrounding natural water sources at Corrimal Springs (approximately 0.1mL/day);
- potable water supplemented from the Brick Tank(which is to be replaced by three plastic tanks) located above the pit top level;
- treated stormwater from the Thickener Tank overflow (approximately 1.7mL/day); and
- mine water from underground storages (between 0 and 1.2mL/day).

When required surplus underground water is pumped from the mine workings to the surface at the Russell Vale site, treated and reused within the surface water management system. The existing water management arrangement is illustrated on *Figure 2.6*.

Process water is used for a variety of purposes at the surface and underground, including dust suppression, vehicle wash, fire fighting and road cleaning. Process water is also used at truck filling points, wash down areas and on the stockpiles.

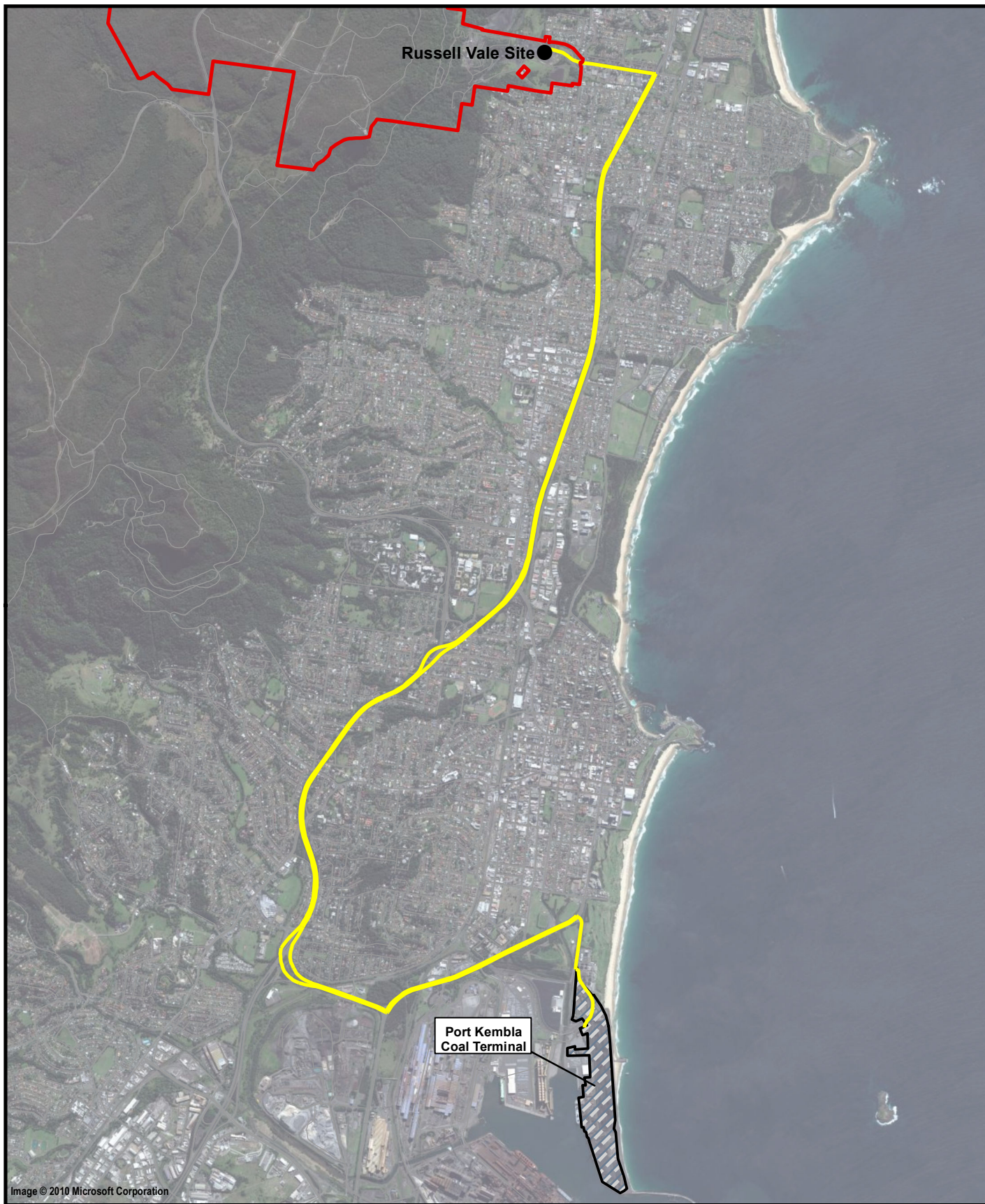
2.5.3 *Process Water*

Russell Vale

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- clean raw water from surrounding natural water sources at Corrimal Springs (approximately 0.1mL/day);
- potable water supplemented from the Brick Tank(which is to be replaced by three plastic tanks) located above the pit top level;
- treated stormwater from the Thickener Tank overflow (approximately 1.7mL/day); and
- mine water from underground storages (between 0 and 1.2mL/day).

When required surplus underground water is pumped from the mine workings to the surface at the Russell Vale site, treated and reused within the surface water management system. The existing water management arrangement is illustrated on *Figure 2.6*.



Legend

- Project Application Area
- Port Kembla Coal Terminal
- Coal Transport Route

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EA_GIS025_R0.mxd		
Date:	22/09/2010	Drawing size:	A4
Drawn by:	NS	Reviewed by:	MK
Scale:	Refer to Scale Bar		



0 490 980 1,470m

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Figure 2.5
Coal Transport Route

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CURRENT FLOW BALANCE

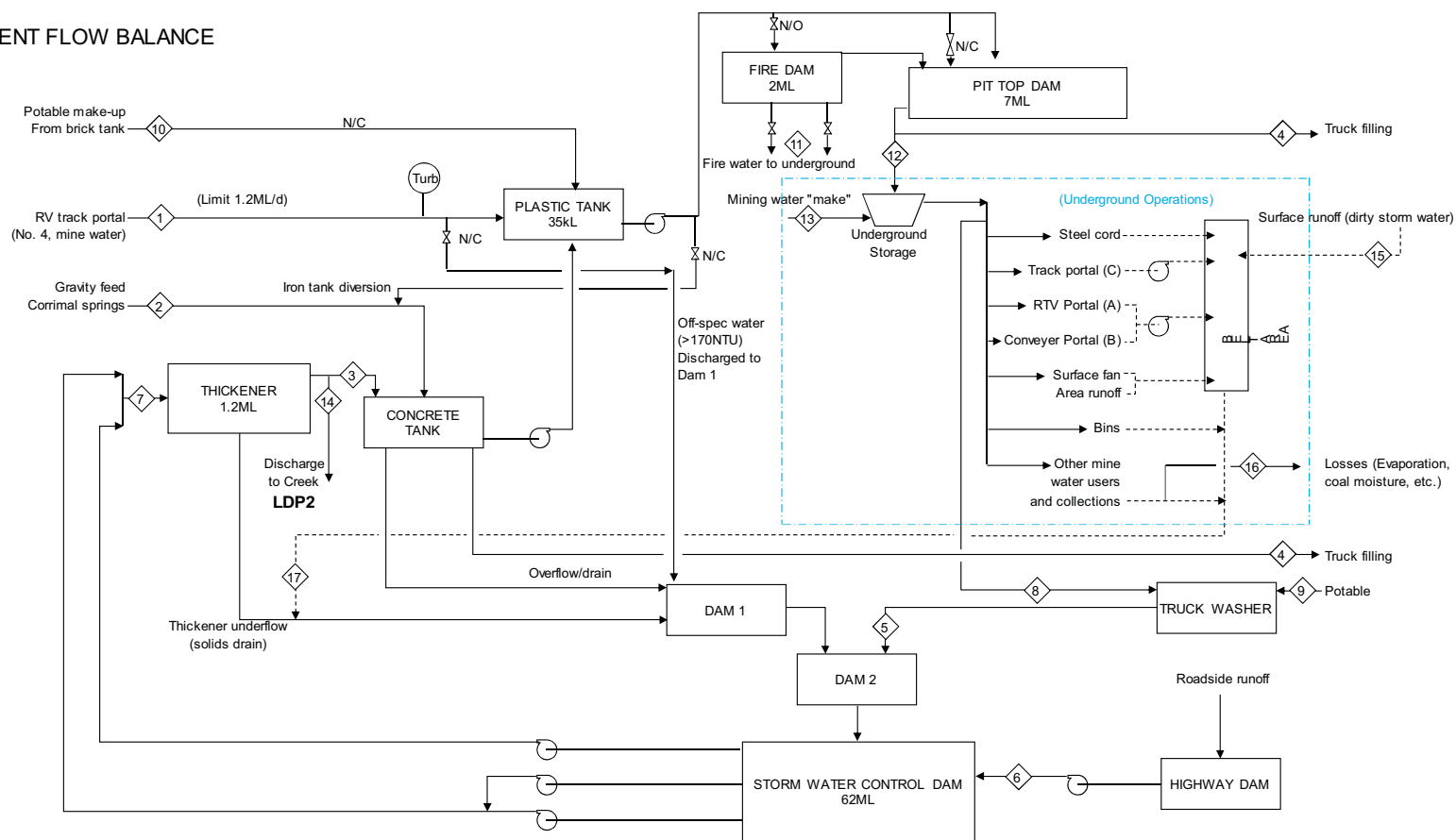


Figure 2.6
Current Russell Vale Block/Process
Flow Diagram

Client: Gujarat NRE Coking Coal Limited

Project: NRE No.1 Colliery
Environmental Assessment

Drawing No: 0079383h_EA_C001_R1.cdr

Date: 07/02/2013 Drawing size: A4

Drawn by: JD Reviewed by: NB

Source: Beca (2011)

Scale: Not to Scale

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Process water is used for a variety of purposes at the surface and underground, including dust suppression, vehicle wash, fire fighting and road cleaning. Process water is also used at truck filling points, wash down areas and on the stockpiles. The truck wash uses a combination of potable and process water. On average the current daily process water use is approximately 2.1 megalitres per day.

Process water, together with dirty stormwater, is collected from surface drains in the processing areas and directed to Dam 1 for subsequent treatment within the existing surface water management system.

No.4 Shaft

Process water is a combination of mine water that is collected underground and pumped to the surface and treated grey water from the bathhouse. These two water sources are stored in the Main Collector Dam on the surface for dust suppression, underground and emergency fire fighting requirements. However, in the event that the Main Collector Dam reaches full capacity, the excess mine water, is diverted to the Russell Vale site for treatment, re-use and/or discharge.

2.5.4 *Stormwater*

Russell Vale

Beca (2010) (see Appendix A of *Annex B*) describes the existing stormwater collection network and catchments. The stormwater collection network at the Russell Vale site directs 'dirty water' to a series of earthen formed dams for primary solids settling prior to treatment.

The Russell Vale site consists of three major catchment zones depending on their location and their land use and grade. These three catchment zones are defined as:

- Upper Catchments – characterised by predominantly natural escarpment and steep heavily vegetated slopes with thick undergrowth. This catchment zone is considered to be 100% clean water with no coal stockpiling or conveyor activities within any of its sub catchments;
- Middle Catchments – including the workshop, offices, a number of existing and proposed portals, and a network of access roads between the stockpile and the Upper Catchments. It is characterised by steep batters of both natural slopes and waste rock from previous mining activities and will not generally be exposed to coal stockpiling, conveyor operations, or hauling in the proposed mine upgrade; and
- Lower Catchments – dominated by the coal stockpile and haul areas, truck loading facility and settlement basins.

Each catchment has been broken down into sub-catchments based on location within the overall catchment plan and their dirty water or clean water characteristics. The sub-catchments are described in *Table 2.2* and illustrated on *Figure 2.7*.

Table 2.2 Stormwater Catchments

Name	Description of Catchment	Water Type
Upper Catchments:		
U1 to U3, U5	Natural escarpment catchment dominated by trees and heavy undergrowth with a number of unsealed access roads and fire trails.	Clean Water
U4	Site of the original electrical power station of the mine. The natural soil in this location has a high percentage of ash and fine silty materials and is therefore highly prone to erosion.	Clean Water
Middle Catchments:		
M1	Characterised by both a section of natural escarpment slopes located below the U2 and U3 catchment and also the workshop and mine portal area.	First Flush
M2	Consists of the office building, and car parking facilities as well as a small section of natural catchment to the west.	Clean Water
M3	Consists of an existing steep artificial batter and set down area for materials, items of plant, and deliveries as well as an access road which links this area to the workshop area.	Clean Water
M4	This is a small component of heavily vegetated natural slope adjacent to the M7 conveyor portal catchment.	Clean Water
M5	Consists of steep artificial batters and access roads.	Clean Water
M6	Characterised by steep artificial batters and access roads.	Clean Water
M7	Located at the southern extent of the Russell Vale site and is the location of the conveyor portal outlet from underground operations.	Dirty Water
M8	Characterised by a long narrow natural ridge and a sealed roadway.	Clean Water
Lower Catchments:		
L1	Consists of the ridge and slope immediately adjacent to the proposed clean water diversion channel which runs past the stockpile area.	Clean Water
L2	Consists primarily of the coal stockpile, truck loading bay, and surrounding dirty areas.	Dirty Water
See Figure 2.7 for location of Catchments		

Dirty stormwater and process water is collected and treated together at the Russell Vale site. This water is generally collected into Dam 1, with a gravity overflow to Dam 2 (refer to Figure 2.6). These dams provide some holding volume to aid solids settling prior to routing it, by gravity, to the Stormwater Control Dam (SWCD). Water from Dam 2 is routed (by gravity) to the SWCD together with water pumped from the Highway Dam (this dam collects roadside drainage water from the sealed access road). A schematic of the dam water flow is shown in Figure 2.6.

Water from the SWCD is then pumped through one or two pumps (three installed, maximum two duty and at least one standby) to the Thickener Tank where suspended solids are removed with the aid of flocculent/coagulant dosing. Clarified water from the Thickener Tank overflow is either routed to the Concrete Tank, then on to the Pit Top Dam for reuse in the mine or discharged to Bellambi Gully Creek via Licensed Discharge Point 2 (LDP2).

The level in the SWCD is managed (by selectively operating pumps) to allow sufficient free volume to receive a 10 year annual recurrence interval (ARI) storm event. The SWCD has a volume of 62mL under normal operating conditions and has been approved to operate as a dry detention basin.



- Legend**
- Project Application Area
 - Catchment Boundary
 - Clean Water
 - Dirty Water
 - First Flush

Figure 2.7
Stormwater catchments at the Russell Vale Site

Client: Gujarat NRE Coking Coal Limited
 Project: NRE No.1 Colliery Environmental Assessment
 Drawing No: 0079383s_EA_CAD012_R0.dwg
 Date: 10/01/2011 Drawing Size: A3
 Drawn By: NS Reviewed By: MK
 Source: Beca 2010
 Scale: Refer to scale bar



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Solids from the Thickener Tank are not further treated and are re-routed to Dam 1 from where solids removal is periodically performed, approximately every three to four months. Solids removed from the dams are dried, reused on site or blended into ROM coal product where applicable.

Bellambi Gully Creek

Clean stormwater is directed off site via Bellambi Gully Creek, which currently flows through the site via an underground pipe below the existing ROM coal stockpile. This pipe is being replaced by an open drainage channel in Stage 1 Preliminary Works Project. Beyond the Russell Vale site boundary, Bellambi Gully Creek flows east through the suburbs of Russell Vale and Bellambi and discharges into the ocean at Bellambi Beach, which is several kilometres north of and not connected to Bellambi Lagoon.

No.4 Shaft

At No.4 Shaft, stormwater runoff is directed to the site's Main Collector Dam for recycling. Water collected from the workshop is managed via oil interceptors, and then flows to the Main Collector Dam. If required stormwater on site may be harvested and used for dust suppression and other purposes underground.

Any surplus stormwater not recycled on-site (including roof water and water from the car parking) has the ability to be diverted off-site into the catchment. Off-site discharges are dependent on climatic conditions, however they are not a regular occurrence.

Water management at No.4 Shaft is not currently licensed by the NSW Department of Primary Industries, Office of Water (NOW).

2.5.5 *Sewage*

Russell Vale

Sewage generated at the Russell Vale site is disposed of via connection to Wollongong's reticulated sewerage system.

No.4 Shaft

At the No.4 Shaft, grey and black water are treated on site in separate Pasveer facilities. The Pasveer treatment system is an automatic extended aeration tank.

The grey water effluent from the bathhouse is treated using Pasveer No.1 prior to storage in the main collector dam, where it is mixed with mine dewatering water and stormwater overflow. Water stored in this dam is used in the hydrant system for underground operations or emergency response on the surface.

Black water is treated using Pasveer No.2, where the inflow water is aerated then temporarily stored in maturation ponds. Maturation allows for a detention time of several months and also UV treatment. This water is generally disposed of via spray irrigation in a designated area as indicated in *Figure 2.2* or alternatively, a licensed contractor is used for its disposal off-site.

In conjunction with the Preliminary Works Project NRE has committed to undertake the following:

- a manual monitoring assessment including visual observation for the presence of ponding of water on the surface of the irrigation area; and
- installation of a tertiary treatment system at No 4 Shaft by the end of first quarter 2011 to reduce pathogens resulting in a 1mg\L chlorine. The tertiary treatment system was installed in August 2011.

2.6 *OTHER*

2.6.1 *Power and Telecommunications*

The Colliery is supplied from Integral Energy's Bellambi Transmission Substation via the substation located at Russell Vale at the mine pit top level. An easement for overhead transmission lines crosses the site (east-west) connecting the Russell Vale site and each of the shaft sites to the electrical grid. A surface lease exists over this easement and is managed and maintained by NRE.

The supply to the mine is 33kV and is reduced to 6.6kV using site transformers at the Russell Vale site, No. 1 Shaft and No. 4 Shaft. A 6.6kV supply runs from No. 4 Shaft to No. 5 Shaft and also to a pumping station transformer located just above the high water mark on Cataract Dam.

Communications to the site are provided by Telstra utilising the existing infrastructure along with private communication and data links along the power supply easement.

It is proposed to augment the power supply at the Colliery, to accommodate the future operations utilising the existing easements. No changes to the existing telecommunication supply arrangements are proposed at surface sites.

2.6.2 *Roads and Fire Trails*

The Russell Vale site is accessed via Bellambi Lane off the Princess Highway (State Highway No.1). There are a number of internal roads, both sealed and unsealed providing access to parking and facilities. Parking for approximately 170 vehicles is provided at a number of car parking areas adjacent to the administration and bathhouse buildings.

No.4 Shaft is accessed using Fire Trail No.8 off Picton Road. Picton Road is a major road managed by the RMS. Parking for approximately 200 vehicles is provided in a car park adjacent to the administration building at No.4 Shaft.

2.6.3 *Waste*

Putrescible waste, waste timber and other rubbish at the Russell Vale and No.4 Shaft are disposed off-site by a licensed contractor at an approved facility. Scrap steel is generally managed by selling to a metal recycler. Waste paper from the administration areas of both sites is recycled where possible.

Waste oil is stored temporarily at the Russell Vale and No.4 Shaft in bulk storages (up to 1000L) prior to disposal by a licensed contractor. Appropriately sized and maintained bunds around the above ground storages are in place and operational.

2.6.4 *Hazardous Materials*

An explosives storage unit is located approximately 200m from the No.4 Shaft site. The Colliery holds a Dangerous Goods Licence for these items.

The licence allows storage for up to 2 000 kilograms (kg) of explosives and 5 000 units of detonators (Note: this typically is well above the actual quantities stored). The facility complies with all statutory requirements.

Diesel fuel is stored at the Russell Vale site in a purpose built unit that is double bundled and closely monitored. Although the capacity of this unit is 14KL, the average quantity stored is about 10KL.

At No. 4 Shaft the diesel storage facility is in a bundled area and has a nominal capacity of nine kilolitres. Fuel quantities stored here average approximately seven kilolitres and are closely monitored.

An oil storage area is located under cover at the Russell Vale site where oil is stored in 20 litre drums and bundled accordingly.

2.7 *EMPLOYMENT AND HOURS OF OPERATION*

NRE No.1 Colliery currently employs approximately 278 staff and 90 contractors as detailed in Table 2.3. Table 2.4 details the shift times at the Colliery.

Table 2.3 *Current Number of Employees at NRE No.1 Colliery*

Facility and Employee Status	Number of Employees
Russell Vale:	
Staff	56
Underground	221
Contractors	10
Russell Vale Total	287
# 4 Shaft:	
Staff	4
Underground	6
Contractors	-
#4 Shaft Total	10
Total Employees:	297

Table 2.4 *Shift Times at NRE No.1 Colliery*

Shift	Weekdays	Weekend
Day Shift	6.00am - 2.30pm	10.30am - 10.30pm
Afternoon Shift	2.30pm - 10.30-pm	NA
Night Shift	10.30pm - 6.30am	10.30pm - 10.30am (Friday and Saturday)

Hours of operation for both underground mining operations and surface facilities are 24 hours per day, 7 days per week. Coal transport trucks operate between the hours of 7.00am and 10.00pm Monday to Friday and 8.00am to 6.00pm Saturdays, Sundays and Public Holidays.

3 PROJECT DESCRIPTION OVERVIEW

This chapter details the geology and resource upon which the Project is based and the components and processes to be applied in the implementation of the Project.

3.1 GEOLOGY AND RESOURCE DESCRIPTION

NRE No.1 Colliery is located in the NSW Southern Coalfield, which is the southern portion of the Sydney Basin. Within the Southern Coalfield is the Illawarra Coal Measures, which contains all of the economic coal seams. The three commonly mined coal seams of these measures are the upper most Bulli seam, below which is the Balgownie seam and then the Wongawilli seam.

Figure 3.1 provides a stratigraphic section showing the relative position of the Bulli, Balgownie and Wongawilli seams.

The Bulli seam has been extensively mined for more than 125 years within CCL 745. The thinning of the seam to the north-west represents the general trend. The immediate roof may be carbonaceous shale, a mudstone-shale or a laminite. The immediate floor is comprised of carbonaceous shale, grading down to shale or siltstone then to sandstone. This sandstone unit averages about 9.0m thick and forms the roof of the underlying Balgownie seam.

The Balgownie seam is approximately 10m below the Bulli seam and was mined by longwall methods in the 1970s and more recently by first workings in 2002 to 2003. The roof is invariably cross-bedded sandstone and the floor is formed by a carbonaceous mudstone grading to mudstone or siltstone.

Two minor seams, the Cape Horn seam and the Hargrave seam, lie between the Balgownie and Wongawilli seams, but are too thin and too high in ash to be of economic significance.

The top of the Wongawilli seam lies 22m to 25m below the Balgownie seam and is typically nine to 11m thick. The Wongawilli seam consists of interbedded bands of (occasionally) kaolinitic brown mudstone or carbonaceous shale (with occasional thin pyrite or siderite lenses) and coal layers. Only the lower section of the seam is considered of economic value due to deterioration from thickening and increasing numbers of stone bands in the working section progressing northward in the Coalfield. The seam has been mined by longwall methods at other collieries in the Southern Coalfield; and has been mined most recently in Longwall A2 LW4 in accordance with the approved subsidence management plan. In the NRE No.1 lease area there is a basal section varying between 2.3m to 3.4m that has been selected as a potential economic mining section. This is a thicker section than that used for the last resource evaluation in 2010 (Bureau Veritas, 2010). The floor is composed of mudstone or siltstone grading down into a laminite.

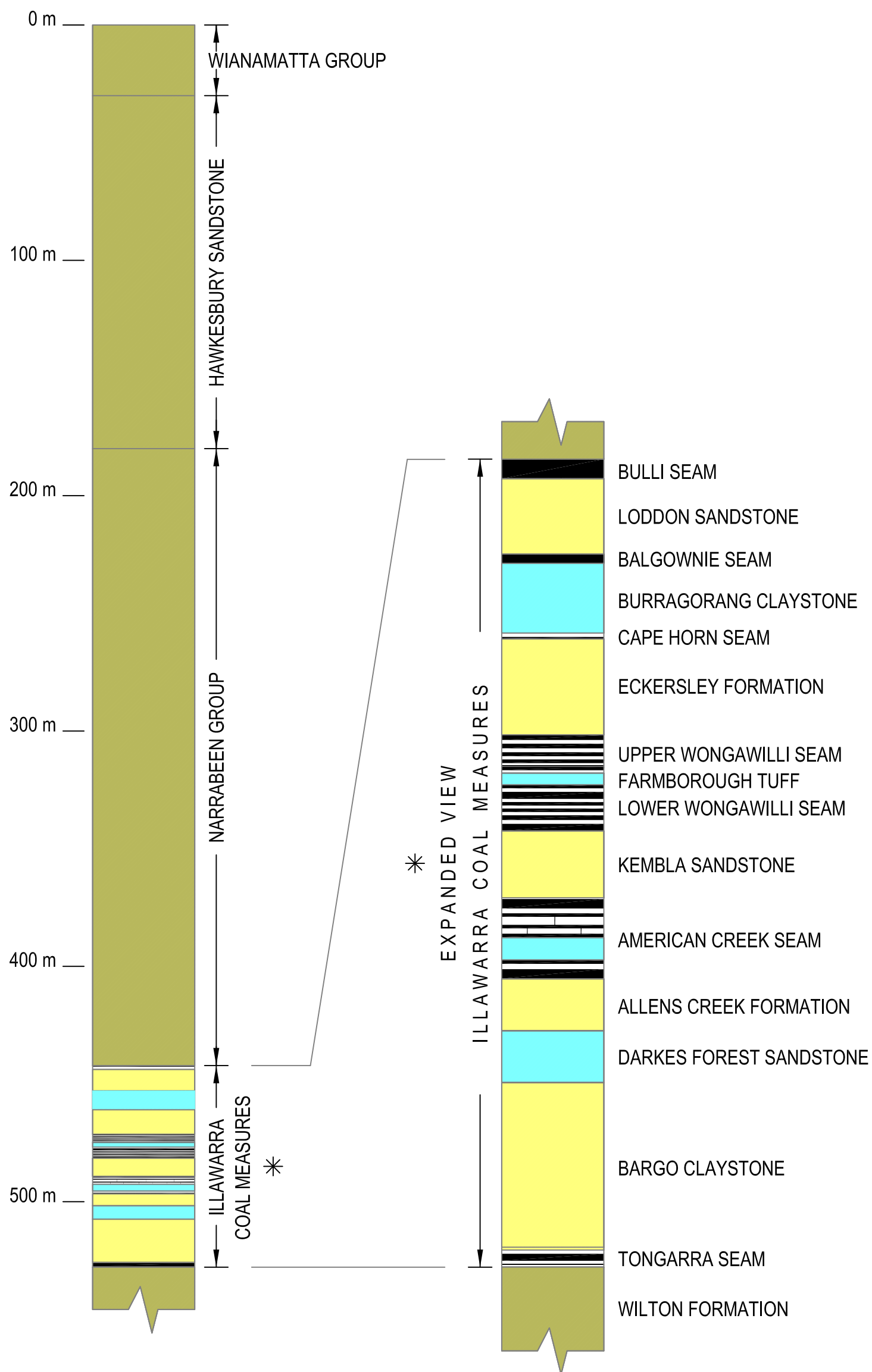


Figure 3.1

Stratigraphic Section

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EA_CAD001_R0.dwg		
Date:	10/01/2011	Drawing Size:	A3
Drawn By:	NS	Reviewed By:	MK
Source:	Olsen Environmental Consulting Ref: DP-3495.dwg		
Scale:	Not to Scale		

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Seam thickness details are summarised in *Table 3.1*.

Table 3.1 *Seam Thickness Details*

	Bulli ¹	Balgownie	Wongawilli ²	
			Full seam	Mining Section
Minimum (m)	1.6	0.6	8.0	2.3
Maximum (m)	2.8	1.7	10.8	3.4
Average (m)	2.1	1.3	9.3	2.9

1. The Bulli seam has highly variable spot thicknesses.
2. Only the basal 2.3m to 3.4m of the Wongawilli seam has economic potential.

3.1.1 *Resource Estimation*

More than 300 million tonnes of coking coal resources remains within the PAA in these seams.

The Bulli Coal, as a resource, is evaluated over its full coal section. Deteriorated roof and floor sections of the seam are included in the resource estimation but may not form part of the mining section. An area of seam deterioration exists in the southwest of the PAA where the seam is interbedded with significant bands of stone. This section is assessed as uneconomic and is excluded from the resource estimation.

Bulli Coal thickness within the unmined western portion of the PAA reaches a maximum of 2.72m in the far west (borehole SR16) (see *Figure 3.2*). This maximum thickness is a result of a 1.19m section of stone within the middle of the seam. Excluding this borehole the Bulli Seam reaches a thickness of 2.38m (in borehole WB9) west of the 500 series panels. Average thickness over the western portion is 2.12m with a trend to thickness reduction to the northwest.

Resources have been calculated for the Bulli seam in the PAA based on the area in square kilometres of designated resource status polygons. The tonnages are inclusive of inherent moisture of 1.7%.

The Balgownie Coal, as a resource, is evaluated over its full coal section. In many of the drill holes, particularly in the central to western area, the Balgownie Coal has a lower transitional section that is composed of mudstone and shale and coal in varying proportions and sequence. Given its thin section it is almost guaranteed that during mining a height of about 1.5m would be a minimum thus the total Balgownie Coal would be mined. This will impact on the economics of mining due to the significance of dilution on such a thin coal seam.

Full seam Balgownie thickness across the PAA reaches a maximum of 1.68m in the central northern portion (borehole SR3). The minimum thickness for the Balgownie seam is 0.58m (SR19). There is a distinct thinning of the Balgownie seam across the central northern area east of SR3.

This thinning represents a zone of thinning and deteriorating Balgownie seam stretching north into Appin Colliery and has been excluded from the resource estimation.

Resources have been calculated for the Balgownie seam in the PAA based on the area in square kilometres of designated resource status polygons. The tonnages are inclusive of inherent moisture of 1.7%.

The Wongawilli Coal has a fairly consistent thickness of about 9.3m over the colliery area, ranging from approximately 7.7m to 10.8m (see *Figure 3.3*). The total coal section consists of interbedded plies of coal and stone in varying thickness and, for the coal plies, varying quality, significantly in mineral matter content.

Mining practices in other southern collieries have involved mining the basal section, the more economic portion of the Wongawilli Coal, as deterioration in quality (or an increase in the proportion of stone to coal) occurs with increase in mining height.

Resource estimation undertaken in 2010 of the Wongawilli seam has been based on the basal section known as the clay band section, which ranges from 1.87m to 2.61m over the PAA. There is some data available on the upper sections but it is insufficient to give an understanding of what could potentially be the most economic and mineable section. The main trend is for a thickening of the clay band section from the outcrop area into the central west of the PAA.

As mining to the thicker standard working section was undertaken successfully in the adjacent Cordeaux Colliery it would appear plausible that this section could be economically mined, at least in the central and western areas in the PAA. This would increase the potential resource estimation tonnage for the Wongawilli seam.

Resources have been calculated for the Clay Band Section of the Wongawilli Coal in the PAA based on the area in square kilometres of designated resource status polygons. The tonnages are inclusive of inherent moisture of 2.8%.

Table 3.2 provides a summary of estimated resources in each of the above seams as provided by Bureau Veritas (2010).

Table 3.2 *In situ Coal Resource Estimate*

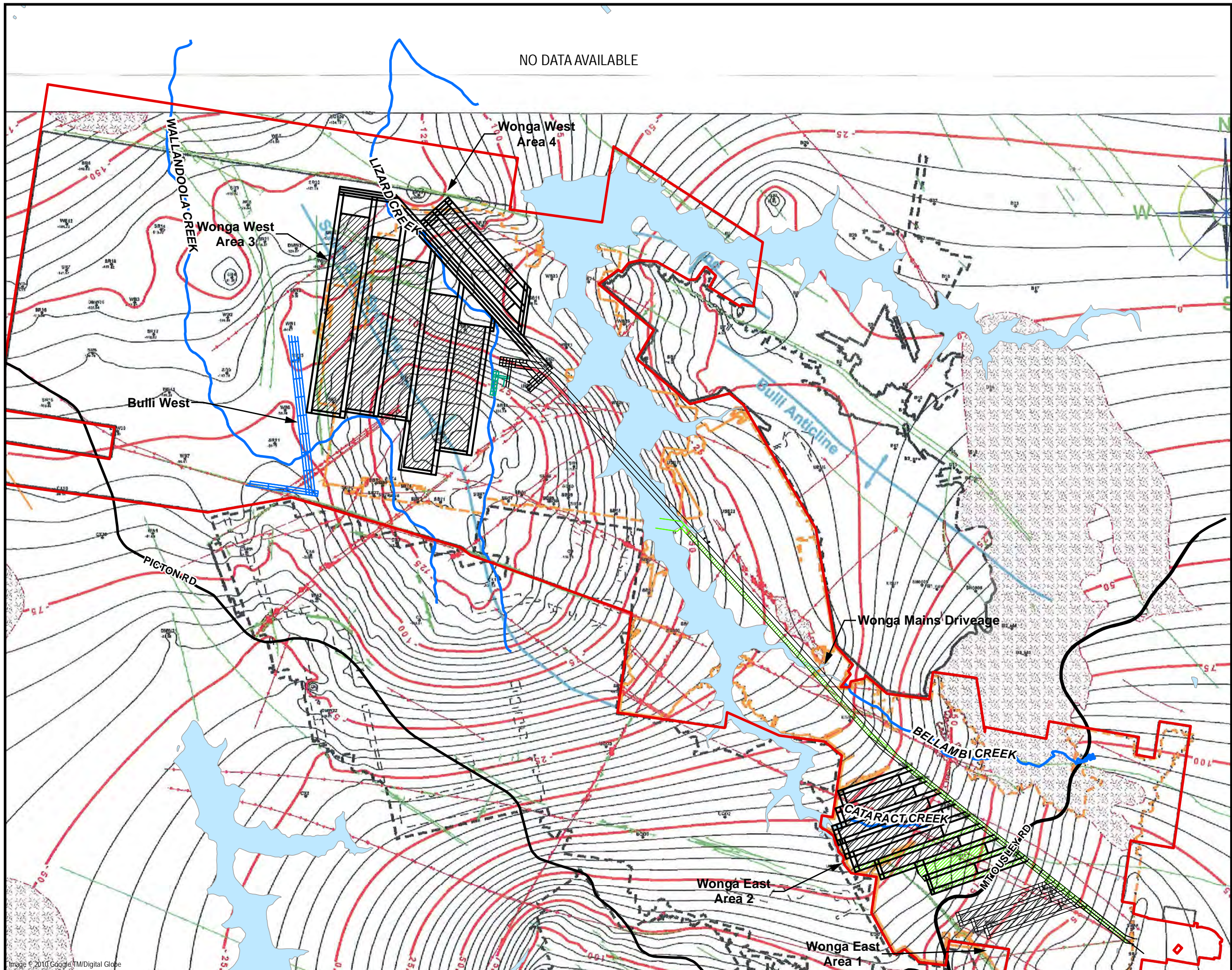
Seam	Measured (Mt)	Indicated (Mt)	Inferred (Mt)	Total (Mt)
Bulli	12.0	31.2	13.3	56.5
Balgownie	-	34.1	41.5	75.6
Wongawilli	13.5	62.2	107.1	182.8
Total	25.5	127.5	161.9	314.9

Source: Bureau Veritas (2010)

3.1.2 *Geological Structures*

There is a general increase in depth of cover north to northwest, away from the existing Bulli seam mine workings in the central portion of the PAA (see Figure 3.2). Depth of cover to the Bulli seam ranges between approximately 300m in the central eastern part of the PAA to slightly over 460m in the central west of the PAA (Bureau Veritas, 2008).

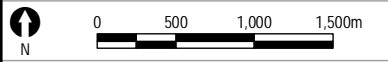
The extensive workings of the Bulli seam and information from surrounding collieries (Appin, Bulli, Cordeaux and Corrimal) have been used to develop an understanding of the structural nature of the Bulli seam in the PAA. The majority of the structures proven or inferred in the Bulli seam have been projected down to the lower Balgownie and Wongawilli seams.



- Legend
- Project Application Area
 - Approved Workings (MP10_0046)
 - Proposed Balgownie Seam First Workings
 - Proposed Bulli Seam First Workings
 - Wongawilli Seam Floor Contours
 - Creek/River
 - Major Road
 - Fault
 - Dyke
 - Anticline

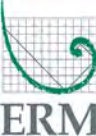
Figure 3.2
NRE No. 1 Colliery Bulli Seam
Structure

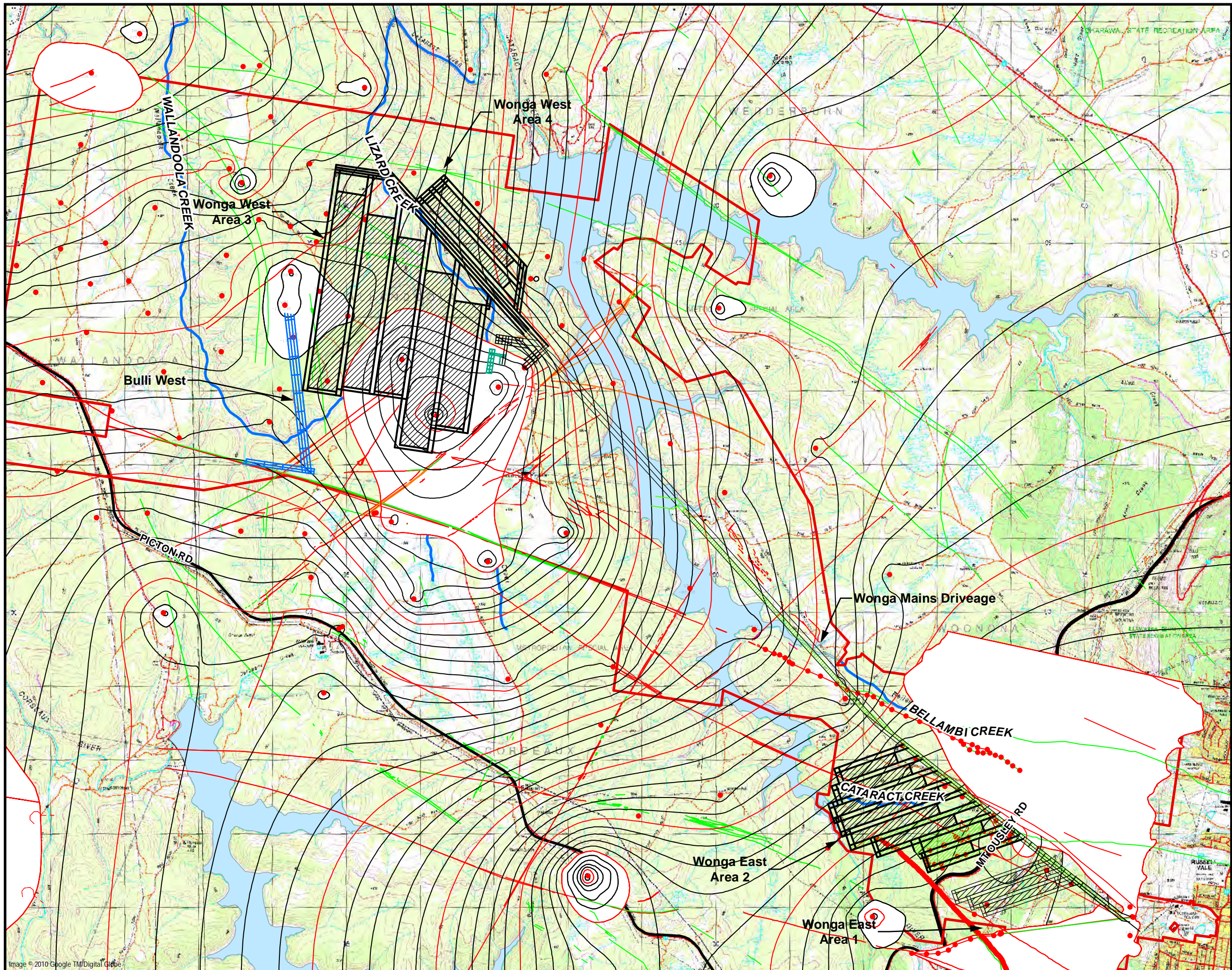
Client: Gujarat NRE Coking Coal Limited
Project: NRE No.1 Colliery Environmental Assessment
Drawing No: 0079383s_EARPA2012_G055_R0.mxd
Date: 22/11/2012 Drawing size: A3
Drawn by: SQW Reviewed by: MK
Scale: Refer to Scale Bar



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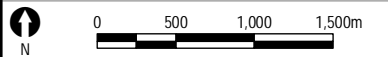




- Legend
- Project Application Area
 - Proposed Longwalls
 - Approved Workings (MP10_0046)
 - Proposed Balgownie Seam First Workings
 - Proposed Bulli Seam First Workings
 - Seam Floor Contours
 - Creek/River
 - Major Road
 - Fault
 - Dyke
 - Anticline
 - Borehole

Figure 3.3
NRE No. 1 Colliery Wongawilli Seam Structure

Client: Gujarat NRE Coking Coal Limited
Project: NRE No.1 Colliery Environmental Assessment
Drawing No: 0079383s_EARPA2012_G027_R1.mxd
Date: 22/11/2012 Drawing size: A3
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Faulting within the PAA is predominately of the 'normal' type. No major faulting has been intersected within the Bulli seam workings but significant faulting has been identified from boreholes and in-seam drilling. To the north of the workings in-seam drilling detected faulting of approximately 35m displacement. In borehole SR19 a fault was intersected with an approximate displacement of 24m. In borehole WB10 in the northwest section of the PAA a fault of approximately 10m displacement was intersected. These features have been interpreted as part of one fault system that is projected almost east to west across the top of the PAA. This projected fault has been used as the northern boundary of the PAA (see *Figure 3.2*) and thus will not impact upon proposed mining.

No other major faulting is known to occur within the PAA but evidence of structural disturbance in several bore holes implies there may be some faulting present in the unworked western area. Detailed exploration is yet to be undertaken over this area.

Within the mine workings of the PAA and surrounding collieries igneous intrusions of dykes, sills and plugs or diatremes have been intersected.

Dykes are the most common form of igneous intrusion and are generally oriented in a NE - SW or WNW - ESE direction. The dykes are generally soft, altered to clays, and occur as individual dykes or as dyke swarms. Dyke thickness is generally less than three metres. Strike length of the dykes can be variable from intermittent lengths of 10s of metres as part of dyke swarms to kilometres for the major dyke intrusions. A significant dyke complex extends from near outcrop to over 10km in length and is part of the fault/dyke system forming the southern boundary of the PAA. This system is predicted to continue further to the west-nor-west into the south western part of the PAA and could present some mining difficulties.

Sills have a far greater impact on mine development than dykes. Their horizontal attitude or emplacement means that large areas (often hectares) can be rendered uneconomic due to cindering, alteration and/or loss of coking properties to the coal.

Sills are erratic in nature and historically their definition other than in a general way has been difficult to define prior to mining.

Silling associated with some of the dykes has been found to be variable in lateral extent. In the eastern portion of the PAA extensive silling has occurred in the Bulli, Balgownie and Wongawilli seams. The exact extent and boundaries of the silling in the Balgownie and Wongawilli seams is not accurately established and the western boundary of the silling is poorly established. The general complex nature of the silling process lends a degree of difficulty in establishing the extremities of the silling and in the Wongawilli seam in particular the position and amount of silling within the coal seam can be variable and unpredictable. Because of this, mine planning about sill boundaries needs to be conservative until mine development is at a sufficient level to allow for long hole exploration drilling.

Plugs or diatremes are vertical or near vertical injections of igneous material. Their occurrence is generally rare within the Southern Coalfield. Only one plug has been found in the PAA and this was in the V Main panels where it was found to be approximately 30m in lateral dimension. The plug was mined on three sides, which allowed its extent to be established.

Inseam gas contents and compositions in the western area of the Bulli seam appear to be below threshold requirements for mandatory inseam drilling and drainage ($>9\text{m}^3/\text{t}$ structure free or $>7\text{m}^3/\text{t}$ with structure) the amount of gas data is not sufficient to say that areas of high gas contents do not occur. It is likely inseam drilling will remain a mandatory requirement for mining in virgin Bulli seam.

In the lower seams the gas contents are relatively unknown. It is likely the Balgownie seam will contain similar contents and compositions to the Bulli seam. The Wongawilli seam was shown in Cordeaux Colliery to be considerably higher in gas content than the Bulli seam and inseam drilling was required prior to mining. It is therefore highly probable that gas contents will be such in the Wongawilli seam that inseam drilling and possible gas drainage will be a mandatory requirement to mining approval as development progresses to the west.

It must be stressed that inseam gas is not considered a parameter that affects the assessment of resources unless established that content and composition are such that the economics of mining are affected. Seam gas is primarily considered a condition that can impact on panel development timing and sequencing.

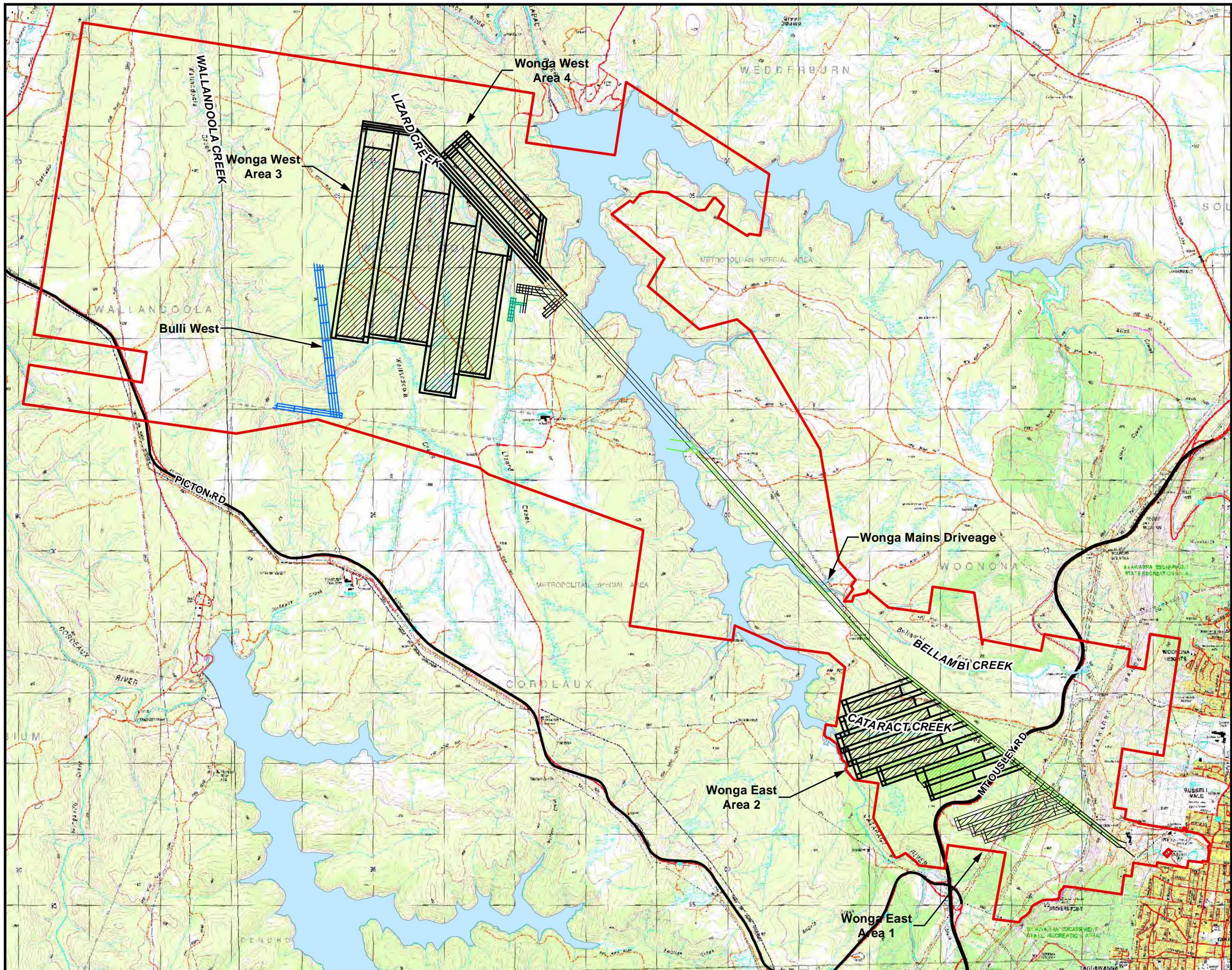
Coking coal from NRE No.1 Colliery within the Wongawilli seam is generally of high quality due to its strong coking properties, low phosphorus ($<0.005\text{ppm}$), moderate sulphur and ash content, good fluidity and reflectance and suitability for direct feed into coke ovens. It is well suited to production of high quality metallurgical coke.

3.2 **PROPOSED UNDERGROUND MINING OPERATIONS**

The proposed mining workings are illustrated in *Figure 3.4* and *3.5*. Mining methods include first workings and secondary extraction. First workings will involve development of headings or roadways within the coal seam and results in less than 20 mm of subsidence. Following the completion of first workings, the retained panels of coal in the Wonga East and Wonga West areas will be extracted by the retreating longwall mining method of secondary extraction. Further details of mining methods and domains as well as access, ventilation and gas drainage are provided in *Chapter 17*.

3.3 **PROPOSED SURFACE WORKS UPGRADES**

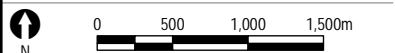
Coal handling infrastructure will be further upgraded to improve operational efficiency and minimise impacts on the environment and local community. The proposed upgrades as a conceptual design have been prepared by JBK Engineering and Mining (JBK) and described by Olsen (2010). The JBK design plans are provided in *Annex C*. The full Olsen (2010) report *NRE No 1 Colliery Russell Vale Site Stage 2 of Upgrade to Surface Facilities and on-site Traffic Report* is provided in *Annex D*.



- Legend**
- Project Application Area
 - Proposed Longwalls
 - Approved Workings (MP10_0046)
 - Proposed Balgownie Seam First Workings
 - Proposed Bulli Seam First Workings
 - Major Road

Figure 3.4
Proposed Workings

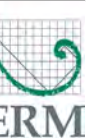
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Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EARPA2012_G026_R0.mxd		
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Drawn by:	SQW	Reviewed by:	NB
Scale:	Refer to Scale Bar		

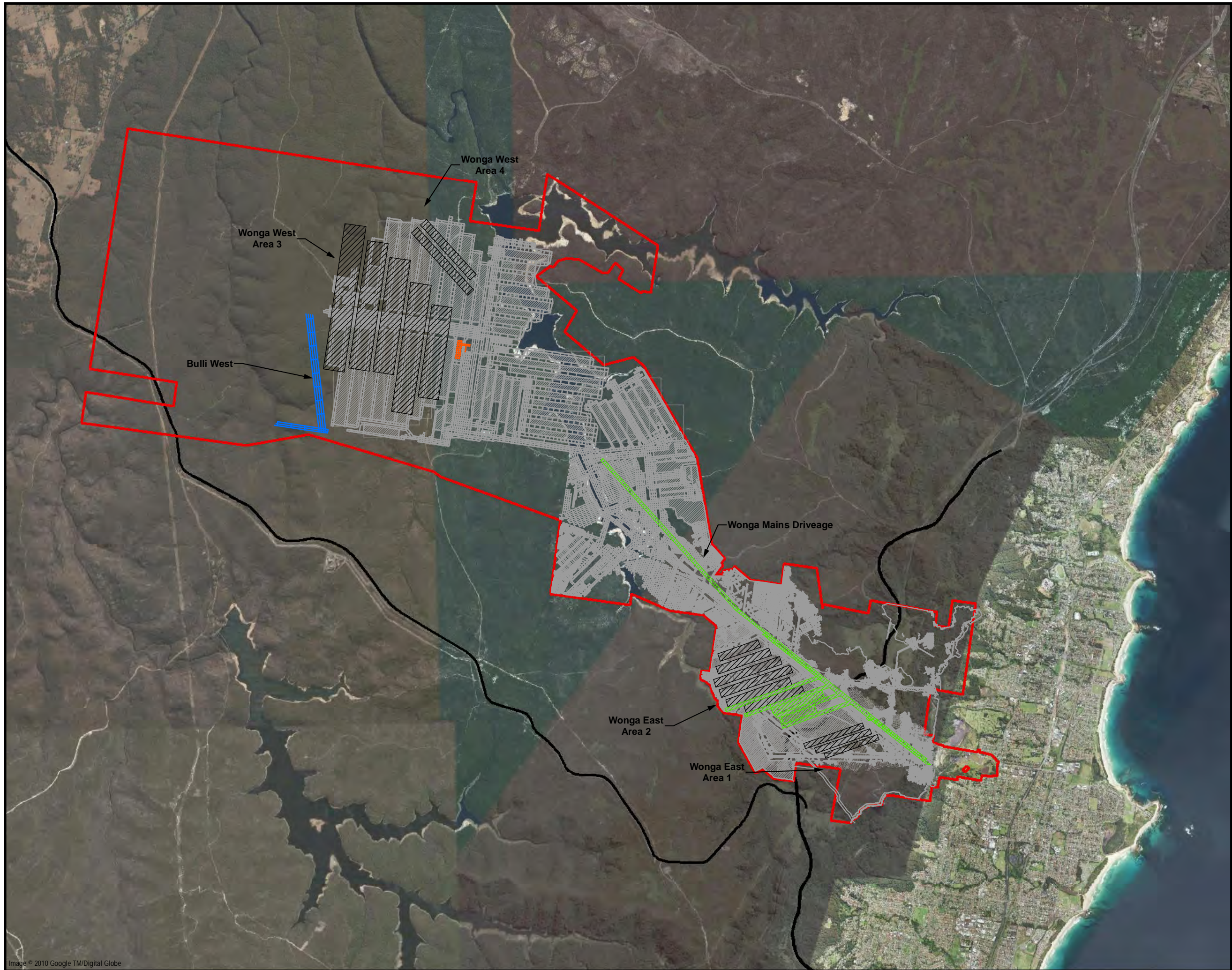


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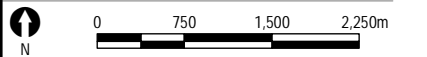




- Legend
- Project Application Area
 - Proposed Longwalls
 - Approved Workings (MP10_0046)
 - Proposed Bulli Seam First Workings
 - Proposed Balgownie Seam First Workings
 - Existing Workings

Figure 3.5
Proposed Mining Areas and Existing Workings

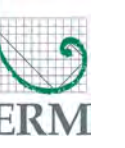
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Project:	NRE No.1 Colliery Environmental Assessment		
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Proposed surface works include further upgrading of existing mine infrastructure and services at Russell Vale, including surface conveyors and coal handling infrastructure, coal sizing, screening, and load-out facilities, site noise, dust controls, mine water and stormwater controls and construction and operation of new Coal stockpile for run-of-mine (ROM) coal. Essential maintenance and refurbishment of existing ventilation shafts and power and water supply arrangements is also proposed to ensure they comply with current day operational and safety requirements. Further details of surface facility upgrade works and expanded operations are included in *Chapter 7*.

3.4 PROJECT SCHEDULE AND MINE LIFE

An indicative underground works schedule is presented in *Table 3.3*. The Project is expected to extend the life of the mine by 18 years until 2028.

Table 3.3 Indicative Underground Works Schedule

Mining Domain	Coal Extracted (tonnes)	Start Time	Finish Time
<i>Bulli Seam</i>			
Bulli West – First workings	300 000	2013	2015
<i>Balgownie Seam</i>			
Balgownie – First Workings	25 000	2014	2014
<i>Wongawilli Seam</i>			
Wonga Mains driveage	660 000	Current	FY15
Wonga West Mains driveage	600 000	FY14	FY21
Wonga East LW Domain – First workings	1 000 000	FY10	FY15
Wonga West LW Domain – First workings	1 640 000	FY14	FY26
Wonga East – Longwalls	5 500 000	FY12	FY16
Wonga West – Longwalls	23 000 000	FY17	FY27

Construction will begin for new surface infrastructure elements once the necessary approvals are in place. Construction of new infrastructure in a sequential manner will enable the coal supply to be maintained continually during modification of the stockpile arrangements.

It is anticipated that the surface facilities construction phase will extend over a period of approximately three years and the schedule of works is summarised in *Table 3.4*.

Table 3.4 Surface Works Indicative Construction Schedule

Stage	Start	Finish
New reclaim belt	September 2013	December 2014
New coal load out facility and truck parking area	September 2013	December 2013
New stockpile area 2.	December 2013	December 2014
New settling pond	December 2013	March 2014
New stockpile area 3	January 2015	January 2016

3.5 **WORKFORCE AND HOURS OF OPERATION**

NRE No.1 Colliery currently employs approximately 287 full-time staff and 10 contractors (see Table 3.5). The Project will potentially increase the number of full-time employees to approximately 381 permanent staff and 40 contractors, as detailed in Table 3.5. In addition, an estimated 65 people will be employed during the construction phase.

No changes to the current shift times or hours of operation (see Section 2.7) are proposed; however during mining in Wonga East all personnel will enter the mine from the Russell Vale Site.

Table 3.5 Proposed Number of Employees at NRE No.1 Colliery

Surface Facility and Employee Status	Number of Employees During Mining of	
	Wonga East	Wonga West
<u>Russell Vale</u>		
Staff	37	26
Underground	263	35
Contractors	10	5
Number of Employees	310	66
<u>No 4 Shaft</u>		
Staff	21	32
Underground	60	288
Contractors	30	35
Number of Employees	111	355
Total Number of Employees	421	421

3.6 **PROJECT ALTERNATIVES**

Multiple options for key Project components have been canvassed over the Project's development phase. Consultation with the DP&I, feedback received during the community consultation process and during the first adequacy review and input from engineering professionals and environmental specialist were fundamental in modifying the Project to meet economic, social and environmental objectives.

The location of the Project is primarily defined by the existing NRE No.1 Colliery and the remaining Bulli, Balgownie and Wongawilli seam coal reserves in CCL 745, MPL 271 and

ML 1575. Given these constraints, alternative options for the location of the Project are not considered to require further review.

The following alternatives are assessed in *Table 3.6*:

- mine plan and orientation;
- stockpile location and design; and
- coal transport.

3.6.1 *Mine Layout*

A number of alternative mine plans were drafted and reviewed in determining a final design. The final mine layout was determined with consideration given to geotechnical suitability and safety, presence of geological structures, presence of previous mine workings in the above coal seam/s and associated impact, if any, on significant surface features. Further consideration was also given to both natural and built features. Options were considered both for Wonga West and Wonga East areas. The alternatives are illustrated in *Figure 3.6*.

Wonga East

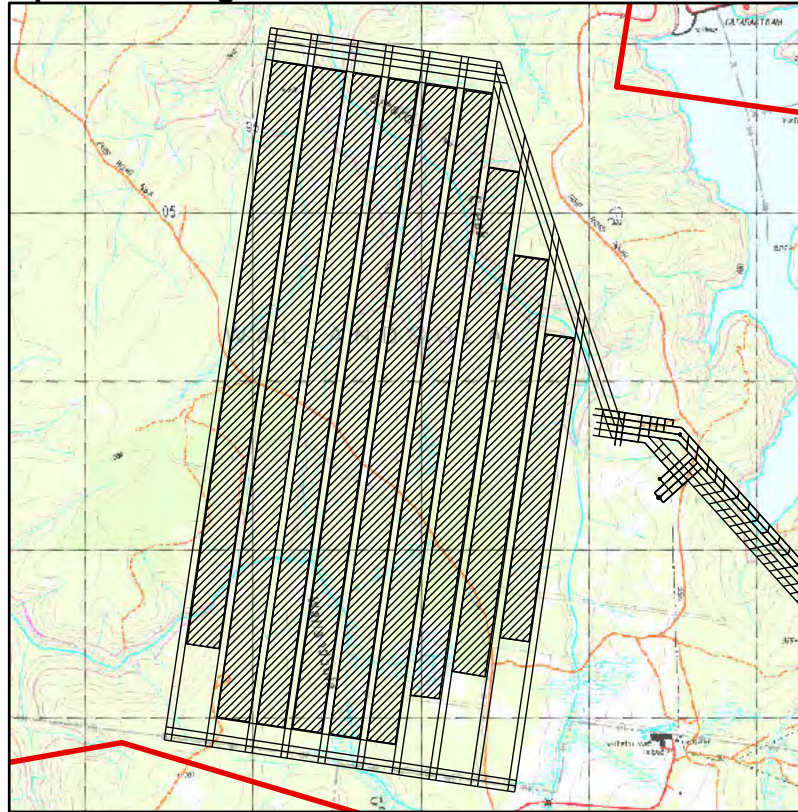
A number of alternative mine plans were drafted and reviewed prior to developing a preferred design. The final mine layout was determined with consideration given to geotechnical suitability and safety, presence of geological structures, presence of previous mine workings in the above coal seam/s and associated impact, if any, on significant surface features. Further consideration was also given to both natural and built features, including but not limited to, power lines, roads and certain environmental as well as archaeological features.

The width of the longwalls was determined to minimise subsidence using large chain pillars whilst ensuring the longwall domains are still economically viable.

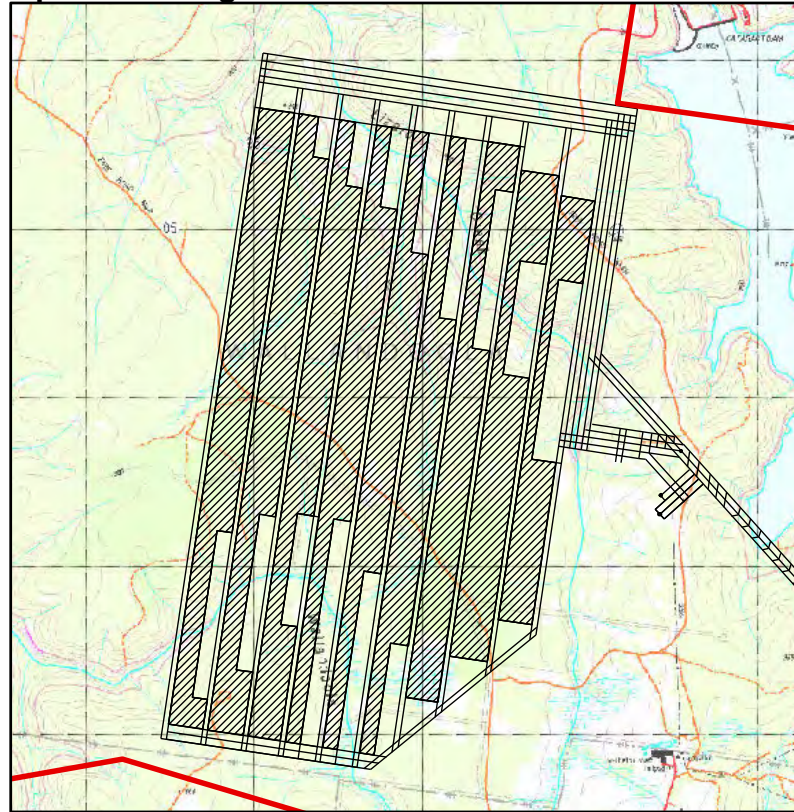
Wonga East Option 1

Longwall panels in an orientation parallel to the mains were explored, however undermining of Mount Ousley Road would occur, causing significant subsidence stress to the road with potential unpredictable consequences. By varying the wall length and width and increasing the chain pillars, the subsidence could be minimized and the risk made manageable. However, geological features (ie a dyke running parallel to the mains) would render this orientation uneconomical (see *Figure 3.6*)

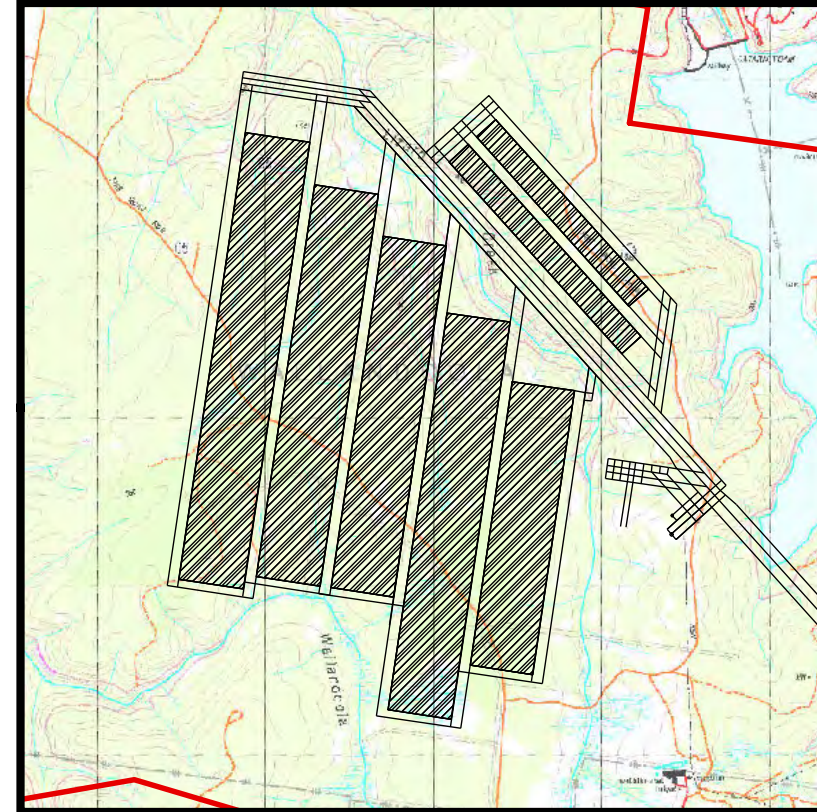
Option 1 Wonga West



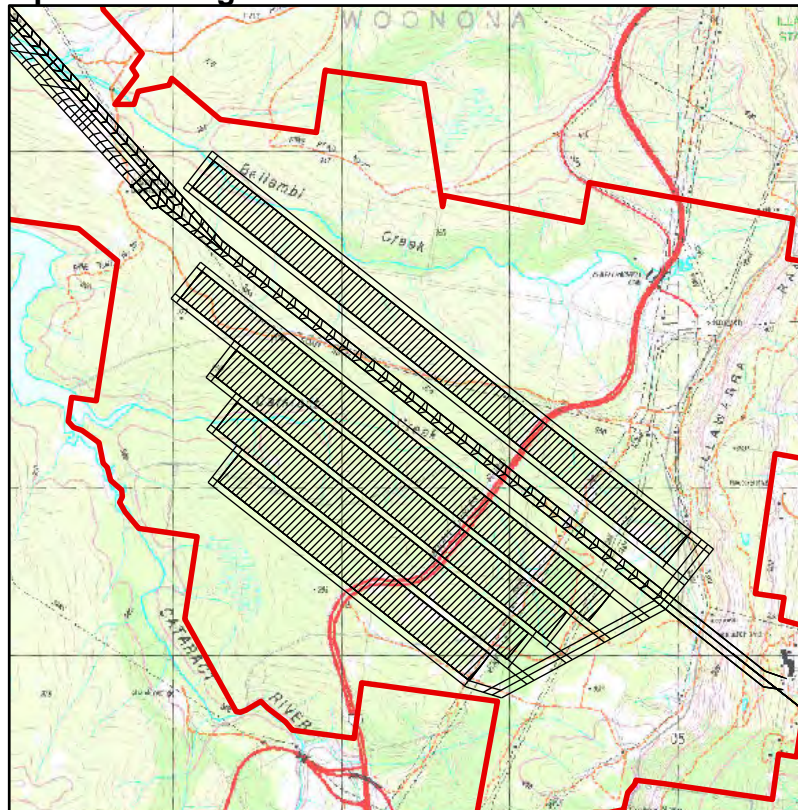
Option 2 Wonga West



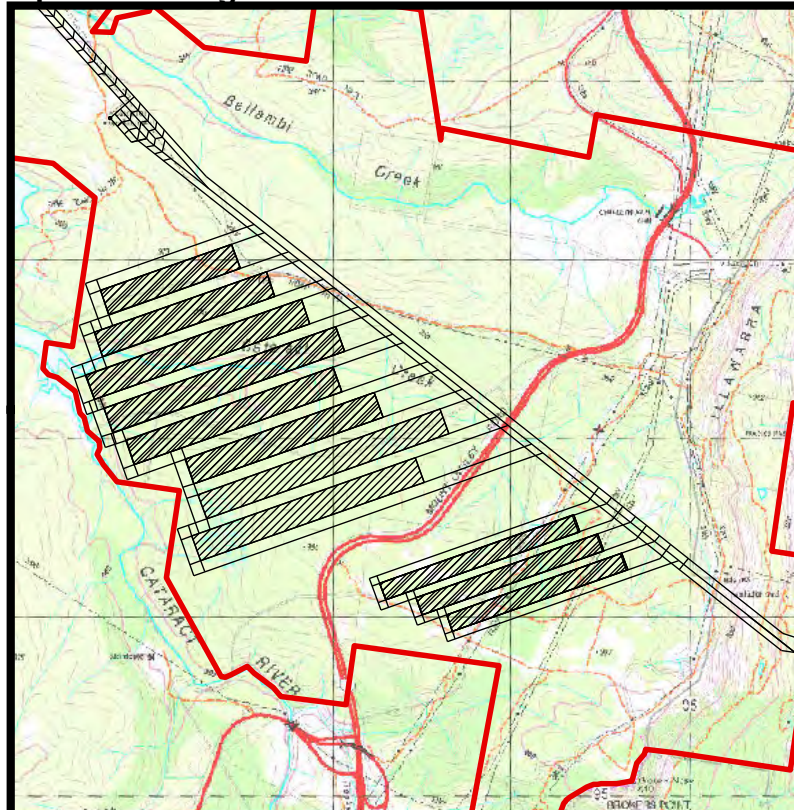
Option 3 Wonga West (Preferred Option)



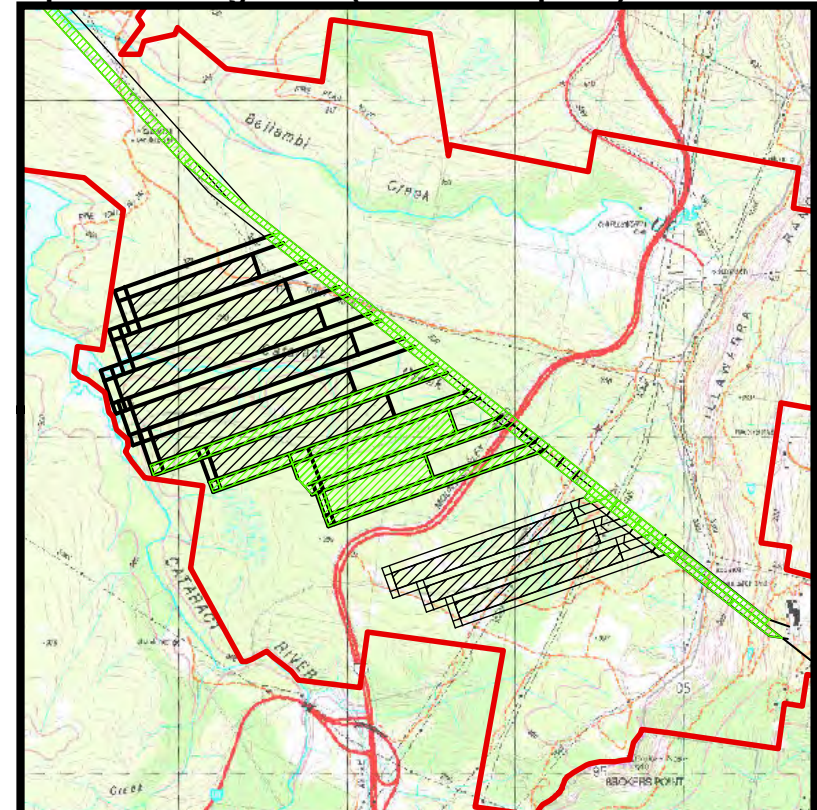
Option 1 Wonga East



Option 2 Wonga East



Option 3 Wonga East (Preferred Option)



- Legend**
- Project Application Area
 - Proposed Longwall
 - Approved Workings (MP10_0046)

Figure 3.6
Longwall Layout Alternatives

Client: NRE Coking Coal Limited

Project: NRE No.1 Colliery
Environmental Assessment

Drawing No: 0079383s_EARPA2012_G023_R0.mxd

Date: 23/11/2012 Drawing size: A3

Drawn by: KB Reviewed by: NB

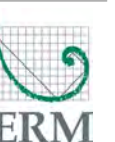
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Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney



Wonga East Option 2

Longwall panels running south west to north east and engineered standoff distances, avoiding mining under Mount Ousley Road.

To ensure continuation of existing mining operations, approval for longwall mining of Longwall panels 4 and 5 was sought from DRE with an application supported by a Subsidence Management Plan (SMP) and Review of Environmental Factors (REF) prepared under Part 5 of the EPA Act.

Longwall panels 4 and 5 undermine large coastal upland swamp CRUS1. This swamp supports habitat (breeding and foraging) for threatened frogs as listed under State and Commonwealth legislation and is representative of the Coastal Upland Swamp Endangered Ecological Community as listed under the *Threatened Species Conservation Act 1995* (TSC Act). To avoid potential impacts on this upland swamp the preferred mine layout was revised.

Wonga East Option 2 – Preferred Option

Longwall panels running south west to north east and engineered standoff distances, avoiding mining under Mount Ousley Road.

The length of Longwall panels 4 and 5 were shortened to avoid the large coastal upland swamp CRHS1.

Wonga West

The Wonga West design has taken into account a number of significant geological and geotechnical features similar to the Wonga East area, in determining a design suitable for the application. The subsidence effects from a number of longwall orientations, widths and lengths were reviewed with respect to the overlying previous workings and the resulting impacts to significant surface features, and a design with minimal impact whilst still economically viable, was chosen.

The following sections discuss the orientations and designs reviewed and considered.

Wonga West Option 1

Maximum recovery using staggered layout with panel widths determined by overlaying Bulli seam workings.

Wonga West Option 2

Staggered layout with panel widths determined by overlaying Bulli seam workings layout and narrowing of panels under the major streams.

Wonga West Option 3 – Preferred Option

Locate wide longwalls primarily to the south of Lizard Creek and smaller longwalls parallel to and north of Lizard Creek, while not mining directly beneath Lizard and Wallandoola Creeks.

3.6.2 *Surface Facilities*

Stockpile

Four options were considered for the design of the stockpile. These options are described below and further assessed in *Table 3.6*. The size and location of facilities was determined taking into account issues including noise, visual amenity, air quality, stormwater drainage, geotechnical stability, operational considerations and financial objectives. Wherever possible, the stockpile arrangement needs to cater for the potential separation of multi coal seam products.

Option 1:

- an initial single conical stockpile with a capacity of 120 000t with a height of 42m (approximately 87m AHD) to handle Bulli or Balgownie seam product;
- dual reclaim feeders that load onto a single reclaim conveyor;
- a second single elongated stockpile with a capacity of 615 000t and a height of 45m (approximately 90m AHD, including skyline conveyor) to handle Wongawilli product with dual skyline tripper conveyors. The stockpile would need to be 345m long and 110m wide. Coal would be reclaimed from this stockpile by feeders directing coal onto a reclaim conveyor, which would run under the entire length of the stockpile.

Option 2:

- an initial single conical stockpile with a capacity of 120 000t (Bulli Product) with a height of 42m (approximately 87m AHD); and
- two additional 360 000t capacity conical stockpiles to handle Bulli seam and Wongawilli seam coal separately. The stockpiles would be fed via rill towers. There were also a varied range of conveyor configurations considered for this option.

Option 3:

This option considered the construction of a series of elongated stockpiles, with a height of 24m (approximately 79m AHD) and a capacity of approximately 315 000t. Stockpiles will be partially subterranean. Coal reclaimed from the base of the stockpile utilising rotary plough reclaimers. The rotary plough reclaimers will feed coal onto reclaim conveyors. These reclaim conveyors would be located in a tunnel at the base of each stockpile and deliver coal to a cross belt at the eastern end of the stockpiles.

Option 4 – Preferred Option:

The existing stockpile (SP1) with a capacity of 60 000t to 80 000t will be maintained, following construction as part of the Preliminary Works project (MP 10_0046).

Two additional stockpile areas (SP2 and SP3) will be installed east of SP1, each with a capacity of up to 140 000t. Coal will be delivered to SP2 and SP3 via an overhead conveyor and tripper arrangement. Coal will be reclaimed from the stockpile via a new reclaiming system. A dozer will be used to push coal to reclaim points where required. The stackers will have height of 31m (approximately 91m AHD).

Coal Loadout

Consideration was given to three options as listed in *Table 3.6*:

- Option 1 - coal load out from No.4 Shaft
- Option 2 - continuing all coal loadout via the Russell Vale site using the existing infrastructure; and
- Option 3 (Preferred Option) - continuing all coal loadout via the Russell Vale site while upgrading the infrastructure to mitigate on site noise and air impacts and to assist with coal loading up to 3Mtpa.

Coal Transport

Coal transport alternatives, including trucking (*Option 1*) and rail (*Option 2*) were considered. These are assessed in *Table 3.6*.

3.6.3 ***Do-Nothing' Option***

The 'do-nothing' option would leave a large reserve of high quality coking coal within the lease area and, as such, be in breach of NRE's obligations under Section 70 Conditions of Mining Leases of the *Mining Act 1992*. Such an approach would also fail to realise the potential economic and employment benefits of the resource.

Furthermore, if mining does not continue, the ongoing economic and social benefits to industry and the community within the Wollongong LGA and Illawarra region will cease. Similarly, a failure to continue coal extraction within the lease boundary would not take advantage of NRE's initial investment in capital and personnel and the knowledge of local geological and mining conditions developed during the prior operations. Accessing resources at a later date would be less likely to be economically viable due to the significant costs associated with re-establishing infrastructure and services.

The 'do-nothing' option would also mean the cessation of employment for many, if not all, of the personnel, and result in both direct and indirect negative impacts on the local and regional economy/ community.

Table 3.6 *Summary of Options Assessed for Major Project Components*

Component	Description	Advantages	Disadvantages	Preferred Option
Mine Plan Wonga East	Option 1	<ul style="list-style-type: none"> Maximise coal return. 	<ul style="list-style-type: none"> High impact of natural features. Undermining of Mt Ousley Road would cause significant subsidence stress to the road with unpredictable consequences. By varying the wall length and width and increasing the chain pillars, the subsidence could be minimized, however geological features (dyke running parallel to the mains) would render this orientation to be un-economical. Potential for adverse geotechnical and mining conditions due to orientation to old workings and joints. 	NO
Mine Plan Wonga East	Option 2	<ul style="list-style-type: none"> Minimises impact on significant natural features including Cataract Dam and Cataract River. Longwall widths minimise subsidence with large chain pillars whilst ensuring the longwall domains are still economically viable. Provides advantageous geological/ geotechnical mining conditions. 	<ul style="list-style-type: none"> Does not achieve maximum coal return. Narrow longwalls require higher development costs per tonne of longwall coal, therefore is less cost effective. Higher levels of resource sterilisation. 	NO
Mine Plan Wonga East	Option 3	<ul style="list-style-type: none"> Minimises impact on significant natural features including Cataract Dam and Cataract River. Avoids impact on large upland swamp CRUS1. Longwall widths minimise subsidence with large chain pillars whilst ensuring the longwall domains are still economically viable. Provides advantageous geological/ geotechnical mining conditions. 	<ul style="list-style-type: none"> Does not achieve maximum coal return. Narrow longwalls require higher development costs per tonne of longwall coal, therefore is less cost effective. Higher levels of resource sterilisation. 	YES - This is the preferred option as it considers significant natural features in the mining domain while ensuring that mining is still economically viable.
Mine Plan Wonga West	Option 1	<ul style="list-style-type: none"> Maximise coal return. Panel orientation consistent with overlying mine workings. 	<ul style="list-style-type: none"> Additional subsidence resulting from interactions with workings from previous overlying seams in the strata. Subsidence under streams of up to 3 metres. 	NO

Component	Description	Advantages	Disadvantages	Preferred Option
Mine Plan Wonga West	Option 2	<ul style="list-style-type: none"> Panel orientation consistent with overlying mine workings. Greater coal return in comparison to Option 3. 	<ul style="list-style-type: none"> Problems with ventilation of the narrowed longwalls. Narrow longwalls require higher development costs per tonne of longwall coal, therefore is less cost effective. Not economic. 	NO
Mine Plan Wonga West	Option 3	<ul style="list-style-type: none"> Panel orientation consistent with overlying mine workings. Minimises impact on significant features including Cataract Dam, main channel and waterfalls on Lizard Creek and Wallandoola Creek, large valley infill upland swamps in Lizard Creek and Wallandoola Creek. 	<ul style="list-style-type: none"> Does not achieve maximum coal return. Shortening longwall reduces coal recovery and increases development costs. 	YES - This is the preferred option as it takes into consideration the significant natural features and other surface features while ensuring that mining is still economically viable.
Multi-seam mining	Mining only in the Wongawilli seam	<ul style="list-style-type: none"> Extends life of mine utilising existing infrastructure. Provides ongoing employment. 	<ul style="list-style-type: none"> Does not mine a viable resource. Potential to sterilise coal resources. Limits life of mine and return on investment and future royalties. 	NO
	Full seam extraction in multiple seams (ie Balgownie and Wongawilli)	<ul style="list-style-type: none"> Increased ROM coal production. 	<ul style="list-style-type: none"> Requires purpose built mining equipment to access low height coal seam. Will result in unacceptable subsidence. Poses a safety risk. Potential unacceptable impacts on surface features. 	NO
	Mining in the Wongawilli seam with first workings in the Balgownie and Bulli seams	<ul style="list-style-type: none"> Increased ROM coal production. Extends life of mine utilising existing infrastructure. Provides ongoing employment. Provides access to future coal resources to the west. 	<ul style="list-style-type: none"> Poses considerable issues with programming production. Will require duplication of conveyor infrastructure and potential segregation on coal stock piles. 	YES - Development of first workings only in the Bulli seam is proposed to provide access to future coal resources.
Surface Facilities	Option 1	<ul style="list-style-type: none"> Sizer/crusher included in coal handling in order to meet PKCT requirement of -50mm coal size received. Minimises the number of conveyors required. Full ability to blend product or load out individually. 	<ul style="list-style-type: none"> Production from the Bulli Seam will continue and will need to be stockpiled separately from the Wongawilli seam coal. The height of the overall stockpile. 	NO

Component	Description	Advantages	Disadvantages	Preferred Option
	Option 2	<ul style="list-style-type: none"> Full ability to blend product or load out individually. 	<ul style="list-style-type: none"> The eastern end of the stockpile and associated facilities were considered to be too close to the boundary of the mine. Will require the use of a dozer. Sizer crusher not included to meet PKCT requirement of -50mm coal size received. Additional conveyors required. The height of the overall stockpile. The eastern end of the stockpile and associated facilities were considered to be too close to the boundary of the mine. Will require the use of a dozer. 	NO
	Option 3	<ul style="list-style-type: none"> Sizer crusher included to meet PKCT requirement of -50mm coal size received. Minimises the number of conveyors required. Full ability to blend product or load out individually Allows for truck queuing. Provides integrated truck washing facilities need Minimises noise generated from the stockpile conveyor, dozers on the stockpile and the crushing and screening unit. Minimises coal free falling from conveyors. The RL of stockpiling and conveyor ensure that infrastructure are not visible to residents. 	<ul style="list-style-type: none"> Requires truck load out facility to be located closer to neighbouring residents. Occupies a relatively large surface area. Very expensive. 	NO
	Option 4	<ul style="list-style-type: none"> No dozer required. Sizer crusher included to meet PKCT requirement of -50mm coal size received. Minimises the number of conveyors required, therefore reducing noise. Some potential to blend product or load out individually. Allows for truck queuing. Minimises noise generated from the stockpile 	<ul style="list-style-type: none"> Stacker will be visible from Bellambi Lane. Will require some use of a dozer. 	YES - This is the preferred option as it is the most economically and environmental feasible.

Component	Description	Advantages	Disadvantages	Preferred Option
Coal load out	Option 1	<ul style="list-style-type: none"> conveyor, dozers on the stockpile and the crushing and screening unit. Avoiding extensive excavation of the fill batter above the current coal handling system. Distance from residential areas. 	<ul style="list-style-type: none"> New infrastructure would be required to make this option available including a new stockpile area and load out facilities. This would require securing additional surface lease areas and clearing of land within the SCA's Metropolitan Special Area. Underground infrastructure would also need to be redesigned to have coal exit at No.4 Shaft. Truck haulage from No.4 Shaft would also add an additional 15 km (approx.) to the haulage route and add to current congestion and traffic loads along the Picton Road. Substantial Additional financial costs. Proximity to local residents. 	NO
	Option 2	<ul style="list-style-type: none"> Stockpiling and load out activities have historically taken place at the Russell Vale site. The required infrastructure for these activities already exists at the Russell Vale site. 	<ul style="list-style-type: none"> Proximity to local residents. 	NO
	Option 3	<ul style="list-style-type: none"> Stockpiling and load out activities have historically taken place at the Russell Vale site. Proposed upgrades will improve efficiency and noise management. 	<ul style="list-style-type: none"> Proximity to local residents. 	YES - This is the preferred option as it will be a continuing use of an existing site. Mitigation measures will be included to address any adverse impacts on residents.

Component	Description	Advantages	Disadvantages	Preferred Option
Coal Transport	Rail transport from the Russell Vale Site to PKCT	<ul style="list-style-type: none"> Not adding traffic to local roads. Less dust/ noise emissions along haulage route. 	<ul style="list-style-type: none"> There is no rail infrastructure at the colliery. A new rail siding, load out infrastructure, and connection to the main South Coast line would be required for rail transport. Additional financial costs to provide new infrastructure. Lack of space to provide such infrastructure. Additional noise impacts. 	NO
	Truck transport from the Russell Vale Site to PKCT	<ul style="list-style-type: none"> Truck haulage from the Russell Vale site has been in operation for 40 years. Colliery is within close proximity to PKCT. Will utilise existing major road infrastructure, which was developed to remove trucks from neighbouring roads. Road haulage is the most cost effective option, compared to alternatives such as rail. Truck load out facilities will be upgraded as part of this Project to ensure greater efficiency in the coal handling process. Upgrades to the trucking fleet will also be implemented to ensure the continuation of community amenity. 	<ul style="list-style-type: none"> May cause some disturbance to community amenity. Creates additional traffic on Bellambi Lane and major arterial roads. 	<p>YES - Truck transport as described in <i>Section 3.3</i> will continue to be the preferred option for coal transport due to the distance to PKCT and being the most cost effective.</p> <p>Production levels are consistent with previous operations.</p>
	Truck transportation from No.4 Shaft to Port Kembla	<ul style="list-style-type: none"> Reduces traffic on local roads at Russell Vale 	<ul style="list-style-type: none"> Increases traffic on other road systems. Substantial costs to install infrastructure for coal load out. Lack of space within surface lease, would require additional lease area insensitive SCA land. 	NO
Mine Access	Main access to underground workings for men and materials from Russell Vale site	<ul style="list-style-type: none"> Utilise existing infrastructure. Consistent with current land use. Proximity to proposed mine workings in Wonga East. 	<ul style="list-style-type: none"> Distance from proposed mine workings in Wonga West. 	<p>YES - This option will be used during workings in Wonga East as it reduces the distance of underground transport during that phase.</p>

Component	Description	Advantages	Disadvantages	Preferred Option
	Main access to underground workings for men and materials from No.4 Shaft	<ul style="list-style-type: none"> Continued use of existing site and infrastructure. Proximity to workings in Wonga West. Reduces underground travelling time. 	<ul style="list-style-type: none"> Continued impacts upon catchment lands. Duplication of some infrastructure. Distance from working sin Wonga East. 	<p>YES - No.4 Shaft will be used as the main access to the underground for personnel and materials during mining in Wonga West as this maximises the use of existing infrastructure with no additional disturbance to SCA land.</p>

4 STATUTORY CONSIDERATIONS

This chapter details the approvals required and the statutory context in which the Project must be considered. The details of existing permits and approvals are also provided.

4.1 COMMONWEALTH LEGISLATION

4.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires approval of the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities for actions that may have a significant impact on matters of national environmental significance (NES). The EPBC Act also requires Commonwealth approval for certain actions on Commonwealth land. Matters of national environmental significance under the Act include the following:

- World Heritage properties;
- National Heritage places;
- Great Barrier Reef marine park;
- Ramsar wetlands of international importance;
- threatened species or ecological communities listed in the EPBC Act;
- migratory species listed in the EPBC Act;
- Commonwealth marine environment; and
- nuclear actions.

Any proposed action that is expected to have an impact on matters of NES must be referred to the Commonwealth Minister for Environment for assessment under the EPBC Act.

Implications for the Project

The Project is not located within the Great Barrier Reef marine park, a world heritage area, Ramsar wetland or commonwealth marine environment. The Project does not contain national heritage places, or involve nuclear actions.

An assessment of the impact of the Project on matters of national environmental significance was undertaken and is provided in *Annex T*. The ecological investigations undertaken and described in *Chapters 22 and 24* and *Annexes Q, R and Annex S* informed this assessment and concluded that the Project may potentially impact on threatened species listed under the provisions of the EPBC Act. Therefore, a referral to the Minister for Environment is required and is being prepared in parallel to this assessment.

4.1.2 ***National Greenhouse and Energy Reporting Act 2007***

The *National Greenhouse and Energy Reporting Act 2007* ('NGER Act') establishes a national framework for Australian corporations to report greenhouse gas emissions, reductions, removals and offsets, and energy consumption and production, from 1 July 2008. The NGER Act requires corporations that control facilities emitting 25 kilotonnes (25,000 tonnes) or more of greenhouse gas (CO₂ equivalent) per year to register and report their greenhouse gas emissions.

Implications for the Project

NRE is a registered corporation under NGER Act triggering reporting. The company is therefore required to report air emissions associated with the NRE No.1 Colliery, as production will trigger the 25 kilotonnes reporting threshold.

4.1.3 ***Clean Energy Act 2011***

The *Clean Energy Act 2011* (CE Act) sets up a mechanism to address climate change by placing a price on carbon emissions to encouraging the use of clean energy. The mechanism began on 1 July 2012, and is administered by the Clean Energy Regulator. Liable entities under the CE Act are those organisations that have facilities that emit more than 25,000 tonnes of CO₂ equivalent (CO₂-e) in direct (Scope 1) emissions.

Under the CE Act, liable entities will be subject to carbon pricing from July 2012. Carbon pricing will be introduced under a two stage approach as follows:

- the carbon pricing mechanism will commence on 1 July 2012, with a price that will be fixed for the first three years. The price will start at \$23 per tonne and will rise to \$25.40 in 2014/2015; and
- on 1 July 2015, the carbon price will transition to a fully flexible price under an emissions trading scheme, with the price determined by the market.

Implications for the Project

NRE is a liable entity under the CE Act. NRE currently report their Scope 1 and 2 emissions through the National Greenhouse and Energy Reporting (NGER) scheme. Any increase of emissions associated with the Project will be captured through existing monitoring and reporting arrangements, with payments for emissions to be made in accordance with the CE Act as amended from time to time.

4.2 ***ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979***

The relevant planning legislation for NSW is the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EP&A Act establishes a system of environmental planning and assessment in NSW and is administered by the Department of Planning and Infrastructure.

The former Part 3A of the EP&A Act provided an assessment and approval process for development defined as a Major Development.

State Environmental Planning Policy (Major Development) 2005 (SEPP MD) defined certain developments as Major Developments under Part 3A of the EP&A Act, which are determined by the Minister for Planning. This Project is development for the purpose of mining and therefore Part 3A of the EP&A Act applies as discussed in *Section 4.3.1*.

However on the 1st October 2011, Part 3A of the Act was repealed by the *Environmental Planning and Assessment Amendment (Part 3A) Repeal Act 2011* (the Amendment Act). The Amendment Act makes provision for transitional arrangements in respect of Part 3A projects through Schedule 6A into the EP&A Act.

Clause 2 (1) of Schedule 6A identifies that Part 3A will continue to apply to 'transitional Part 3A projects', being:

- (a) *an approved project (whether approved before or after the repeal of Part 3A);*
- (b) *a project that is the subject of an approved concept plan (whether approved before or after the repeal of Part 3A),*
- (c) *a project for which environmental assessment requirements for approval to carry out the project, or for approval of a concept plan for the project, were last notified or adopted within 2 years before the relevant Part 3A repeal date (unless the environmental assessment is not duly submitted within 2 years after the repeal of Part 3A or such further period or periods as the Director-General may allow by notice in writing to the proponent)'*
- (d) *a project for which an environmental assessment report (whether for approval to carry out the project or for approval of a concept plan for the project) was duly submitted before the relevant Part 3A repeal date."*

The Project EAR was originally submitted in February 2011 and is therefore defined as a transitional Part 3A project in accordance with the provisions of Schedule 6A Clause 2(1)(d) of the EP&A Act.

Clause 3 of Schedule 6A identifies that Part 3A of EP&A Act (as in force immediately before the repeal of that Part and as modified under Schedule 6A after that repeal) continues to apply to and in respect of a transitional Part 3A project.

This EAR, which assesses the likely impact of a Project on the environment, has been prepared in accordance with Section 75F of the EP&A Act and the Director-General's Requirements (DGRs) (see *Section 1.5*).

Pursuant to Section 75U the following authorisations are not required for a project approved under Part 3A:

- (a) *the concurrence under Part 3 of the Coastal Protection Act 1979 of the Minister administering that Part of the Act,*
- (b) *a permit under section 201, 205 or 219 of the Fisheries Management Act 1994,*
- (c) *an approval under Part 4, or an excavation permit under section 139, of the Heritage Act 1977,*

- (d) a permit under section 87 or a consent under section 90 of the National Parks and Wildlife Act 1974,
- (e) an authorisation referred to in section 12 of the Native Vegetation Act 2003 (or under any Act to be repealed by that Act) to clear native vegetation or State protected land,
- (f) a permit under Part 3A of the Rivers and Foreshores Improvement Act 1948,
- (g) a bush fire safety authority under section 100B of the Rural Fires Act 1997,
- (h) a water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the Water Management Act 2000.

Pursuant to Section 75V of the EP&A Act, authorisation of a mining lease under the Mining Act 1992, or an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act) cannot be refused if they are necessary for carrying out an approved project, and are to be substantially consistent with the approval granted under Part 3A of the EP&A Act. Under Section 34B of the EP&A Act, provision is to be made in a State Environmental Planning Policy requiring consent authorities to refuse consent to development applications relating to any part of the Sydney drinking water catchment, unless the consent authority is satisfied that the proposed development would have a neutral or beneficial effect on water quality. *State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011* has been made to satisfy this obligation (refer to Section 4.3.5).

4.3 STATE ENVIRONMENTAL PLANNING POLICIES

4.3.1 *State Environmental Planning Policy (Major Development) 2005*

The State Environmental Planning Policy- Major Development 2005 (SEPP-MD) was prepared to identify projects, which would fall under Part 3A of the EP&A Act and clearly articulate the role of the Minister for Planning as the consent authority. As identified in Clause 2 of Schedule 6A of the EP&A Act this policy continues to apply to this Project. Schedule 1 of SEPP-MD identifies the different classes of development, which are defined as Major Developments under Part 3A.

The Project is defined as a Major Development under Clause 5 Mining, petroleum production, extractive industries and related industries, which includes:

(1) *Development for the purpose of mining that:*

- (a) *is coal or mineral sands mining, or*
- (b) *is in an environmentally sensitive area of State significance, or*
- (c) *has a capital investment value of more than \$30 million or employs 100 or more people.*

Implications for the Project

The Project is 'development for the purpose of mining' and is therefore classified as a Major Development and subject to assessment under the transitional provisions applying

to Part 3A of the EP&A Act. Therefore, in accordance with Section 75D (1) of the EP&A Act, the Minister for Planning and Infrastructure is the approval authority for the Project.

4.3.2 *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*

State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (SEPP Mining) consolidates and updates planning provisions related to mining and extractive industries as well as requiring potential environmental and social impacts to be addressed.

Implications for the Project

Detailed assessments of the impacts of the Project on surrounding land uses and natural resources are presented in *Chapters 8 to 28* in this EAR. Part 2 of SEPP Mining enables underground mining on any land with consent.

Part 3 of the Policy includes specific matters for consideration including compatibility with other land uses, natural resource management and environmental management, resource recovery, transport, and rehabilitation. These matters applicable to the Project are addressed in *Table 4.1*.

Table 4.1 *SEPP Mining 2007 Matters for Consideration*

Part 3 Matters for Consideration	Project Compliance
<i>Clause 12 Compatibility of proposed mine, petroleum production or extractive industry with other land uses</i>	
<p><i>Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider:</i></p> <p>(i) <i>the existing uses and approved uses of land in the vicinity of the development, and</i></p>	<p>Existing land uses above the underground mining operations include Cataract Dam, and the existing features include the Illawarra escarpment which is zoned environmental protection and dominated by native bushland. Mount Ousley Road bisects the site and runs along the Illawarra Escarpment. Surrounding land uses adjoining the Russell Vale site include low density residential and light industrial. Russell Vale township is directly north of the mine site. Corrimal and Bellambi townships are located to the south and east respectively. Mining has been a feature of the landscape since 1887.</p> <p>Mining operations will continue within the environmental protection zone and whilst subsidence is expected in sections management measures have been prepared to mitigate any negative impacts.</p> <p>The surface infrastructure upgrades adjoining the Russell Vale and Bellambi townships will not reduce the vegetation buffer provided along the Princes Highway and north to existing residences. The amenity impacts associated with expansion of mining operations and associated upgrade of facilities has been considered in <i>Chapters 10</i> and <i>13</i> and appropriate mitigation measures have been identified. The increase in traffic volumes have been assessed in <i>Chapter 12</i> and include recommendations for traffic management.</p>

Part 3 Matters for Consideration	Project Compliance
(ii) <i>whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and</i>	Residential, light industrial and environmental protection are likely to continue as preferred land uses. The Project is not expected to have a significant impact on these uses.
(iii) <i>any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and</i>	Mining has long been a feature of the area and has resulted in local employment and urban development. Subsidence will be managed so as not to adversely affect environmental protection zones. Increase in production levels will result in increased traffic volumes along the existing road network. Mitigation/management measures have been adopted to minimise any adverse impacts to surrounding communities. Noise and air quality impacts have also been assessed.
(b) <i>evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii),</i>	The public benefit will be through increased employment opportunities and associated economic benefits being created by increasing mining operations and upgrade of Russell Vale site facilities (refer to <i>Chapters 26 and 28</i>).
(c) <i>evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).</i>	Measures to mitigate incompatibility have been considered and included in the statement of commitments (<i>Chapter 29</i>).
Clause 14 <i>Natural resource management and environmental management</i>	
(1) <i>Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:</i>	
(a) <i>that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,</i>	Impacts to surface water and groundwater have been assessed within <i>Chapters 20 and 21</i> respectively.
(b) <i>that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,</i>	Impacts on threatened species and biodiversity are addressed in <i>Chapter 24</i> .
(c) <i>that greenhouse gas emissions are minimised to the greatest extent practicable.</i>	Greenhouse gas emissions have been assessed in <i>Chapter 11</i> .
(2) <i>Without limiting subclause (1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.</i>	Greenhouse gas emissions have been assessed in <i>Chapter 11</i> .
Clause 15 <i>Resource recovery</i>	
(1) <i>Before granting consent, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.</i>	Mine planning has balanced efficiency (resources, recovery & economics) against environmental protection - refer to Project Alternatives - <i>Chapter 3</i> .
(2) <i>Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.</i>	Mine planning has balanced efficiency against environmental protection (refer to <i>Chapters 8 to 28</i>).

Part 3 Matters for Consideration	Project Compliance
<i>(3) The consent authority may refuse to grant consent to development if it is not satisfied that the development will be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.</i>	Waste produced as part of the mining operations has been assessed within Chapter 15. Management measures have been included within the Project.
Clause 16 Transportation	
1) Before granting consent, the consent authority must consider whether or not the consent should be issued subject to conditions that do any one or more of the following: (a) require that some or all of the transport of materials in connection with the development is not to be by public road,	Transportation of ROM coal to the Port Kembla Coal Terminal (PKCT) is via the existing road network. Increasing traffic volumes have been assessed in Chapter 12. Alternative options are limited and have also been considered.
(b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,	Coal truck movements are confined to the approved trucking route between the Russell Vale site and PKCT.
(c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.	A code of conduct has been prepared.
(2) If the consent authority considers that the development involves the transport of materials on a public road, the consent authority must, within 7 days after receiving the development application, provide a copy of the application to: (a) each roads authority for the road, and (b) the Roads and Traffic Authority (if it is not a roads authority for the road).	It is anticipated that the DP&I will consult the RMS regarding the traffic impacts associated with the Project. Consultation with the RMS has been undertaken as part of the Project (refer to Chapter 5).
Clause 17 Rehabilitation	
(1) Before granting consent the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.	A mine closure plan was developed as part of the Mining Operations Plan (MOP) for NRE No.1 Colliery. This plan has been reviewed as part of this EAR. It is NRE's intention to consider areas that become surplus to needs for rehabilitation as mining works progress.
(2) In particular, the consent authority must consider whether conditions of the consent should: (a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or	Mine closure and rehabilitation have been considered in Chapter 15.
(b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or	Waste produced as part of the mining operations has been assessed within Chapter 15. Management measures have been included within the Project.
(c) require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under section 145C of the Act and the Contaminated Land Management Act 1997), or	Chapter 15 addresses how contamination if any will be managed according to the rehabilitation plan.
(d) require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.	The mine closure plan identifies areas for rehabilitation during mining operations. The plan includes public safety measures to mitigate any adverse impacts.

4.3.3 ***State Environmental Planning Policy No. 44 - Koala Habitat Protection***

State Environmental Planning Policy 44 (SEPP 44) - Koala Habitat Protection aims to 'encourage the proper conservation and management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent free-living populations over their present range and to reverse the current trend of population decline'. Wollongong and Wollondilly LGAs are listed in Schedule 1 as areas where Koalas are known to occur and accordingly where the provisions of SEPP 44 apply. However, only applications under Part 4 of the EP&A Act are subject to this SEPP.

Under SEPP 44 'potential' Koala habitat is defined as areas of native vegetation where the trees of the types listed in Schedule 2 of SEPP 44 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component. 'Core' Koala habitat is defined as an area of land with a resident population of Koalas, as evidenced by attributes such as breeding females (with young), recent sightings and historical records of a population.

Implications for the Project

As the proposal is being assessed under Part 3A of the EP&A Act this SEPP does not apply. Some of the vegetation communities within the ecological assessment Study Area in the PAA, are identified as *potential* Koala habitat under SEPP 44, given the representation of *Eucalyptus haemastoma* as a dominant tree species (greater than 15% of canopy cover). However the Study Area is not considered *core* Koala habitat as there is no evidence to indicate the presence of a resident population of Koalas or recent sightings or historical records of a resident population.

4.3.4 ***State Environmental Planning Policy No. 33 (Hazardous and Offensive Development)***

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) provides definitions for 'hazardous industry', 'hazardous storage establishments', 'offensive industry' and 'offensive storage establishment'. The definitions enable decisions to approve or refuse a development to be based on the merit of a proposal.

Implications for the Project

All hazardous materials will continue to be managed in accordance with NRE's existing management practices that are currently implemented successfully at the colliery.

Where procedures do not exist for a work activity, a risk assessment is required to be undertaken prior to commencement of work. Risk assessments are aimed at identifying potential risks/ hazards, including environmental risks or hazards, associated with the work tasks.

4.3.5 ***State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011***

SEPP (Sydney Drinking Water Catchment) 2011 applies to land within the hydrological catchments that contribute to Sydney's drinking water supply.

The aims of this Policy are:

- *to provide for healthy water catchments that will deliver high quality water while permitting development that is compatible with that goal; and*
- *to provide that a consent authority must not grant consent to a proposed development unless it is satisfied that the proposed development will have a neutral or beneficial effect on water quality; and*
- *to support the maintenance or achievement of the water quality objectives for the Sydney drinking water catchment.*

A large part of the PAA is designated as a *Schedule 1 Restricted Access Area (Metropolitan Special Area)* under the *Sydney Water Catchment Management Act 1998* (refer to *Section 4.4.3*) and is managed by the Sydney Catchment Authority (SCA). Consequently this SEPP applies.

In deciding whether or not to approve the Project under Part 3A, the Minister may take into account Clause 9 and 10 of the SEPP (Sydney Drinking Water Catchment).

Clause 9 states that:

- 1) *any development or activity proposed to be carried out on land to which this Policy applies should incorporate the Authority's current recommended practices and (performance) standards;*
- 2) *If any development or activity does not incorporate the Authority's current recommended practices and (performance) standards, the development or activity should demonstrate to the satisfaction of the consent authority or determining authority how the practices and performance standards proposed to be adopted will achieve outcomes not less than those achieved by the Authority's current recommended practices and standards'.*

Clause 10 states that:

- 1) *"A consent authority must not grant consent to the carrying out of development under Part 4 of the Act on land in the Sydney drinking water catchment unless it is satisfied that the carrying out of the proposed development would have a neutral or beneficial effect on water quality;*
- 2) *For the purposes of determining whether the carrying out of the proposed development on land in the Sydney drinking water catchment would have a neutral or beneficial effect on water quality, the consent authority must, if the proposed development is one to which the NorBE Tool applies, undertake an assessment using that Tool."*

The *Neutral or Beneficial Effect Tool* (NorBE Tool) identified in Clause 10 of SEPP (Sydney Drinking Water Catchment) 2011 describes how to assess a neutral or beneficial effect (NorBE) on water quality for development applications made to consent authorities for land in the Sydney drinking water catchment, as defined in the SEPP.

The NorBE Tool is detailed in Appendix 1 of the *Neutral or Beneficial Effect of Water Quality Assessment Guidelines 2011* (NorBE Guidelines). The NorBE Guidelines supports the implementation of the SEPP by providing clear direction on what a neutral or beneficial effect means, how to demonstrate it, and how to assess an application against the neutral or beneficial effect on water quality test using the NorBE Tool.

Implications for the Project

Impacts of the Project on the quality of water within lands to which the Sydney Drinking Water Catchment SEPP applies are assessed in *Chapter 20*.

The assessment concludes that the Project will not have significant impact on water quality. As a Part 3A project under the EP&A Act a development application under Part 4 of the Act does not have to be submitted.

Although not specified in the SEPP, the NorBE Guideline may provide a framework to consider major infrastructure and other projects under Part 3A of the EP&A Act. The Minister for Planning and Infrastructure determines these projects and which water quality test will be applied.

4.3.6 Illawarra Regional Environmental Plan No.1

As of 1 July 2009, regional environmental plans (REPs) are no longer part of the hierarchy of environmental planning instruments in NSW. All existing REPs are now deemed State Environmental Planning Policies (SEPPs).

The aim of the *Illawarra Regional Environmental Plan No.1* (IREP) plan is to “*maximise the opportunities for the people of the region and the State to meet their individual and community economic and social needs with particular reference to the way in which these needs are related to the allocation, availability, accessibility and management of the region’s land resources*”. This plan is administered by the local government unless the statutory process identifies a different consent authority as stated within Part 3A.

Coal Mining Activities

Part 4 of the IREP applies to coal mining, transportation and refuse emplacement. The objectives of Part 4 are:

- a) *to ensure that proposed development is assessed in relation to the feasibility of its rendering coal resources unavailable,*
- b) *to eliminate haulage of coal on public roads as far as practicable in order to overcome conflict with other road users and the adverse environmental impact of such haulage, and*
- c) *to provide guidelines for ensuring coal washery refuse emplacements are located and designed with minimum adverse environmental impact.*

Implications for the Project

The impacts of road haulage on the local road network are assessed in *Chapter 12*. Options for alternative transport were considered and assessed in *Chapter 3*.

The assessment concludes elimination of haulage of coal on public roads is not practical given the lack of available alternative infrastructure.

No coal washery is proposed as part of the Project as ROM coal is exported.

Development of the Illawarra Escarpment

Part 12 of the IREP identifies provisions relating to development of the Illawarra Escarpment. *“The objective relating to the escarpment is to protect the natural environmental and scenic amenity of the escarpment area, while promoting its use for recreational purposes and accommodating the needs of the coal industry”.*

Clause 102 requires the consideration of the following matters prior to granting development consent for a development application along the escarpment.

- (a) consider the visual impact of the proposed development when viewed from a public place, and take such measures that will, in its opinion, minimise any visual impact,*
- (b) (Repealed)*
- (c) be satisfied that the development will not be subject to slip hazard.*

Implications for the Project

Consideration has been given to the visual presentation of the pit top in *Chapter 13*. The visual assessment concluded that the Project will not significantly impact on the visual landscape.

Environmental Heritage

Part 15 Clause 124 of the IREP identifies the objectives for consideration of environmental heritage being a *building, work, relic, or place of historic, scientific, cultural, social, architectural, archaeological, natural or aesthetic significance*. The objectives seek to:

- (a) to encourage the conservation of the environmental heritage of the region, and*
- (b) to control the demolition and renovation of items identified by this plan as items of the environmental heritage of the region.*

Clause 128 of the IREP states that consent shall not be granted to the *“carrying out of development in the vicinity of an item of the environmental heritage unless it has made an assessment of the effect which the carrying out of that development would have on the historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the item of the environmental heritage and its setting”.*

Implications for the Project

A number of items within the NRE No.1 Colliery (formerly the South Bulli Colliery) are listed as environmental heritage items under Schedule 1 of the IREP. The impact of the Project on these items is assessed in *Chapter 14*.

4.4 OTHER STATE LEGISLATION

4.4.1 *Protection of the Environment Operations Act 1997*

The *Protection of the Environment Operations Act 1997* (POEO Act) provides an integrated system of licensing for polluting industries. Schedule 1 of the POEO Act identifies types of development that require an Environmental Protection Licence (EPL). Mining for coal is included in Schedule 1.

Clause 28 defines mining for coal as:

- (1) *“processing or handling of coal (including tailings and chitter) at underground mines or open cut mines.*
- (2) *The activity to which this clause applies is declared to be a scheduled activity if:*
 - (a) *it has a capacity to produce more than 500 tonnes of coal per day, or*
 - (b) *it has disturbed, is disturbing or will disturb a total surface area of more than 4 hectares of land by:*
 - (i) *clearing or excavating, or*
 - (ii) *constructing dams, ponds, drains, roads, railways or conveyors, or*
 - (iii) *storing or depositing overburden or coal (including tailings and chitter).*

Implications for the Project

Environment Protection License (EPL) number 12040 issued under the POEO Act applies to the operations at NRE No.1 Colliery. The license regulates water quality, volume discharges and requires dust monitoring at the site. It is expected that modification to this licence will be required.

4.4.2 *Mining Act*

The *Mining Act 1992* refers to the granting of Mining Leases and mining activities generally and, amongst other legislative instruments, places controls on methods of exploration and mining, the disposal of mining waste, and rehabilitation and environmental management activities. This site currently has an approved Consolidated Coal lease (CCL) 745, Mining Purpose Lease (MPL) 271 and Mining Lease (ML) 1575. The Division of Resources and Energy (DRE) of the Department of Trade and Investment Regional Infrastructure and Services (DTIRIS) administer the *Mining Act 1992*.

Implications for the Project

Under the *Mining Act 1992*, environmental protection and rehabilitation are regulated by conditions in all Mining Leases, including requirements for the submission and approval from the DRE of a Mining Operations Plan (MOP) prior to the commencement of operations. A MOP for the Colliery has been accepted by DTIRIS. This will be updated as required to reflect changes resulting from the Project.

4.4.3 ***Sydney Water Catchment Management Act 1998***

The *Sydney Water Catchment Management Act 1998* is administered by the SCA. The role of the SCA is to:

- a) *to manage and protect the catchment areas and catchment infrastructure works, and*
- (b) *to be a supplier of raw water, and*
- (c) *to regulate certain activities within or affecting the outer catchment area as well as the inner catchment area.*

Consultation with the SCA has been undertaken throughout the assessment process to ensure that the Project is consistent with the aims of the *Sydney Water Catchment Management Act 1998*.

Sydney Catchment Authority Special Areas Strategic Plan of Management 2007

The *Sydney Catchment Authority Special Areas Strategic Plan of Management 2007* (SASPoM) was prepared to protect the water quality in Sydney's drinking water catchment. The Special Areas are the lands, which surround Sydney's drinking water storages and are declared under the *Sydney Water Catchment Management Act 1998*. Due to protective management and restricted access the Special Areas have high ecological values.

As the part of the lease fall within the Metropolitan Special Area, the SASPoM is relevant to the proposed development. The goals of the SASPoM are to "*protect and optimise water quality entering storages*" and "*conserve ecosystem integrity, natural and cultural values.*"

4.4.4 ***Water Management Act 2000***

The *Water Management Act 2000* (WM Act) incorporates the provisions of various acts relating to the management of surface and groundwater in NSW, and provides a single statute for the regulation of water use and works that affect surface and groundwater, both marine and fresh. The NSW Office of Water (NOW) administers the WM Act.

The WM Act replaced the Water Act, 1912 in the PAA on 1 July 2011 following gazettal on the 25th of February, 2011 of the;

- Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011; and
- Water Sharing Plan for the Greater Metropolitan Region Groundwater Water Sources 2011.

Accordingly, the provisions of the WM Act apply to the project.

Approval is required under the WM Act to:

- use water from a regulated water source (Section 89);
- construct and use water supply works (Section 90); and

- carry out a specified controlled activity such as excavation, the construction of infrastructure and access roads, and any activity that takes or interferes with water in an aquifer (Section 91).

Furthermore, any extraction, interception or diversion from either surface and/or groundwater requires access licences under the provisions of Clause 56 of the WM Act, including the take of water by means of redistributing or diverting water from a water source, as provided in the definition of take of water in the *Water Management Amendment Act 2010*.

Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources

The Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources encompasses the Study area, and is contained within the Sydney Basin Nepean Groundwater Source Area. A macro water sharing plan for the Greater Metropolitan Region's surface water resources is also being developed in parallel with the groundwater sharing plan.

The plan includes rules aimed at protecting Groundwater Dependent Ecosystems consistent with the Groundwater Dependent Ecosystem Policy (DLWC, 2002). The policy includes wetlands, terrestrial vegetation and caves or karst systems. In the proposed plan, terrestrial ecosystems are protected by a 200m stand off for new bores from any sandstone escarpment where hanging swamps or base flow to rivers is supported by groundwater. It should be noted however, that no extraction bores are proposed and there are no 'hanging' swamps, as opposed to 'upland' swamps in the Study Area.

While it does not extend into the Study Area, there is currently an embargo on further applications for sub-surface water licences in the Southern Coalfield (ordered under section 113A of the *Water Act, 1912*), for areas covering the:

- Nepean Sandstone Water Shortage Zone GWMA 607 (gazetted 8 June 2007); and
- NSW Southern Highlands (gazetted 21 May 2004 and 16 December 2005).

NSW Aquifer Interference Policy 2012

The NSW Aquifer Interference Policy 2012 was released in September 2012 and details the NSW Government's policy for the licencing and assessment of aquifer interference activities. The full implications of the Policy in respect the Project are detailed in GeoTerra groundwater assessment (see *Annex P*).

A water license is required under the WM Act unless an exemption applies or water is being taken under a basic landholder right, where any act by a person carrying out an aquifer interference activity causes the:

- removal of water from a water source;
- movement of water from one part of an aquifer to another part of an aquifer; and

- movement of water from one water source to another water source, such as from an aquifer to an adjacent aquifer, an aquifer to a river/lake, or from a river/lake to an aquifer.

Where an aquifer interference activity causes movement of water from a connected regulated or unregulated river water source into the groundwater source, than an access license in the regulated or unregulated river water source is required to account for the take of water from that water source and another access license in the groundwater source is required for the remainder of the take.

Implications for the Project

Lizard, Wallandoola and Cataract Creeks are located within the Upper Nepean River Tributaries Headwaters Management Zone (UNRTHMZ) of the Upper Nepean Water Source. The creeks provide water for environmental requirements and enhancement of flows augmenting regulated releases in the Cataract River to the Broughton's Pass Weir off take, and downstream to the Nepean River.

The NSW Office of Water (NOW) considers the diversion of water from surface water sources to sub-surface fracture zones, or redistribution within groundwater sources as a 'take' under the WM Act and as a result water access licences under Clause 56 of the WM Act must be obtained to account for the take of water from the respective water source.

Schedule 6A of the EP&A Act applies to transitional Part 3A projects and excludes the requirement to obtain approvals under Sections 89, 90 and 91 of the WM Act for projects approved under Part 3A. However, the EP&A Act does not remove the need for licencing under the WM Act of access licences required for the extraction of water from a water sources that is the subject of a water sharing plan.

The Proponent lodged an application for a licence under the WM Act in January 2009 and paid the necessary fee. However to date a licence has not been issued.

Potential impacts to the regional and local surface and groundwater systems have been addressed in detail in *Chapters 20 and 21*.

4.4.5 Coal Mine Health and Safety Act 2002

The *Coal Mine Health and Safety Act 2002* is administered by the DRE and regulates activities undertaken on coal mines to ensure that the health, safety and welfare of persons involved in their operation are protected. Activities undertaken at the NRE No. 1 Colliery will continue to be undertaken in accordance with this Act.

4.4.6 Coal Mines Regulation Act 1982

The *Coal Mines Regulation Act 1982* is administered by the DRE and regulates activities on coal mines including mine management and operations. Activities at the NRE No. 1 Colliery will continue to be undertaken in accordance with the provisions of this Act.

4.4.7 **Dams Safety Act 1978**

Under Schedule 1 of the *Dams Safety Act 1978*, Cataract Dam is a prescribed dam for which the Dam Safety Committee (DSC) has the following functions:

- (a) *to maintain a surveillance of prescribed dams, the environs under, over and surrounding prescribed dams and the waters or other materials impounded by prescribed dams to ensure the safety of prescribed dams,*
- (b) *to examine and investigate the location, design, construction, reconstruction, extension, modification, operation and maintenance of prescribed dams, the environs under, over and surrounding prescribed dams and the waters or other materials impounded by prescribed dams,*
- (c) *to obtain information and keep records on matters relating to the safety of dams,*
- (d) *to formulate measures to ensure the safety of dams,*
- (e) *to make such reports or recommendations to the Minister or any other person in relation to the safety of prescribed dams as the Committee considers necessary or appropriate,*
- (f) *to make reports and recommendations with respect to the prescription of dams for the purposes of this Act,*
- (g) *to exercise such other functions as are conferred or imposed on the Committee by or under this or any other Act or the regulations, and*
- (h) *to do such supplemental, incidental and consequential acts as may be necessary or expedient for the exercise of its functions.*

Implications for the Project

Consultation has occurred during the assessment process with the DSC (refer to Chapter 5) with respect to works proposed adjacent to Cataract Dam. The proposed workings are within the dam's Notification Area and approval/s will be sought accordingly together with the appropriate DSC consultation.

Notification areas are defined by the DSC under Section 369 of the *Mining Act 1992*. A modification to the Notification area was gazetted on 11 December 2011, which increased the exclusion zone around the dam wall to 1.5km. Consideration of the notification area of Cataract Dam and potential impacts as a result of the Project are detailed in *Chapters 20 and 21*.

4.5 **NON-LIMITING STATE LEGISLATION**

This section reviews other legislation that applies to the Project Area. In some instances the transitional provisions for Part 3A within Schedule 6A of the EP&A Act effectively limits the applicability or necessity for gaining further approvals or permits. Where this occurs, it is identified in the following sections.

4.5.1 ***National Parks and Wildlife Act 1974***

The *National Parks and Wildlife Act 1995* (NPW Act) is administered by the OEH. An object of the NPW Act is to conserve objects, places or features (including biological diversity) of cultural value within the landscape.

Sections 87 of the NPW Act requires a permit to disturb or excavate land for the purpose of discovering an Aboriginal object and Section 90 requires consent to destroy an Aboriginal object. However, Schedule 6A of the EP&A Act excludes projects approved under Part 3A from requiring these permits.

4.5.2 ***Fisheries Management Act 1994***

The *Fisheries Management Act 1994* is administered by Fisheries NSW unit of the Department of Primary Industries and includes provisions to declare and list threatened species of fish and marine vegetation, endangered populations and ecological communities, and key threatening processes. Schedule 6A, of the EP&A Act excludes projects approved under Part 3A from requiring a permit under sections 201, 205 or 219 of this Act.

4.5.3 ***Heritage Act 1977***

The *Heritage Act 1977* is administered by the NSW Heritage Office and protects the natural and cultural history of NSW (with emphasis on non-Aboriginal cultural heritage) through protection provisions and the establishment of a Heritage Council. As this proposal is being assessed under Part 3A of the EP&A Act, an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977* is not required in accordance with the transitional provisions of Schedule 6A of the EP&A Act. Under Section 146 of the *Heritage Act 1977*, the NSW Heritage Council must be notified of any unexpected discoveries of 'relics' during the works.

4.5.4 ***Native Vegetation Act 2003***

The *Native Vegetation Act 2003* (NV Act 2003) aims to provide flexibility and incentives to manage native vegetation, end broad scale clearing (unless it improves or maintains environmental outcomes) and encourage healthy and productive landscapes. Under Section 12 of the NV Act authorisation is required to clear 'native vegetation'.

Schedule 6A of the EP&A Act excludes projects approved under Part 3A from requiring "an authorisation referred to in section 12 of this (or under any Act to be repealed by that Act) to clear native vegetation".

4.5.5 ***Threatened Species Conservation Act 1995***

Projects determined by a statutory authority of the NSW State Government, are required to be assessed in accordance with the EP&A Act, as amended by the *Threatened Species Conservation Act 1995* (TSC Act). The TSC Act lists threatened species, populations and ecological communities under Schedules 1 and 2 of the Act, that are priorities for conservation within NSW.

The potential impacts on threatened species have been considered in accordance with the requirements of the TSC Act and the EP&A Act.

Schedule 3 of the TSC Act lists Key Threatening Processes for species, populations and ecological communities within NSW. *Alteration of habitat following subsidence due to longwall mining* is listed as a Key Threatening Process under the TSC Act.

The presence of threatened flora and fauna species and endangered ecological communities were investigated as part of this EAR and are discussed in *Chapters 20 to 24* and *Annex Q* to *Annex S*.

4.6 LOCAL PLANNING INSTRUMENTS

4.6.1 Wollongong Local Environmental Plan 2009

Under the *Wollongong Local Environmental Plan 2009* (WLEP 2009) the PAA is subject to a number of different zones including Zone RU1 Primary Production, E2 Environmental Conservation, and SP2 Infrastructure (see *Figure 4.1*).

Implications for the Project

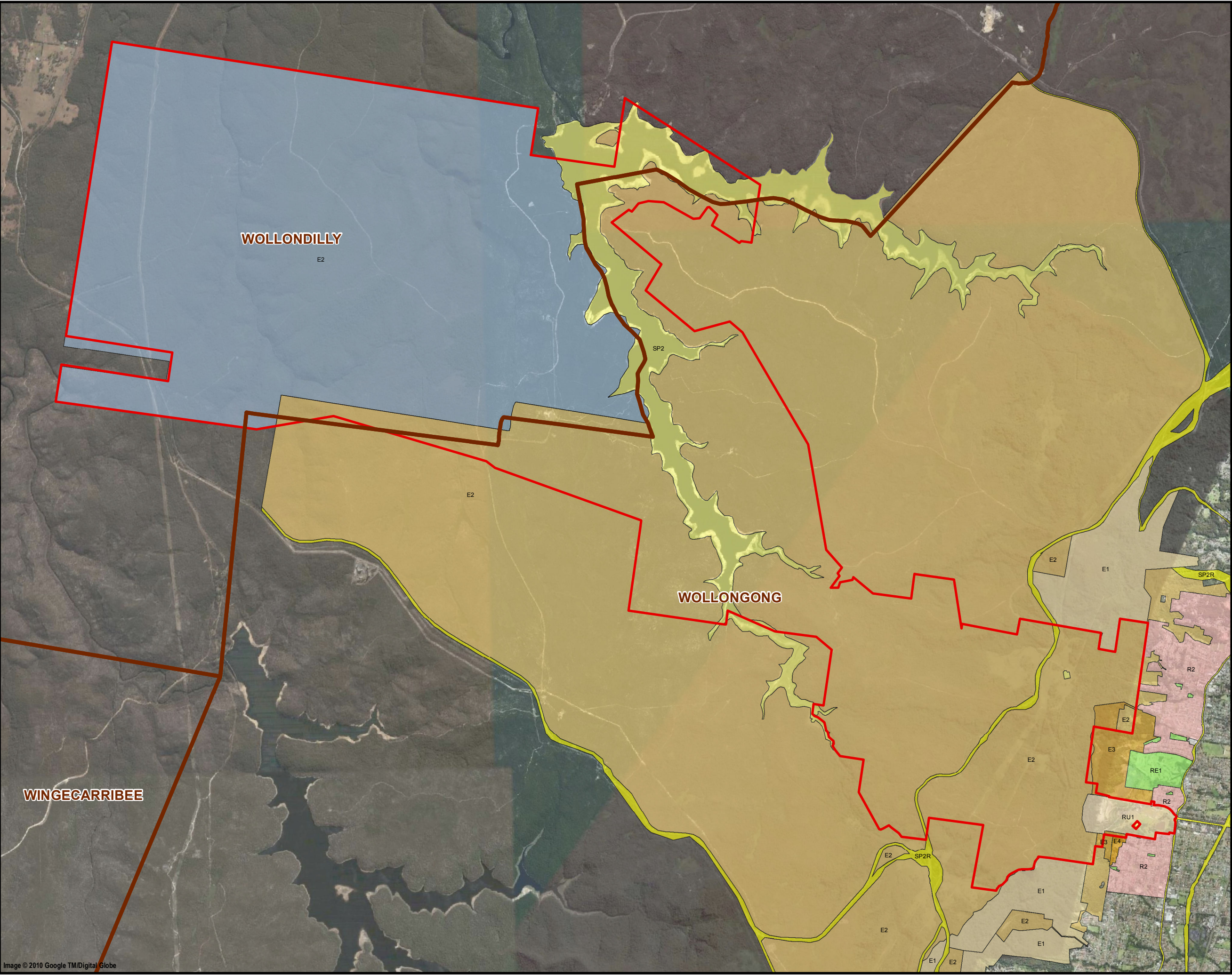
Extractive industries are permissible within the RU1 – Primary Production zone subject to development consent. Mines are prohibited in both zones E1 and SP2. Notwithstanding the provisions of the WLEP 2009, SEPP Mining permits the development.

4.6.2 Wollondilly Local Environment Plan 2011

A section of the PAA is within Wollondilly LGA and is subject to Wollondilly LEP 2011. Under LEP 2011 it is zoned E2 Environmental Conservation. The objectives of this zone are:

- *to protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values; and*
- *to prevent development that could destroy, damage or otherwise have an adverse effect on those values.*

Mining is prohibited in zone E2. Notwithstanding the provisions of the Wollondilly LEP 2011, SEPP (Mining) permits the development.



Legend

Project Application Area

LGA

Zoning (Wollongong LEP 2009)

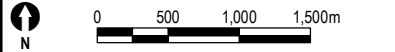
- E1 - National Parks and Nature Reserves
- E2 - Environmental Conservation
- E3 - Environmental Management
- E4 - Environmental Living
- IN2 - Light Industrial
- R2 - Low Density Residential
- RE1 - Public Recreation
- RU1 - Primary Production
- SP2 - Infrastructure (Water Supply System)
- SP2R - Infrastructure

Zoning (Wollondilly LEP 2011)

- E2 - Environmental Conservation
- SP2 - Infrastructure (Water Supply System)

Figure 4.1
Land Use Zonings

Client:	Gujarat NRE Coking Coal Limited		
Project:	NRE No.1 Colliery Environmental Assessment		
Drawing No:	0079383s_EARPA2012_G001_R0.mxd		
Date:	29/11/2012	Drawing size:	A3
Drawn by:	KB	Reviewed by:	TM
Scale:	Refer to Scale Bar		



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4.7 EXISTING PERMITS AND APPROVALS

Existing and pending licences, permits and leases for the site are listed below in *Table 4.2*. All Gujarat NRE No.1 Colliery activities will be undertaken in accordance with these listed items.

Table 4.2 Existing Licences, Permits and Leases

Licence/Approval	Document No	Issue Date / Expiry Date
Preliminary Works Project Approval	MP 10_0046	13 October 2011 – 13 October 2014
Consolidated Coal Lease Renewal	745	27/12/1990 – 30/12/2023
Mining Purpose Lease	271	3/3/1994 – 9/5/2033
Mining Lease	1575	9/7/2008 – 7/10/2029
Pillar Extraction Approval T&W Mains	C90/0146(G)	31/10/2011
	C91/0146(H)	23/01/2002
	C01/009	28/06/2001
Approval to mine P&O Panels (first workings)	10.123.081	7/01/2005
DC for thin seam Mining P/L	D1096/01	19/09/2001
EPA Licence	12040	Current
EPA Approval for Storm Water Control Dam	90/4711(280021C/20)	10/08/1992
DC for Storm Water Control Dam and Water Treatment	D91/551	17/06/1992
Dangerous Goods Licence	35/021269	02/09/2008 – 23/04/2012
SPCC Approval for Stage 3	90/4711	04/09/1992
	(280021C/20)	
DC for Russel Vale Waste Emplacement	D89/839	11/04/1990
DC for Demolition of Washery	D2004/32	14/12/2004
Mining Operations Plan (MOP)		01/01/2008 – 31/12/2017
Water Extraction Licence	To be determined	Submitted to NoW in January 2009

4.7.1 Development Consents

There are three development consents in force for NRE No.1 operations:

- Major Project Approval (MP 10_0046), the Preliminary Works Project, being development described as:
 - augmenting, upgrading and using the existing infrastructure at the mine;
 - extracting up to 1 million tonne of run-of-mine coal a year from the Bulli and Wongawilli coal seams for a period of up to 3 years using pillar extraction mining methods;
 - extracting remnant coal reserves within existing mining areas;
 - transporting run-of-mine coal from the mine by road; and
 - rehabilitating the site.

- Notice of Determination of Development Application D2004/32 – being development described as decommissioning and removal of coal washery plant - Bellpac No.1 Colliery (formerly South Bulli Colliery); and
- Notice of Determination of Development Application No D89/39 – being development described as coal washery reject emplacement area.

NRE lodged a Subsidence Management Plan application for the extraction of Longwalls 4 and 5 in Wonga East with the Department of Trade and Investment Division of Resources and Energy (DRE) in March 2012. Approval for A2 LW4 was granted on 26 March 2012. Mining of this longwall is complete.

A separate application to modify the Preliminary Work Project (MP 10_0046), was prepared by Cardno (2012) and lodged with the Department of Planning and Infrastructure (DP&I) in August 2012. The modification application seeks to amend the approval for main gates 4 and 5 in the Wonga East mining domain from exploratory driveages to operational gateroads and the extraction of coal from Longwall panels 4 and 5; and, development of main gates 6, 7 and 8 in Wonga East.

The decommissioning and removal of the old washery plant (Application No. D2004/32) has been largely completed, and much of the washery has been removed. However, two coal stacking gantries remain and a final heritage report is pending.

The emplacement area operates under consent D89/839 from Wollongong Council which allows refuse to be emplaced on the site from the workings of the NRE No.1 Colliery (then known as the South Bulli Colliery).

The emplacement area is not within the PAA and is not intended to be used for future operations as coal will be exported unwashed. Rehabilitation of the emplacement area will be undertaken in accordance with the existing consent.

4.7.2 *Environmental Protection Licence 12040*

NRE No.1 Colliery holds an Environmental Protection Licence (EPL) for the mining of coal, 500,000 to 2,000,000 tonnes. Under the conditions of EPL12040, NRE are required to monitor dust levels at five monitoring locations within and around the Russell Vale site. Dust levels are monitored using dust gauges with two gauges located on West Street and one each on Brokers Street, Midgely Street and within the Russell Vale site (see *Figure 4.2*).

In addition NRE are also required to monitor water quality and water quantity from three licensed discharge points (LDP) within the Russell Vale site. These points are shown on *Figure 4.2*. LDP 1 and 3 monitor stormwater from the site while LDP 2 monitors wastewater. The sampling method, units of measure, and the frequency must be done in accordance with the conditions of the EPL. The results and findings of the monitoring program must be submitted to the EPA in an Annual Return.

The EPL has also required a number of Pollution Reduction Programs (PRP) be implemented at the colliery. The most recent PRP (completed in October 2009) required a noise investigation and mitigation program to be implemented at the colliery.



Legend

 Project Application Area

EPL Monitoring Locations

● Dust Monitoring

■ Discharge to Waters

Client: Gujarat NRE Coking Coal Limited

Project: NRE No.1 Colliery
Environmental Assessment

Drawing No: 0079383s_EA_GIS008_R0.mxd

Date: 28/11/2012 Drawing size: A4

Drawn by: KB Reviewed by: MK

Scale: Refer to Scale Bar



0 40 80 120m

Maps and figures contained within this document may be based on third party data, may not be to scale and is intended for use as a guide only. ERM does not warrant the accuracy of any such maps or figures.

Figure 4.2

Licensed Monitoring and Discharge Points at the Russell Vale Site

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch,
Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney



4.7.3 *Water Licence*

An application for a water licence for NRE No. 1 Colliery has been submitted in January 2009 and is still pending.

4.7.4 *Mining Operations*

A Mining Operations Plan (MOP) is approved and currently in force for NRE No.1 Colliery. The MOP is an operations manual for the colliery and sets out environmental management and monitoring regimes to be followed and is summarised in *Table 4.3*. The MOP also details a rehabilitation strategy for the closure of the mine.

Table 4.3 *Key MOP Environmental Management and Monitoring Measures*

Issues	Management and Monitoring Measures
Air Quality	<ul style="list-style-type: none">• Management of dust through water sprays on the stockpile, water trucks to dampen stockpiles and roads, and an operating truck wash.• Monitoring of dust levels as per the EPL.
Erosion and sediment	<ul style="list-style-type: none">• Management of sediment runoff through the existing stormwater system.• Visual monitoring of control structures.
Water quality	<ul style="list-style-type: none">• Water quality is monitored as per the EPL.
Weeds	<ul style="list-style-type: none">• Ongoing and progressive control of weeds on the property has been contracted out to the Noxious Weeds Branch officers associated with Wollongong City Council or private contractor.
Noise	<ul style="list-style-type: none">• Maintaining equipment in good working order.• Consultation with EPA, local residents and mine personnel.• Ongoing awareness training of all staff and operators of heavy equipment.
Mine Subsidence	<ul style="list-style-type: none">• Regular monitoring by survey.• Subsidence Monitoring Plans have been prepared, which include specific independent technical reports and subsidence monitoring requirements.
Waste	<ul style="list-style-type: none">• Putrescible waste, waste timber and other rubbish are disposed of using the services of a licensed contractor.• Scrap steel is sold to a metal recycler.• Waste paper from the administration section is also recycled where possible.

4.8 *RECOMMENDATIONS OF THE SOUTHERN COALFIELDS INQUIRY REPORT*

In 2006, in response to concerns about mine subsidence impacts on significant natural features in the Southern Coalfield, the NSW Government established an Independent Inquiry into underground coal mining in the Southern Coalfield. A summary of how the Project has taken into consideration the preliminary findings and recommendations of the Independent Inquiry (2008) report into *Impacts of Underground Coal Mining on Natural Features in the Southern Coalfield* (DoP 2008) is presented in *Table 4.4*.

Table 4.4 Southern Coal Fields Inquiry Report Checklist

Recommendation	Response	Reference
Assessment and Regulatory Processes		
1. Risk Management Zones (RMZs) should be identified in order to focus assessment and management of potential impacts on significant natural features. RMZs are appropriate to manage all subsidence effects on significant natural features, but are particularly appropriate for nonconventional subsidence effects (especially valley closure and upsidence). Consequently, RMZs should be identified for all significant environmental features which are sensitive to valley closure and upsidence, including rivers, significant streams, significant cliff lines and valley infill swamps.	RMZs have been applied to named third order streams or above (in the Strahler stream classification) in Wonga East and Wonga West including: <ul style="list-style-type: none"> • Wallandoola Creek; • Lizard Creek; • Unnamed tributaries of Lizard Creek (called Lizard Creek Tributary 1 and Lizard Creek Tributary 2); • Cataract Creek; and • Cataract River. 	Chapter 20, Chapter 21, Chapter 26 Annex O, Annex Q, Annex R, Annex S and Annex V.
2. RMZs should be defined from the outside extremity of the surface feature, either by a 40° angle from the vertical down to the coal seam which is proposed to be extracted, or by a surface lateral distance of 400 m, whichever is the greater. RMZs should include the footprint of the feature itself and the area within the 40o angle (or the 400 m lateral distance) on each side of the feature.	There are a number of upland swamps in the catchment of these streams. Risk assessments have been undertaken for each swamp of special significance (see Annex Q).	Chapter 26 and Annex V (cliffs and steep slopes)
3. RMZs for watercourses should be applied to all streams of third order or above, in the Strahler stream classification. RMZs should also be developed for valley infill swamps not on a third or higher order stream and for other areas of irregular or severe topography, such as major cliff lines and overhangs not directly associated with watercourses.	Valley infill swamps have been identified along Lizard Creek and Wallandoola Creek. Within the Study Area valley infill swamps are all located on third order or higher streams. Wallandoola Creek, Cataract Creek, Lizard Creek and Lizard Creek Tributary 1 contain continuous and semi-continuous cliff formations, however these are not being mined directly beneath. An assessment of cliff lines and steep slopes has been undertaken (see Annex V). A risk assessment of Aboriginal heritage items above the proposed longwalls has been undertaken.	Chapter 25 and Annex U (Aboriginal heritage)
4. Environmental assessments for project applications lodged under Part 3A should be subject to the following improvements in the way in which they address subsidence effects, impacts and consequences: <ul style="list-style-type: none"> • a minimum of 2 years of baseline data, collected at an appropriate frequency and scale, should be provided for significant natural features, whether located within an RMZ or not; 	The approach in this EA is consistent with recommendation 4 including the following: <ul style="list-style-type: none"> • NRE has gathered a comprehensive data set for each of the environmental studies. 	Annex M to Annex V

Recommendation	Response	Reference
<ul style="list-style-type: none"> • <i>identification and assessment of significance for all natural features located within 600 m of the edge of secondary extraction;</i> 	<ul style="list-style-type: none"> • All significant natural features within 600m of secondary extraction have been identified and taken into consideration in establishing study areas. 	<i>Annex M to Annex V</i>
<ul style="list-style-type: none"> • <i>better distinction between subsidence effects, subsidence impacts and environmental consequences;</i> 	<ul style="list-style-type: none"> • The results of a subsidence assessment and pillar run report provided predictions to inform technical studies, specifically surface water, groundwater, aboriginal heritage and terrestrial and aquatic ecology. The specialist studies have identified subsidence impacts and environmental consequences. 	<i>Annex D and F to M</i>
<ul style="list-style-type: none"> • <i>increased transparency, quantification and focus in describing anticipated subsidence impacts and consequences;</i> 	<ul style="list-style-type: none"> • Anticipated subsidence impacts and consequences have been documented and addressed throughout the report. 	<i>Chapter 18 to Chapter 26, Annex M to Annex V</i>
<ul style="list-style-type: none"> • <i>increased communication between subsidence engineers and specialists in ecology, hydrology, geomorphology, etc;</i> 	<ul style="list-style-type: none"> • A risk workshop was held with subsidence engineers and technical specialists to allow better communication and discussion of subsidence impacts on significant features. 	<i>Annex F</i>
<ul style="list-style-type: none"> • <i>key aspects of the subsidence assessment (particularly in respect of predicted impacts on significant natural features and their consequences) should be subject to independent scientific peer review and/or use of expert opinion in the assessment process; and</i> 	<ul style="list-style-type: none"> • The subsidence prediction methodology was subject to a technical review session to confirm that the risk management approach adopted was robust and acceptable and identify any factors or components that were either inadequately addressed or that had not yet been considered. Impacts on significant natural features have been identified in specialist surface water, upland swamps, cliffs and ecological assessments. 	<i>Annex F and N</i>
<ul style="list-style-type: none"> • <i>increased use of net benefit reviews by both mining proponents and regulatory agencies in assessing applications.</i> 	<ul style="list-style-type: none"> • The net benefit of the proposal has been considered. 	<i>Chapter 27 and 28</i>
<p>5. <i>Due to the extent of current knowledge gaps, a precautionary approach should be applied to the approval of mining which might unacceptably impact highly-significant natural features. The approvals process should require a 'reverse onus of proof' from the mining company before any mining is permitted which might unacceptably impact highly-significant natural features. Appropriate evidence should include a sensitivity analysis based on mining additional increments of 50 m towards the feature. If such mining is permitted because the risks are deemed acceptable, it should be subject to preparation and approval of a contingency plan to deal with the chance that predicted impacts are exceeded.</i></p>	<p>A subsidence assessment has been prepared detailing the predicted subsidence from mining. This assessment has informed technical studies specifically surface water, groundwater, aboriginal heritage and terrestrial and aquatic ecology which has assessed the environmental consequences resulting from the subsidence.</p> <p>The precautionary approach was applied to mine planning and design; where by impacts to significant features were avoided by eliminating mining beneath that feature. Where required, commitments have been made to modify the extent of mining in light of measured subsidence effects to minimise subsidence impacts and environmental consequences on features of natural significance in particular Cataract Creek and upland swamps.</p>	<i>Annex M and Chapter 18</i>

Recommendation	Response	Reference
<p>6. <i>Approved mining within identified RMZs (and particularly in proximity to highly-significant natural features) should be subject to increased monitoring and assessment requirements which address subsidence effects, subsidence impacts and environmental consequences. The requirements should also address reporting procedures for back analysis and comparison of actual versus predicted effects and impacts, in order to review the accuracy and confidence levels of the prediction techniques used.</i></p>	<p>A management strategy will be put in place for:</p> <ul style="list-style-type: none"> • Lizard Creek; • Wallandoola Creek; • Cataract Creek; • Mount Ousley Road; • Cataract Reservoir; • Significant ecological features; and • Aboriginal heritage items. <p>Monitoring of ground movements will be undertaken to measure the extent to which the actual ground movements may differ from those that have been predicted and to periodically review the impacts in the light of additional data.</p>	Chapter 29
<p>7. <i>Part 3A of the Environmental Planning and Assessment Act 1979 should be the primary approvals process used to set the envelope of acceptable subsidence impacts for underground coal mining projects. This envelope of acceptability should be expressed in clear conditions of approval which establish measurable performance standards against which environmental outcomes can be quantified. Once a project has approval under Part 3A, the Subsidence Management Plan approval should be restricted to detailed management which ensures that the risk of impacts remains within the envelope assessed and approved under Part 3A. In cases where a mining project approval under Part 3A of the EP&A Act does not yet exist, the SMP process should take a greater role in assessing and determining the acceptability of impacts.</i></p>	<p>It is considered that this recommendation applies to the NSW Government.</p>	N/A
<p>8. <i>The acceptability of impacts under Part 3A (and, in the interim, the SMP process) should be determined within a framework of risk-based decision-making, using a combination of environmental, economic and social values, risk assessment of potential environmental impacts, consultation with relevant stakeholders and consideration of sustainability issues.</i></p>	<p>This EA has been prepared utilising a risk based framework for the assessment of potential impacts and consequences of the Project, as well as management measures to help mitigate these. This has included:</p> <ul style="list-style-type: none"> • the completion of a risk assessment; • consultation with the Executive Working Group (EWG) to obtain feedback on key issues for assessment and overall consultation with relevant stakeholders; and • integrated assessment of environmental and socio-economic issues. 	<p>Chapter 6 Chapter 5 Chapter 27 and 28</p>

Recommendation	Response	Reference
9. <i>Mining which might unacceptably impact highly-significant natural features should be subject to an increased security deposit sufficient to cover both anticipated rehabilitation costs (as at present), and potential rehabilitation costs in the event of non-approved impacts to the highly significant feature. The higher deposit should be commensurate with the nature and scale of the potential impact and should be attached to the mining lease by DPI under powers available to its Minister under the Mining Act 1992. If non-approved impacts occur and the feature is not able to be remediated by the mining company, then the deposit should be able to be forfeited as compensation for the loss of environmental amenity.</i>	Noted.	N/A
10. <i>Consideration should be given to the increased use within Part 3A project approvals of conditions requiring environmental offsets to compensate for either predicted or non-predicted impacts on significant natural features, where such impacts are non-remediable.</i>	It is NRE's intention through the development of a well designed mine plan to avoid impacts on significant natural features. Environmental offsets and other ecological management measures are discussed in <i>Chapter 22 to 24</i> .	<i>Chapter 18 to 26</i>
11. <i>Mining companies should ensure that they consult with key affected agencies as early as possible in the mine planning process, and consult with the community in accordance with applicable current industry and Government guidelines (eg NSW Minerals Council's Community Engagement Handbook and DoP's Guidelines for Major Project Community Consultation). For key agencies (eg DECC and SCA), this engagement should begin prior to the planning focus stage of a project application.</i>	Consultation with key affected agencies in particular the Executive Working Group (EWG) was undertaken at an early stage in the process of the Project application. Ongoing consultation with the EWG and individual agencies continued throughout the development of the EA.	<i>Chapter 5</i>
12. <i>Government should provide improved guidance to both the mining industry and the community on significance and value for natural and other environmental features to inform company risk management processes, community expectations and Government approvals. This guidance should reflect the recognition that approved mining would be expected to have environmental impacts.</i>	Noted.	NA
<i>Subsidence Impact Management</i>		
13. <i>The coal mining industry and Government should undertake additional research into the impacts of subsidence on both valley infill and headwater swamps. This research should focus on the resilience of swamps as functioning ecosystems, and the relative importance of mining induced, climatic and other factors which may lead to swamp instability.</i>	NRE would cooperate with the Government in relation to research into the impacts of subsidence on both valley infill and headwater swamps.	N/A

Recommendation	Response	Reference
<p>14. The coal mining industry should undertake additional research into means of remediating stream bed cracking, including:</p> <ul style="list-style-type: none"> • crack network identification and monitoring techniques; • all technical aspects of remediation, such as matters relating to environmental impacts of grouting operations and grout injection products, life spans of grouts, grouting beneath surfaces which cannot be accessed or disturbed, techniques for the remote placement of grout, achievement of a leak-proof seal and cosmetic treatments of surface expressions of cracks and grouting boreholes; and • administrative aspects of remediation, in particular, procedures for ensuring the maintenance and security of grout seals in the long term. 	Noted.	N/A
<p>15. Coal mining companies should develop and implement:</p> <ul style="list-style-type: none"> • approved contingency plans to manage unpredicted impacts on significant natural features; and • approved adaptive management strategies where geological disturbances or dissimilarities are recognised after approval but prior to extraction. 	An Extraction Plan will be developed for the Project which will include and adaptive management approach, incorporating contingency plans, subsidence monitoring.	Chapter 29
<p>16. Government should review current control measures and procedures for approval and management of non-mining related impacts on Southern Coalfield natural features. These include various forms of discharge into rivers and streams, as well as water flow control practices. The impacts of such non-mining factors must be recognized when assessing the value of significant natural features in the region, and the assessment of appropriate control strategies.</p>	Management of non-mining related impacts including water discharges, noise and air quality impacts have been addressed in this EA. Assessments have concluded that non-mining related impacts will not result in significant impacts to natural features.	Chapter 8, 12 and 14 and Annex B, N and O
Prediction Of Subsidence Effects And Impacts		
<p>17. The coal mining industry should escalate research into the prediction of non-conventional subsidence effects in the Southern Coalfield and their impacts and consequences for significant natural features, particularly in respect of valley closure, upsidence and other topographic features.</p>	Noted.	N/A
<p>18. Coal mining companies should place more emphasis on identifying local major geological disturbances or discontinuities (especially faults and dykes) which may lead to non-conventional subsidence effects, and on accurately predicting the resultant so-called 'anomalous' subsidence impacts.</p>	Noted.	Annex I and Chapter 9

Recommendation	Response	Reference
19. <i>In understanding and predicting impacts on valleys and their rivers and significant streams, coal mining companies should focus on the prediction of valley closure in addition to local upsidence. Until prediction methodologies for non-conventional subsidence are more precise and reliable, companies should continue to use an upper-bound, or conservative, approach in predicting valley closure.</i>	A detailed subsidence assessment has been prepared and found that upsidence and valley closure movements are predicted to occur in Wonga West in the order of 100mm (Seedsman, 2012). A maximum of 200mm of valley closure has been predicted in Wonga East. Longwall mining will cease when valley closure reaches 150mm.	<i>Annex M and Chapter 18</i>
20. <i>Mining companies should incorporate a more extensive component of subsidence impact prediction with respect to natural features, in any future planning submissions. Such predictions should be accompanied by validation of the prediction methodology by use of back-analysis from previous predictions and monitoring data.</i>	A peer review of the subsidence prediction methodology was undertaken.	<i>Annex M and Chapter 18 with peer reviews in Annex F and Annex N</i>
Environmental Baseline Data		
21. <i>Regulatory agencies should consider, together with the mining industry and other knowledge holders, opportunities to develop improved regional and cumulative data sets for the natural features of the Southern Coalfield, in particular, for aquatic communities, aquifers and groundwater resources.</i>	Noted.	NA
22. <i>Coal mining companies should provide a minimum of two years of baseline environmental data, collected at appropriate frequency and scale, to support any application under either Part 3A of the Environmental Planning and Assessment Act 1979 or for approval of a Subsidence Management Plan.</i>	NRE has gathered a comprehensive data set for each of the environmental studies in this EAR.	<i>Annex O to V</i>

4.9 **PLANNING ASSESSMENT COMMISSION'S REPORT ON THE METROPOLITAN COAL PROJECT**

The Metropolitan Coal Project was the first mining proposal in the Southern Coalfield to be assessed under Part 3A of the EP&A Act since the SCI was released.

The Minister for Planning directed a Planning Assessment Commission (PAC) be constituted to assess the Project application. The PAC was required to

- a) carry out a review of the potential subsidence related impacts of the Metropolitan Coal Project on the values of Sydney's drinking water catchment, and in particular its potential impact on the Waratah Rivulet and Woronora Reservoir, taking into consideration the recommendations of the Southern Coalfield Inquiry;*
- b) advise on the significance and acceptability of these potential impacts, and to recommend appropriate measures to avoid, minimise, or offset these impacts; and*
- c) identify and comment on any other significant issues raised in submissions regarding the Metropolitan Coal Project or during the public hearings.*

In June 2009, the Minister for Planning released the PAC's Metropolitan Coal Project Review Report (the PAC Report). In regard to the applicability of the PAC Report to the Project, the report states:

The Panel considers that it would be desirable if future proposals for mining in the Southern Coalfield were required to take account of the SCI recommendations as modified by this report in preparing the Project Application and the subsequent EA. It follows that a rigorous review of adequacy of the EA prior to exhibition would assist in making the review stage as short and productive as possible.

The PAC Report includes a number of recommendations for future proposals in the Southern Coalfield. Recommendations relevant to this Project are discussed in the following sections.

4.9.1 **Refinement of the SCI Recommendations**

Recommendation 2

The Panel recommends that the concept of RMZs enunciated in the SCI report be incorporated into a broader risk framework that includes:

- Identifying natural features likely to be at risk of negative environmental consequences from subsidence impacts.*
- Assessing the potential risk to those features from the mining proposal.*
- Identifying the options for dealing with any significant risk.*
- Determining which of these options will form part of the management plan.*
- Monitoring the subsidence impacts, consequences for the feature, and outcomes from the management strategies.*

- *Contingency options and planning to deal with exceedances, and*
- *Auditing of the risk management process.*

Recommendation 3

The Panel recommends that the steps set out in Section 6.2 of this review for assessing risk be considered for inclusion in future requirements for the assessment of proposals for mining in the Southern Coalfield to ensure that appropriate information on risks to significant natural features is available in the EA.

The PAC Report (2009) suggests that significant features should include at least rivers and significant streams, upland swamps, endangered ecological communities (EEC), threatened species habitat, major cliff lines and Aboriginal Heritage. The following chapters of this EA identified features likely to be at risk of negative environmental consequences from subsidence impacts. Significant features identified in the Wonga East and Wonga West areas include:

- Rivers – Cataract River;
- Significant streams - Lizard Creek, Wallandoola Creek, and Cataract Creek;
- Upland swamps;
- Endangered ecological communities – Shale Sandstone Transition Forest in the Sydney Basin Bioregion (represented by Transitional Shale Stringybark Forest and Transitional Shale Open Blue Gum Forest) and Coastal Upland Swamps of the Sydney Basin Bioregion (represented by Upland Swamps: Banksia Thicket, Upland Swamps: Sedgeland-Heath Complex and Upland Swamps: Tea-tree Thicket);
- Threatened species habitat for a variety of species;
- Major cliff lines – Wallandoola Creek gorge and Lizard Creek gorge and cliffs associated with waterfalls; and
- Aboriginal Heritage - 21 Aboriginal heritage sites located within the potential subsidence footprint.

Each of these features is discussed in more detail in the following chapters. A risk assessment process was used to identify all significant features and help focus the environmental assessment (see *Chapter 6*).

RMZs have been applied to named third order streams or above (in the Strahler stream classification) in Wonga East and Wonga West including Wallandoola Creek, Lizard Creek, Lizard Creek Tributary 1, Lizard Creek Tributary 2 and Cataract Creek in accordance with Section 6.2 of the PAC report. Individual risk assessments for each third order or above stream and all upland swamps have been undertaken. These assessments are provided in *Annex O*, and *Q*. A risk assessment of potential impacts to items of Aboriginal heritage is provided in *Chapter 25* and *Annex U*. Assessment of significant ecological features is provided in *Chapters 21 to 24* and *Annexes Q to T*.

Recommendation 4

The Panel recommends replacement of the concept of Reverse Onus of Proof as used in the SCI report by a single requirement that the Proponent demonstrate the reasonableness (or overall merit) of its proposals in relation to the significant natural features that may be exposed to subsidence impacts. The decision-maker can then assess reasonableness (or merit) in the context of the importance of the feature, the predicted risk and any management options for that risk.

A detailed subsidence assessment has been prepared for the Project. The assessment has taken the approach of applying the following hierarchy of risk controls:

- elimination;
- substitution;
- engineering; and
- administration.

This means that where possible subsidence impacts to significant features have been eliminated by avoiding secondary extraction beneath those features. Where impacts have not been eliminated, the mine layout has been designed to minimise any impacts and the approach taken in the risk assessments presented in *Annex F*.

4.9.2 **Subsidence**

Recommendation 6

The Panel also recommends that the deficiency in the EA concerning the provision of net subsidence effects at significant features be noted and that future EAs be scrutinised at the adequacy review stage to determine whether all the required information has been provided.

Seedsman (2010) subsidence prediction methodology was subject to a review session Dr Ken Mills (of SCT Operations Pty Ltd) and Arthur Waddington (of MSEC) in the form of a Failure Mode Effects Analysis. The aim of the review was to confirm that the risk management approach adopted was robust and acceptable, and to identify any factors that were either inadequately addressed or had not yet been considered.

Additional actions were agreed upon during the review to enhance the robustness of the subsidence assessment. A revised subsidence assessment, Seedsman 2012, was produced with to include the recommended actions. The full subsidence assessment is included as *Annex M* and summarised in *Chapter 18*.

4.9.3 **Surface Water**

Recommendation 11

The Panel recommends that until objective measures or policy guidance are available, adoption of an approach to significance and protection be adopted that is characterised by a case by case assessment of the values attributed to the watercourse, the options for protecting these values

and the feasibility and costs of doing so. A suggested set of values is included in Section 6.4.1 of this report.

The significance of waterways in the proposed mining areas has been assessed in *Annex F* and *Annex O*.

Recommendation 17

The Panel recommends that the framework in Section 6.2, as adapted to swamps in Section 9.4.1, be used as a guide for future Southern Coalfield proposals involving upland swamps and that the production of RMZs be obligatory for all upland swamps (ie headwater and valley infill). These RMZs should trigger a requirement to provide comprehensive information on predicted impacts and consequences that might be expected from both conventional and non-conventional subsidence sources. The adequacy of the information provided should be subject to rigorous scrutiny at the adequacy review stage of the assessment process.

A number of upland swamps are located within the proposed mining areas, and are primarily located along the main streamlines and tributaries of Wallandoola and Lizard Creeks in Wonga West and associated with the upper stream reaches of Cataract Creek, Cataract River and Bellambi Creek in Wonga East. RMZs have been applied to some of the upland swamps associated with Lizard Creek and Wallandoola Creek. An individual risk assessment has been undertaken for all upland swamps, in particular swamps identified as of special significance, in accordance with Section 9.4.1 of the PAC report and the more recent draft Upland Swamp Environmental Assessment Guidelines developed by OEH in 2012 in response to the PAC reports. This assessment is summarised in *Chapter 22* and provided in *Annex Q*.

Recommendation 18

The Panel recommends that, in considering the acceptability or otherwise of negative environmental consequences for swamps, an approach based on the material in Section 9.4.1 of this report be adopted ie negative environmental consequences are considered undesirable for all swamps and:

- a) swamps of special significance will be protected from negative environmental consequences; and*
- b) a presumption of protection from significant negative environmental consequences will exist for all other swamps unless the Proponent can demonstrate for an individual swamp that costs of avoidance would be prohibitive and mitigation or remediation options are not reasonable or feasible. Under circumstances where the decision is to allow significant negative environmental consequences to occur and remediation is not feasible offsets and other forms of compensation may be considered appropriate.*

The Panel also recommends that the steps for implementing this approach set out in Section 9.4.1 of this report be adopted.

Refer *Chapter 22* and *Annex Q*.

4.9.4 **Vegetation**

Recommendation 19

The Panel recommends that future Director-General's requirements for vegetation surveys in relation to upland swamps should specify that the surveys are to be of an adequate standard and intensity to detect the presence of valley infill vegetation associations where these might reasonably be expected to occur.

Detailed vegetation mapping of the upland swamps has been undertaken by Biosis. The methodology and results of this mapping are provided in full in *Annex Q* and summarised in *Chapter 22*.

A combination of interpretation of LiDAR data and the vegetation mapping of the Woronora plateau (NPWS 2003) was used to identify areas for targeted field investigations to define swamp boundaries and vegetation types. The vegetation mapping was used to define coastal upland swamps and informed assessment of distribution of habitats for threatened species and endangered ecological communities.

A total of 84 upland swamps have been identified by Biosis within the proposed mining areas with 39 identified in Wonga East and 45 in Wonga West. A description of the swamp size, vegetation types present, area and the swamp type, being either headwater swamp or valley infill swamp has been noted in the swamp matrix (see *Appendix 2* of *Annex Q*).

4.10 **PLANNING ASSESSMENT COMMISSION'S REPORT ON THE BULLI SEAM OPERATIONS PROJECT, 2010**

The Bulli Seam Operations Project relates to the continuation of longwall mining operations at the Appin Mine and West Cliff Colliery within existing coal leases and new mining leases and extends the life of the mine by approximately 30 years.

The Minister for Planning referred the Project proposal to the Planning Assessment Commission (PAC) (the PAC Report 2010) for review and advice on the significance and acceptability of the potential subsidence related impacts of the project on significant natural features, built infrastructure and the values of Sydney's drinking water catchment, and for recommendations as to appropriate measures to avoid, control, or offset these impacts.

The applicable recommendations of the PAC Report 2010 to the Project are detailed herein.

4.10.1 **Swamp Impacts and Consequences**

Recommendation 19 of PAC (2010) identifies protection measures, including monitoring and adaptive management requirements for upland swamps, including special significance swamps.

An individual risk assessment has been undertaken for upland swamps, in particular swamps identified as of special significance, in accordance with the more recent draft Upland Swamp Environmental Assessment Guidelines developed by OEH in 2012 in response to the PAC 2009 and 2010 reports.

All upland swamps mapped as a part of this assessment meet the statutory threshold criterion as they are representative of the Coastal Upland Swamp EEC.

In addition, a number of upland swamps within the Study Area are, either known to support threatened species and / or provide potential habitat for threatened species.

All upland swamps in the Study Area form part of the Wallandoola Creek swamp cluster while none meet the criterion of importance of scientific research.

Accordingly, determination of 'special significance' for each of the upland swamps identified in the PAA by Biosis was based upon specific criteria as advised by OEH and these include whether it is a large swamp, of unusual complexity, provides biodiversity and is the subject of scientific research (see *Annex Q* for this assessment).

4.10.2 *Surface Water and Aquatic Ecology*

Recommendation 20 of the PAC (2010) identified Wallandoola Creek as a stream of 'special significance' status on the basis of a qualitative assessment, however it is not apparent whether the WC4 – WC5 reach was considered in the PAC (2010) assessment.

The PAC (2010) did not consider Lizard Creek to be a stream of special significance status given that 'naturalness' value of the creek has been diminished by the effects of previous mining. Notwithstanding this, the PAC considered Lizard Creek a significant stream because of scale, hydrological value and the environmental quality of its physical form and largely pristine setting worthy of protection from negligible.

Recommendation 21 of the PAC (2010) applied the following performance criterion to waters of special significance status, as well as Lizard and Cascade Creeks and the Georges River in West Cliff Area 5:

'no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, minimal gas releases and continued maintenance of water quality at its pre-mining standard'.

Where the predicted subsidence impacts could lead to unacceptable environmental consequences for significant natural features, the PAC adopted a strategy of specifying outcomes to be achieved for a significant feature, rather than prescribing limits for subsidence effects and/or impacts, or setting arbitrary mining setbacks.

In accordance with the PAC (2010) findings, a stream risk and an associated potential stream effects, impacts and consequences assessment was conducted through comparing findings and predictions summarised in previous sections, along with observations from field inspections and monitoring (refer to *Chapter 20*).

4.10.3 *Cliffs and Steep Slopes*

The PAC (2010) recommendations in relation to cliffs state:

Recommendation 28:

That a hierarchy of mining-induced consequences on cliffs be established as follows:

- i. nil environmental consequences – where nil has the meaning of none whatsoever.*
- ii. negligible environmental consequences - where negligible has the meaning ascribed in the Metropolitan Coal Project Approval of small and unimportant so as not to be worth considering. Occasional displacement of boulders, hairline fracturing and isolated dislodgement of slabs from overhangs that in total do not impact on more than 0.5% of the total length of a cliffline are indicative of the scale of impacts falling within this category.*
- iii. minor environmental consequences – where minor has the meaning of relatively small in quantity, size and degree. Isolated rock falls of less than 30m³ that do not impact on aboriginal heritage, EECs, public safety and the like; which affect less than 5% of the total length of cliffs and associated overhangs; and which affect less than 10% of any 100m interval of cliff line are indicative of the scale of impacts falling within this category.*

Recommendation 29:

That cliffs in the Study Area having the following attributes be afforded special significance status:

- i. Cliffs longer than 200m*
- ii. Cliffs higher than 40m.*
- iii. Cliffs higher than 5m that constitute waterfalls.*

Recommendation 30:

That any approval be based on a Performance Criteria of negligible environmental consequences for all cliffs which have:

- i. Special significance status, or which*
- ii. Flank or are within streams that have been described in this report as warranting special significance status.*

Recommendation 31:

That any approval be based on a Performance Criteria of minor environmental consequences for all other cliffs in the Study Area.'

Impacts to cliff faces and steep slopes associated with the proposed project have been assessed by STC Operations (SCT) (2012) in their report titled *Assessment of Mining Impacts on Cliffs and Steep Slopes for NRE No 1 Colliery Underground Expansion Project (MP 09_0013) Part 3A* (refer to Annex V).

The assessment identified three cliff features within the area likely to be affected by mining subsidence that are considered of special significance.

They are:

- waterfall on Lizard Creek, approximately 20m high;
- waterfall on Wallandoola Creek, approximately 5m high; and
- 300m long line of cliff formations on the northern side of Lizard Creek but outside of the footprint of the proposed longwall panels.

All of the features of special significance occur in the Wonga West area.

In addition to these, the line of cliff formations above Longwall A4 LW6, that is semi-continuous over the panel and extends for approximately 700m to the north west of the panel, is considered 'border line' special significance, depending on how the length of cliff is defined. Although there is approximately 300m or so of the cliff line directly above the panel, the cliff line is discontinuous and isolated rock falls are not considered likely to be of high significance (SCT 2012).

The Illawarra Escarpment, to the east of Wonga East mining domain, is also considered of special significance but is outside of the predicted impact area for subsidence, given its remoteness from the nearest longwall panel.

The environmental impacts to steep slopes within the mining area are considered to be negligible. Minor and negligible environmental consequences are considered possible for cliff formations located directly above the proposed longwall panels. However, no cliff features assigned special significance status are located directly above longwall mining areas. Environmental consequences for cliff formations not above the area of mining are expected to be nil to negligible.

4.10.4 *Aboriginal Heritage*

The PAC (2010) recommendations in relation to Aboriginal heritage:

Recommendation 36:

That a hierarchy of mining-induced consequences on Aboriginal cultural heritage sites be established as follows:

- nil consequences – where nil has the meaning of none whatsoever.*
- negligible consequences - where negligible has the meaning ascribed in the Metropolitan Coal Project Approval of small and unimportant so as not to be worth considering. Hairline fracturing and isolated dislodgement of smalls pieces of ground surface or overhangs that in total do not affect more than 5% of an aboriginal site and do not affect at all the physical condition of any item of aboriginal heritage or any cultural value, are indicative of the scale of impacts falling within this category.*

- iii. *minor consequences – where minor has the meaning of relatively small in quantity, size and degree. Isolated open cracking and rock falls of less than 2 m³ that do not affect the physical condition of any item of aboriginal heritage or any aboriginal cultural value, are indicative of the scale of impacts falling within this category.*

Recommendation 38:

That any approval should be based on a Performance Criteria of negligible environmental consequences for all Aboriginal heritage sites which have special significance status.

The PAC report does not clearly identify when an Aboriginal heritage site should be assigned special significance status. The approach taken to the Aboriginal heritage assessment was to follow the required guidelines. On this basis four sites have been recorded within the subsidence footprint as having high significance. These are:

- three rock shelters with high significance (52-2-1183 , 52-2-1187 and 52-2-1198); and
- one women's site with high significance (New NRE Women's Site).

All four high significance sites within the subsidence footprint are located in Wonga West.

The management approach to Aboriginal sites adopted is that where high or moderately significant sites within the envelope defined by a 600m barrier around the mining footprint at Wonga East and Wonga West are at moderate or high risk they should be actively managed and monitored throughout and following the mining period. The assessment and management approach adopted for the Project is detailed in *Annex U* summarised in *Chapter 25*.

5 ENVIRONMENTAL RISK ASSESSMENT

The risk assessment identifies the potential risks associated with the Project. These have informed the level of assessment deemed appropriate and preparation of technical studies and mitigation measures.

5.1 INTRODUCTION AND METHODOLOGY

A risk assessment was undertaken to identify key environmental issues that would require assessment in the EA as required by the DGRs. The risk assessment took the form of a risk workshop that followed a Failure Mode and Effect Analysis (FMEA) methodology. FMEA is a recognised methodology described in the NSW Department of Primary Industries document MDG 1010, *Risk Management Handbook for the Mining Industry*. It is most applicable when only one type of impact is being considered (eg environmental impact) and was therefore considered appropriate.

FMEA aims to identify the nature of failures which can occur in a system:

- by identifying the components or subsystems;
- considering for each component the full range of possible failure types; and
- assessing the effect on the system of each type of failure.

Further insight into the consequence of the failure modes was achieved by undertaking a Criticality Analysis to assign a rating to both the severity of the possible effects and their likelihood.

The FMEA risk workshop undertaken in 2009 was used to identify key potential environmental issues associated with the Project for further assessment in the EA. The FMEA was used to determine the type of technical studies required for the EA (outside of subsidence impacts) and provide justification for the level of detail adopted for each study. The level of assessment for each issue was determined based on the anticipated level of risk generated by the Project without mitigation or management measures.

The mine subsidence prediction was subsequently modified and a review of the findings of the risk workshop was undertaken in 2011. The purpose of the review was to assess whether the updated mining subsidence information would have any effect on the conclusions of the original FMEA

The outcome of these workshops was a Report titled *Gujarat NRE Minerals Limited No 1 Colliery Wongawilli East and West Mining Areas Failure Mode and Effects Analysis Report* prepared by OCG in January 2012 (see *Annex F*). This report details the outcomes of the original and subsequent reviews.

5.2 IDENTIFYING SIGNIFICANT FEATURES AND FEATURES OF SPECIAL SIGNIFICANCE

The SCI Report (DoP, 2008) recommends that Risk Management Zones (RMZs) be identified to focus assessment and manage potential impacts on significant natural features including rivers, significant streams, significant cliff lines and valley infill

swamps. The Metropolitan PAC report (PAC, 2009) recommends that the SCI recommendations, as modified by the PAC report, be adopted for all future proposals.

In accordance with these recommendations significant natural features within or adjacent to proposed mining areas have been identified and are summarised in *Table 5.1*. Identification of significant features was part of the iterative process used to help inform mine planning and design. Impacts to significant features have been minimised by redesigning the mine layout to avoid mining under these features where practical. Environmental impact assessments have been undertaken for each of these features in the following chapters. Individual risk assessments have also been prepared for:

- third order streams and above (see *Annex F*, and *O*); and
- upland swamps (see *Annex Q*).
- cliffs and steep slope assessment.

Table 5.1 Significant Natural Features Identified

Type of Significant Feature	Features Identified
Rivers	<ul style="list-style-type: none"> • Cataract River is located adjacent to the south west boundary of the Wonga East longwalls.
Significant streams	<ul style="list-style-type: none"> • Lizard Creek – flows north through Wonga West. The main channel of Lizard Creek within the mining area is a 3rd order stream. It becomes a fourth order stream in the north west of Wonga West. Lizard Creek also has one third order unnamed tributary flowing north into the main channel which overlies Wonga West. • Wallandoola Creek – initially flows northerly then in a westerly direction over Wonga West before flowing to the north just outside of the Study Area. The main channel of Wallandoola Creek within the mining area is a third order stream. • Cataract Creek – flows west over the Wonga East area. The main channel of Cataract Creek is a fourth order stream.
Upland swamps	<ul style="list-style-type: none"> • There are a number of upland swamps within the proposed mining areas. The majority of these swamps make up part of the Wallandoola Significant Swamp cluster identified by DECC (2007).
Endangered ecological communities (EECs)	<ul style="list-style-type: none"> • Two EEC listed under the TSC Act were identified within the Study Area: <ul style="list-style-type: none"> • Shale Sandstone Transition Forest in the Sydney Basin Bioregion (represented by Transitional Shale Stringybark Forest; and Transitional Shale Open Blue Gum Forest) and • Coastal Upland Swamps in the Sydney Basin Bioregion.
Threatened species habitat	<ul style="list-style-type: none"> • Threatened species habitat was identified for the following species: <ul style="list-style-type: none"> • <i>Pultenaea aristata</i> • <i>Epacris purpurascens</i> var. <i>purpurascens</i>; • <i>Grevillea parviflora</i> subsp. <i>parviflora</i>; • <i>Leucopogon exalasius</i>; • <i>Melaleuca deanei</i>; • <i>Persoonia hirsuata</i>; • Eastern Bentwing-bat; • Large-eared Pied Bat; • Eastern Pygmy Possum; • Spotted-tailed Quoll; • Long-nosed Potoroo;

Type of Significant Feature	Features Identified
	<ul style="list-style-type: none"> • Giant Burrowing Frog; • Stuttering Barred Frog; • Red-crowned Toadlet; • Heath Frog; • Broad-headed Snake; • Rosenberg's Goanna; • Silver Perch; • Macquarie Perch; • Murray Cod; • Trout Cod.
Major cliff lines	<ul style="list-style-type: none"> • waterfall on Lizard Creek, approximately 20m high; • waterfall on Wallandoola Creek, approximately 5m high; • 300m long cliff line on the northern side of Lizard Creek; and • The Illawarra Escarpment located 480m away from the nearest longwall.
Aboriginal Heritage	<ul style="list-style-type: none"> • 56 Aboriginal sites have been identified within the Study Area. 21 of these sites are located within the potential subsidence footprint.

The various technical assessments included as annexures have examined the risks, the potential impacts and where necessary further detailed assessments have been undertaken to address any subsequent issues as arose. These assessments have also led to a determination of special significance status of identified significant natural features.

5.3 **RISK ASSESSMENT**

Potential temporary and long term impacts of the Project and the results of the systematic risk assessment are presented in *Table 5.2*. The full FMEA risk assessment report is available in *Annex J*. *Table 5.2* describes the level of assessment to be undertaken to address the perceived level of risk and identifies the section of the EA in which the assessment is presented.

Table 5.2 *Environmental, Social and Economic Risk Assessment*

Aspect		Identified Environmental Risks associated with the Project	Level of Risk	Level of assessment	Section Addressed
Landform and Topography		No major changes in landform or topography are predicted to occur as a result of subsidence or other aspects of the Project.	Low	An assessment of significance and impact on cliffs and steep slopes has been undertaken.	<i>Chapter 26</i>
Land Use		The Project will not result in a change in land use.	Low	No assessment is required.	<i>Chapter 8</i>
Landslip		Landslip is unlikely to occur at the Russell Vale site.	Medium	Geotechnical assessment of the Russell Vale site was assessed as part of the preliminary works project. An assessment of significance and impact on cliffs and steep slopes has been undertaken.	<i>Chapter 26</i>
Subsidence		Vertical subsidence of ground surface, ground tilts and strains and non-conventional subsidence effects, with associated environmental consequences.	Medium	A subsidence report including predictions of likely subsidence effects include ground surface, ground tilts and strains and non-conventional subsidence effects has been prepared. Consideration was given to the proposed mine plan with the aim of limiting the impacts on sensitive features.	<i>Chapters 9 and 19</i>
Infrastructure	Subsidence Impacts	Disruptions/ impacts on electrical transmission lines, fibre optic cable and fire trails above the mining area.	High	A subsidence report has been prepared that predicts the likely subsidence consequences on infrastructure and this will be supported by specific management plans for each feature.	<i>Chapter 9</i>
Surface Water	Russell Vale	Potential for dirty water from Russell Vale site to contaminate local stormwater. Potential for flooding due to potential changes in hydrology from the infrastructure area and unmanaged discharge of water from the site .	Low	A surface water assessment has been prepared to accompany this EA that covers surface water management including division of clean and dirty water catchments, reuse of water on site and a water balance.	<i>Chapter 8</i>
	Subsidence related changes	Subsidence-related alterations to stream flows, water quality, fluvial geomorphology, bank stability and/ or flooding regime at Lizard, Bellambi, Wallandoola, and/ or Cataract Creeks and tributaries. Altered drainage paths and localised ponding.	Medium	A surface water assessment has been undertaken that includes: <ul style="list-style-type: none"> • review of existing surface water data; • additional surface water monitoring; • assesses impacts on potentially affected streams and upland swamps; • identifies required management, mitigation and monitoring measures; and • an upland swamp assessment has been undertaken that identifies and assesses the potential impact on upland swamps. 	<i>Chapter 20 and Chapter 22</i>

Aspect		Identified Environmental Risks associated with the Project	Level of Risk	Level of assessment	Section Addressed
Groundwater	Lizard Creek	Disturbance to standing pools in tributaries to Lizard Creek above Wongawilli West Area 3.	Medium	A surface water assessment has been undertaken to assess the level of impact on Lizard Creek.	Chapter 20
	Wallandoola Creek	Disturbance to tributary standing pools in tributaries to Wallandoola Creek above Wongawilli West Area 3. Adverse impacts are not likely.	Medium	A surface water assessment has been undertaken to assess the level of impact on Wallandoola Creek.	Chapter 20
	Underground Operations	Failure of Bald Hill Claystone due to mine subsidence leading to potential draining of Hawkesbury Sandstone aquifer through the claystone and through underlying lithologies to workings.	Medium	A groundwater impact assessment has been undertaken which assesses the potential for connections between Hawkesbury Sandstone and the workings.	Chapter 21
	Mine Water Management	Mine subsidence leading to potential draining of lower to middle Bulgo Sandstone aquifer and underlying aquifers through goaf to workings.	Medium	A groundwater impact assessment has been undertaken which assesses the potential for connections between aquifers in the Bulgo sandstone and underlying aquifers.	Chapter 21
		Additional groundwater inflow into mine workings.	Low	A groundwater impact assessment has been undertaken which assesses the potential for groundwater make for the mine. The findings will be incorporated into a revised surface water management plan.	Chapters 8 and 21
Air Quality		Adverse impacts of dust on surrounding residences from coal handling, stockpiles and transport.	Medium	An Air Quality Assessment has been undertaken to: <ul style="list-style-type: none">• quantify existing air quality and proposed Project emissions;• predict future dust levels at sensitive receivers by air dispersion modelling;• assess acceptability of predicted particulate matter concentrations; and• identify any additional management, mitigation and monitoring measures required.	Chapter 10 and Annex I
Greenhouse Gas		GHG emissions from electricity consumption, releases from coal and rock strata and combustion of fossil fuels.	Medium	A GHG assessment has calculated Scope 1, 2 and 3 GHG emissions and considered GHG reduction and energy conservation measures.	Chapter 11
Acoustics	Operational noise	Increased noise levels at sensitive receivers near the Russell Vale site.	High	An acoustic impact assessment has been undertaken to understand the predicted level of noise to be generated by the proposed surface works at Russell Vale.	Chapter 9 and Annex H

Aspect		Identified Environmental Risks associated with the Project	Level of Risk	Level of assessment	Section Addressed
Ecology	Aquatic ecology	Increased traffic noise levels at residences surrounding the site and haul route.	High	Assessment is based on the INP to produce noise contours and develop appropriate mitigation measures. An acoustic impact assessment has been undertaken to calculate future road traffic noise levels to be experienced at residences near the haul route, assess predicted noise levels against OEH guidelines and identify any additional management, mitigation and monitoring measures required.	Chapter 9 and Annex H
		Adverse impact on the habitat of the aquatic threatened species (Macquarie Perch) above Wongawilli East – Area 2 resulting in interruption to/loss of spawning cycles.	Medium	The predictions in the subsidence report have been used to assess the potential for subsidence impacts to creek and swamp systems above Wongawilli East. An Aquatic Ecology assessment has been undertaken to determine whether Macquarie Perch is present. Assessment prepared to determine impacts on aquatic habitat in creek and swamp systems above Wongawilli East.	Chapter 23 and Annex R
	Terrestrial ecology	Loss of maternity and roost sites for a local cave-roosting population of the threatened Eastern Bent-wing Bat.	Medium	The predictions in the subsidence report have been used to assess the potential for subsidence impacts that could result in the loss of roost site/s. Design monitoring activity to enable better prediction of the effects of mine subsidence on potential roost sites. An ecological assessment of the site has defined roost sites to the extent possible and included field assessment, reporting and development of mitigation measures.	Chapter 24 and Annex S
		Potential adverse subsidence effects on specific highly significant upland swamp and associated creeks (Frog Swamp and Frog Creek) resulting in loss of breeding habitat for the Giant Burrowing Frog (<i>Heleioporus australiacus</i>).	High	The predictions in the subsidence report have been used to assess the potential for subsidence impacts that could result in impacts to significant upland swamps. A swamp assessment has been undertaken that identifies potential impacts and mitigation measures to be adopted by the proponent. An ecological assessment of the site has been undertaken to define threatened species habitat. The assessment included field assessment, reporting and development of mitigation measures.	Chapters 22 and 24 and Annex O

Aspect	Identified Environmental Risks associated with the Project	Level of Risk	Level of assessment	Section Addressed
Aboriginal heritage	Mine subsidence resulting in collapse of rock shelter/s along major creeks and their tributaries (Lizard Creek and Wallandoola Creek) in Wongawilli West – Areas 3 and 4.	Medium	The predictions in the subsidence report have been used to assess the potential for subsidence impacts on identified rock shelters.	<i>Chapter 25 and Annex U</i>
	Rock shelters without art – Wongawilli East – Area 2. Potential impacts Collapse of rock shelter, cracking, changed conditions relating to water exposure.	Medium	The predictions in the subsidence report have been used to assess the potential for subsidence impacts on identified rock shelters. The assessment rates all sites for scientific significance and potential impacts.	<i>Chapter 25 and Annex U</i>
Non-indigenous heritage	No European heritage item will be impacted by the Project.	Low	An historic heritage assessment has been undertaken to understand the heritage environment.	<i>Chapter 14 and Annex L</i>
Traffic and transport	The Project is likely to result in additional trucks using the local roads to transport coal to PKCT	Medium	A traffic assessment has been undertaken to: <ul style="list-style-type: none"> • characterise the existing road network; quantitatively assess potential traffic impacts on the safety and capacity of the surrounding road network and key intersections; • assess safety and efficiency of the internal circulation network and adequacy of parking; and • identify any additional management measures required. 	<i>Chapter 12</i>
Visual	Adverse impact on visual amenity of sensitive receivers.	Low	A visual impact assessment has been undertaken for the Project.	<i>Chapter 13</i>
Waste Management	Increased waste generation.	Low	Waste generation and existing standard waste management practices for the site and the Project are documented in the EA.	<i>Chapter 15</i>
Socio-economic Considerations	Social and economic benefits to the local and regional community and government through employment and revenue generation. Adverse impacts to amenity of nearby residents.	High	A social impact assessment and economic assessment have been prepared to assess the positive and negative social impacts resulting from the Project. It describes the mitigation measures to reduce impacts to the amenity of nearby residents.	<i>Chapter 27 and 28</i>

The risk assessment identified high risk areas for subsidence on built infrastructure such as Mount Ousley Road, electrical transmission lines and fire trails along with, significant upland swamps and noise impacts associated with the transport of coal by truck. There are significantly high and positive socio-economic impacts resulting from the proposed activity providing ongoing employment, royalty payments and other government taxes/charges. All other environmental factors considered in the assessment were considered to have a medium to low risk.

The conclusions of the review have led to the following outcomes:

- the subsidence prediction methodology has been peer reviewed by MSEC and SCT. In addition key aspects such as the potential for pillar run have been reviewed by Pells Consulting and Professor van de Merwe. All parties acknowledge the uncertainty of subsidence predictions. In recognition of this an adaptive management approach to subsidence impacts and consequences has been adopted as discussed in *Chapter 18*;
- subsidence predictions in the Wongawilli West areas are unchanged from those used in the December 2009 FEMA. There were changes in some areas of the eastern Wongawilli areas with updated predictions presented in *Chapter 18*. All relevant technical assessments were updated to consider revised subsidence predictions;
- a detailed cumulative subsidence impact assessment cannot be fully determined because pre-mining subsidence data is not available and subsidence monitoring of previous historical mining in the Bulli seam was not undertaken; and
- ERM emphasized the need to assess the likely impacts on swamps. Biosis have subsequently prepared a detailed swamp assessment giving full consideration to the Southern Coalfields Inquiry and Bulli Seam Operations Planning Assessment Commission and updated Endangered Ecological Community listings of upland swamps. The full assessment is presented in *Annex Q* and summarised in *Chapter 22*.

The need for refined and additional assessments was identified as part of the adequacy review process. Additional assessments undertaken include:

- Biosis 2012 NRE No. 1 Colliery Major Expansion Upland Swamp Assessment (refer to *Chapter 22*); and
- SCT (2012) Cliff and Steep Slope Assessment (refer to *Chapter 26*).

The Seedsman Geotechnics (2012) subsidence prediction report was also identified through peer review as an inappropriate forum for assessing specific detailed impacts on items of special significance. This was identified as leading to confusion and inconsistency.

As a result relevant technical reports have been revised to include predicted level of subsidence and resulting impacts (ie the specific consequences of the predicted subsidence) on features relevant to each discipline. *Chapter 19* provides a summary of identified subsidence impacts on items assigned special significance status.

5.4 *RISK MANAGEMENT*

The following hierarchy of risk management controls has been implemented in the design process of the mine plan:

- elimination;
- substitution;
- engineering; and
- administration.

Significant natural features have been identified by the southern Coal Field enquiry as including:

- rivers;
- third order streams and higher;
- gorges;
- significant cliff lines and overhangs (including waterfalls);
- upland swamps;
- Endangered Ecological Communities;
- Threatened Species Habitat; and
- Aboriginal heritage sites.

These natural features can be assigned Special Significance Status based on an assessment of a natural feature that determines the feature to be so special that it warrants a level of consideration well beyond that accorded to others of its kind. Special significance status may be based on a rigorous assessment of scientific importance, archaeological and cultural importance, uniqueness, meeting a statutory threshold or some other identifiable value or combination of values.

The mine plan has implemented an elimination approach for risk management by not undertake longwall extraction under or in close proximity to the following features of special significance:

- Illawarra Escarpment;
- Mount Ousley Road; and
- Cataract Reservoir and Dam Wall.

The mine plan implements a substitution approach for risk management, by implementing modified coal extraction with reduced longwall panel widths and increased chain pillar width and flexible start lines in order to extract coal below or in close proximity to the following features of special significance, where subsidence monitoring validates that greater than negligible subsidence is otherwise likely to occur:

- Cataract Reservoir Notification Area;
- within Cataract Reservoir dam wall 1.5km exclusion zone;
- third and fourth order streams;
- upland swamps identified as having special significance;
- Aboriginal site of identified special significants status; and
- cliffs of identified special significance.

A number of built features, such as transmission lines and optic fibre cables have also been considered. Specific management plans will be developed for these features in consultation with infrastructure owners.

5.5 *PILLAR RUN RISK ASSESSMENT*

Seedsman (2012) assesses the risk of a Pillar Run event in Wonga East. Pillar run can be defined as a rapid collapse of a large number of pillars. Seedsman determined that there was no record of the Balgownie longwalls inducing a pillar run when extracted 6-8m below the Bulli seam and that the severity of such an event makes it unlikely that any such event went unreported. Seedsman (2012) also states that as Bulli seam pillars immediately adjacent to the Balgownie goaf edges did not fail due to Balgownie seam longwall extraction it is considered unreasonable for a subsequent failure to develop further away from the abutment stress peaks.

Seedsman (2012) also reviews international technical literature and identifies that there is no record of a pillar run induced by mining in a lower seam. There have been examples of isolated pillar failures since the introduction of the current pillar design methods, but Seedsman (2012) is not aware of a pillar run.

Seedsman (2012) states that, in South Africa, recent pillar failures have been at shallow depth, with slender pillars and the incorrect use of pillar design guidelines. In Australia Seedsman identifies that pillar failures that were included in the Uni of NSW database were either formed prior to the introduction of the pillar design methodology or can be tracked to inappropriate implementation of the design methodology. According to Seedsman (2012) there has been no pillar run in Australia that has been discussed in the engineering literature.

All parties involved in the FMEA risk workshop accepted that Bulli Seam pillars could collapse on a localised scale. However, the report concluded that a collapse could not turn into a pillar run that would threaten any sites of special significance and would present a negligible risk for other sites in the Study Area.

Strata Engineering (Australia) Pty Ltd (Strata Engineering) undertook an assessment of the potential for a pillar run in the Balgownie and Bulli seams following the extraction of the Wongawilli east longwall panels. The full assessment is included as *Annex G* and is summarised in the following paragraphs.

The assessment was based on an examination of the current and historic mine plans and specifically the pillar characteristics of the Bulli and Balgownie extraction. The main point to be considered was whether, following the extraction of the proposed Wongawilli East longwalls, the pillars in the overlying Balgownie and Bulli seams could fail in a catastrophic manner and in doing so, induce a pillar run in the barrier pillar located below Mt. Ousley Road.

Their assessment determined that it was evident that all but one of the pillars assessed in the Balgownie Seam exceed the minimum design standards specified as being that the combined Factor of Safety (FoS) and width to height (w/h) ratio of the pillar should lie outside the Design Limit Line and that the pillars should have a minimum w/h ratio of 5 and a minimum FoS of 2.11.

In regard to the one pillar located below the Design Limit Line it was noted that the pillar has a w/h ratio of 8.7, is located above the Limit Line of Known Failed Cases and the neighbouring pillars are located above the Design Limit Line and should in the highly unlikely event that the pillar fails, restrict any potential pillar run.

The assessment determined that although a number of the pillars in the Bulli seam do not attain the required design standards, in all areas the pillars are surrounded by large pillars or barriers which will restrict the magnitude of loading and hence, the likelihood that the pillars will fail in a catastrophic manner and the w/h ratio of the unsatisfactory pillars ranges between 4.9 and 8.6 and as such, the pillars can be described as squat.

In regard to undermining and the potential impact on the strength of the pillars assessed in this report, the assessment notes that none of the Bulli seam pillars located under or directly adjacent to Mt Ousley Road have been undermined by longwalls in the Balgownie seam or will be undermined by the proposed longwalls in the Wongawilli seam. Should the stability of the Balgownie pillars that will be undermined by the proposed longwalls in the Wongawilli seam be compromised in any way, any potential pillar run in this seam will be restricted by the neighbouring pillars located both under and directly adjacent to Mt Ousley Road.

Report by Stable Strata Prof Van de Merwe

On the basis of their detailed assessment Strata Engineering conclude that the proposed longwall extraction in the Wongawilli seam is unlikely to induce a pillar run in the overlying Balgownie and Bulli seams which would otherwise adversely affect surface subsidence around Mt. Ousley Road.

A risk assessment report was also prepared by KNJ Consultants titled *Pillar Run in the Bulli Seam associated with Wongawilli Seam LW4 & LW5 extraction* (2012). The report was undertaken to identify, analyse, evaluate and treat the risk of subsidence that may extend beyond the predicted footprint as a result of extraction of the Wongawilli seam Longwalls 4 and 5. The assessment focused on a 'pillar run' event.

A risk assessment workshop was conducted on the 2 March 2012 and attended by representatives from NRE, Seedsman Geotechnics, Pells Consulting and KNJ Consultants, NSW Mine Subsidence Board, NSW Trade & Investment - Division of Resources & Energy and the NSW Dam Safety Committee.

The assessment investigated consequences to Mount Ousley Road, Picton Road, various transmission lines in the Study Area, various unsealed fire roads and trails; stored waters of Cataract Dam; various Microwave/Radio Transmitters; Cataract Creek; Cataract River; swamps associated with Cataract and Bellambi Creek and Cataract River; Illawarra Escarpment; Archaeological sites; and threatened species habitat in the immediate vicinity of LW4 and LW5.

All parties accepted that any remnant Bulli Seam pillars could collapse on a localised scale. However, it was concluded that a collapse could not turn into a pillar run that that would threaten any sites of special significance and would present a negligible risk for other sites in the Study Area. The assessment found that impacts from the assessed consequences where *“practically impossible, considering present controls”*.

5.6 HAZARDS

Bush Fire

The PAA is located in the jurisdiction of the Illawarra Bush Fire Management Committee (Illawarra BFMC) and Wollondilly District Fire Control Centre (Wollondilly DFCC). The start of a typical fire season coincides with fresh to strong south west to northwest winds, which prevail during August and September. The majority of bush fires can occur from this period until the onset of summer rains or coastal showers. Longer fire seasons are experienced when rainfall is lower than average extending the bush fire season through summer to early autumn (Illawarra BFMC, 2008).

Fires generally travel in an easterly direction under the influence of westerly winds. Southerly and/or easterly winds also have the potential to intensify wildfire burning on or along the escarpment (Illawarra BFMC, 2008).

The major ignition causes in the Illawarra area are arson, car dumping, lightning, electrical power lines, escapes from legal and illegal burning activities (Illawarra BFMC, 2008).

Bush fire smoke can have a major impact on transportation routes for road and rail, ventilation shafts for mines, tourism operations, urban interface areas and hospitals (Illawarra BFMC, 2008).

Fires originating in the mining area would be unlikely to present serious impacts to any townships. Fires originating in bushland behind the pit top could pose a significant risk to Project infrastructure and NRE staff, contractors and equipment. The Project is unlikely to increase the risk of bush fire across the PAA.

The bush fire risk will be managed by existing response procedures and on-site fire fighting water and equipment.

Mitigation measures for bush fire are currently in place at the Russell Vale site and at No.4 Shaft. The measures will continue throughout the Project and include the following:

- slashing/landscaping/vegetation management to minimise fuel build-up;
- maintenance of fire breaks;
- ongoing communication with the NSW Rural Fire Service; and
- site fire fighting equipment and emergency response procedures.

Public Safety

Issues relating to public safety are a matter of regular consideration given the close proximity of the Russell Vale site to local residential areas. Of particular concern is the unauthorised entry onto the property, especially of young people during school holiday periods.

Also of concern are the trucks transporting coal to the Port Kembla Coal Terminal, and the potential hazard they may cause for local pedestrian and vehicular traffic.

Steps taken to ensure public safety include:

- signage around the site to inform the public of the dangers of entering the site. Signs are replaced if removed or damaged;
- maintenance of boundary fences particularly adjacent to residential areas;
- random mobile patrols (by a private security company) of the site and some adjacent streets, covering after hours, weekend and public holiday periods;
- locked access gates after hours;
- installation of camera surveillance facilities at both the Russell Vale and No.4 shaft sites;
- sealing or locking off entrances to portals where possible;
- extra gates have been installed on some of the internal roads around the Russell Vale site in an attempt to minimise the ease with which trail bikes in particular can move around the site after normal daytime hours;
- ensuring all truck drivers obey the road rules through implementation of a driver code of conduct; and
- limiting the speed of trucks entering and leaving the site.

Hazardous Material

Explosive materials are stored in a purpose built facility at the No.4 shaft site. NRE hold a Dangerous Goods licence for this material.

Oil and fuels are stored in appropriately sized, bunded, above ground storages at the Russell Vale site and at the No.4 Shaft. The total capacity of these storages is approximately 8,000 litres. Waste oil is stored temporarily in four 1000 litre bulk storages prior to disposal using the services of a licensed operator.

6 **STAKEHOLDER ENGAGEMENT**

This chapter summarises the consultation undertaken with key stakeholders including the local community and government agencies that has occurred over the life of the Project.

6.1 **METHODOLOGY**

A consultation strategy was developed as part of the environmental assessment process, to identify stakeholders and to provide a process through which stakeholders could gain information about the proposal and raise potential concerns with members of the Project team. This provided a mechanism by which stakeholder concerns could be identified and addressed throughout the environmental assessment phase of this Project.

6.2 **GOVERNMENT AND AGENCY CONSULTATION**

Consultation was undertaken with relevant government departments and agencies throughout the environmental assessment process. Consultation included formal briefings, presentations and ongoing information sharing to ensure that the environmental assessment met key agency requirements. A chronology of the consultation undertaken is provided in *Table 6.1*.

Table 6.1 *Summary of Government Consultation*

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
25 May 2005	Sydney Catchment Authority	Letter	NRE request SCA's requirements with respect to baseline monitoring data for completion of an SMP to commence mining in the Balgownie seam.	NA - not part of this Project
09 June 2005	Sydney Catchment Authority	Letter	SCA recommends that NRE prepare a draft monitoring program with regard to water quality and quantity, assets and landscape and ecological values.	NA - not part of this Project
22 July 2005	Sydney Catchment Authority	Letter	NRE to outline its monitoring plan (for subsidence, surface water, groundwater and ecology) for mining in the Balgownie seam, and plans for baseline data collection.	Base line monitoring commenced in 2007
21 December 2005	Sydney Catchment Authority	Meeting	Meeting to discuss V Mains and installation of monitoring devices. ERM to undertake ecological, ground and surface water and aboriginal heritage investigation within the V mains area.	Stage 1
6 June 2006	Sydney Catchment Authority	Meeting	Meeting held to discuss SCA's comments on the draft Baseline Monitoring Plan for the V Mains area.	Stage 1
23 June 2006	Sydney Catchment Authority	Letter	Letter was sent to formalise the agreed changes to the proposed Monitoring Plan for V Mains area.	Stage 1
27 May 2008	Department of Planning	Letter	Letter sent to provide background information and present options for the Project. The letter outlined the Project description and the general approach towards the assessment.	<i>Chapter 3</i>
18 June 2008	Executive Working Group (including DoP, OEH, DRE, SCA, NOW)	Letter	Letter was sent prior to meeting to provide an outline of the Project description and the general approach towards the assessment.	<i>Chapter 3</i>
20 June 2008	Executive Working Group	Meeting	Initial meeting with the EWG to introduce the NRE No.1 Colliery Major Expansion Project.	NA
26 November 2008	Executive Working Group	Meeting	Issues raised include: <ul style="list-style-type: none"> • subsidence predictions need to be cumulative; • geomorphic mapping must be done; • a groundwater gaps analysis (surface to seam analysis) needs to be undertaken; 	<i>Chapter 18</i> <i>Chapter 20</i> <i>Chapter 21</i>

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
			<ul style="list-style-type: none"> ecology surveys must cover all seasons; surface and groundwater interactions need to be assessed under the SCA guidelines; noise assessment must take into account the extension of the Northern Distributor; and 	Chapter 23 and 20 Chapter 20 and 21 Chapter 9
28 January 2009	Executive Working Group	On site meeting	the need to address mine closure plans for Russell Vale and shaft sites. The EWG was taken on a tour of the NRE No.1 Colliery. Issues raised included: <ul style="list-style-type: none"> options for coal seam gas utilisation; and swamp clusters need to be addressed. 	Chapter 16 Chapter 11 Chapter 22
20 March 2009	Executive Working Group	Meeting	Meeting was held with the EWG to discuss the progress of the NRE No.1 Colliery Project.	NA
11 May 2009	Department of Primary Industries Department of Environment, Climate Change and Water Department of Planning	Meeting	A meeting was held to discuss the approval process required for the maintenance and repairs to be undertaken at NRE No. 1 Colliery's No.1 Shaft. It was agreed that these works be covered by a variation to the current Mining Operations Plan and DPI will undertake an environmental assessment under Part 5 of the EP&A Act with the SCA having a concurrence role.	NA - not part of this Project
12 May 2009	Department of Primary Industries	Letter	Letter from NRE to clarify actions of meeting held 11 May 2009.	NA - not part of this Project
15 July 2009	Dam Safety Committee	Meeting	A meeting was held to discuss future operations of the Colliery. Issues raised included: <ul style="list-style-type: none"> requirement to maintain adequate barriers between longwalls and Lake Cataract, and to adequately separate future workings from the 500 series longwalls that underlie the lake, so as to prevent re-activation of existing goafs; and requirement to maintain an adequate barrier between proposed workings and the dam wall and spillway. Proposed workings should be outside the 1 km barrier around the dam wall and spillway. 	Chapter 18

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
10 August 2009	Department of Environment, Climate Change and Water	Meeting	<ul style="list-style-type: none"> Proposed Aboriginal archaeology methodology was discussed - Field surveys will target previously identified archaeological sites and landforms, where there is the potential for the sites to be impacted by both conventional and non-conventional subsidence, dependent on OH&S issues. There was a general consensus to this methodology. 	Annex U and Chapter 25
13 November 2009	Roads and Traffic Authority	Meeting	NRE initiated discussion with RTA to consider potential subsidence impacts on Mt. Ousley Road.	Chapter 18 and Annex M
17 December 2009	TransGrid	Meeting	NRE advised that infrastructure management plans will be developed in consultation with TransGrid.	Chapter 9 and Annex I
18 December 2009	Wollondilly Council	Meeting	<p>Council requested:</p> <ul style="list-style-type: none"> a copy of the Aboriginal heritage assessment report; and additional information regarding traffic impacts within Wollondilly Council LGA. 	<p>The Aboriginal heritage report will be sent with the EA to Council.</p> <p>No traffic impacts are expected in the Council area, as all heavy vehicle traffic will enter the site at Russell Vale.</p>
21 December 2009	Department of Lands	Letter	Letter sent to inform Department of Project and confirm Crown lands.	Section 1.4.4
23 December 2009	Mine Subsidence Board	Meeting	<p>Mining in proximity to major infrastructure.</p> <p>Channels of communication have been initiated and ongoing.</p>	Chapter 9
27 January 2010	Integral Energy	Meeting	<ul style="list-style-type: none"> NRE advised that management plans will be developed for infrastructure in consultation with Integral Energy. Integral Energy - advised that subsidence monitoring lines be installed, if required, as a tool to measure impacts for the towers in the 'Wonga East' area of mining. Integral raised the possibility of setting up a 'working group' with MSB, Ross Seedsman, and Integral Energy. NRE advised they will investigate this possibility. 	Chapter 9

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
01 February 2010	Executive Working Group	Meeting	<ul style="list-style-type: none"> Concern that there is not enough information available to understand how older workings in Wonga East (with unknown geometry) may potentially affect subsidence. Cumulative subsidence needs to be taken into account. Stream mapping needs to identify existing damage. Will need to justify why 200mm subsidence impact on streams is OK. The possibility of a peer review was discussed and what form this should take. There was some thought that it should include an assessment from a different perspective, although this would be a costly approach. 	Plans of old workings updated (<i>Figure 2.3</i>) <i>Annex M</i> <i>Annex O</i> <i>Annex N</i>
09 February 2010	NSW Office of Water	Meeting	<ul style="list-style-type: none"> Surface and ground water monitoring to date was discussed, as well as subsidence experienced in other mining areas within the Colliery. Commented that the extent of Lizard Creek and its nature, would not allow efficient remediation measures to take place. Licensing requirements were also raised. 	<i>Chapter 20 and 21 and Annex O and P</i>
24 February 2010	Department of Planning	Meeting	Possibility of submitting a separate Part 3A application for a transitional phase of works including continuing underground works and urgent surface works at NRE No.1 Colliery.	Stage 1
10 March 2010	Department of Planning	Meeting	<ul style="list-style-type: none"> Procedure for transitional stage was discussed. A meeting was proposed with OEH and DRE to confirm they agree with the assessment approach. 	Stage 1
29 March 2010	Sydney Catchment Authority	Meeting	<ul style="list-style-type: none"> Concerned that mining in Wonga East has not been discussed with technical SCA staff with regards to the Notification Area. Asked if subsidence predictions would be reviewed by an expert panel. Raised concerns regarding previous impacts and water flows. The SCA were advised that the Preliminary Works Part 3A is being progressed as a result of discussions with DoP. 	<i>Chapter 5</i> <i>Chapter 18, Annex M and N</i> <i>Chapter 20 and 21</i> Stage 1

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
31 March 2010	Department of Planning Department of Environment, Climate Change and Water NSW Industry and Investment	Meeting	Departments advised that all issues need to be assessed including: <ul style="list-style-type: none"> Noise; Air quality; Water discharge; GHG; Traffic; and Rehabilitation. 	Chapter 9 Chapter 10 Chapter 8 and 20 Chapter 11 Chapter 12 Chapter 16
13 April 2010	Department of Environment, Climate Change and Water	Meeting	Advised that a quantitative air quality assessment is not required along Bellambi Lane, and that the implementation of better management practices (eg truck washing on entry to site as suggested by NRE) is a better way forward.	Chapter 10 and Annex I.
28 April 2010	Wollongong Council	Meeting	The Council were concerned about; <ul style="list-style-type: none"> traffic noise; and dust along Bellambi Lane. 	Chapter 9 Chapter 10
06 May 2010	Roads and Traffic Authority	Meeting	<ul style="list-style-type: none"> RTA advised of a requirement to undertake a risk evaluation process that included a Steering Committee and a Technical Committee. The end result would be to gain RTA approval under the Roads Act 1993. Also, that RTA be kept informed of the Project. RTA advised that a formal agreement and terms of reference documentation will be required and approved. RTA will forward on to NRE for review and endorsement. RTA requested a copy of final traffic report. RTA advised that they will be conducting traffic counts on Bellambi Lane to determine effects on traffic flow since the opening of the Northern Distributor. 	Annex J and Chapter 12
06 May 2010	Department of Sustainability, Environment, Water, Population and Communities	Meeting	A meeting was held to discuss the impacts of the Stage 1 surface works on potential Green and Golden Bell Frog Habitat at Russell Vale. An EPBC referral is to be submitted for Stage 1 together with the EA documentation as supportive material, post EA lodgement.	Stage 1

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
			Confirmed that Stage 2 is a controlled action.	<i>Chapter 24</i>
15 June 2010	RTA	meeting	Technical Committee meeting to agree on the process by which a suitable management plan be developed.	<i>Chapter 18</i>
17 July 2010	RTA	Meeting	Technical Committee meeting to walk through subsidence prediction process and potential impacts to RTA infrastructure including Mount Ousley Road. The potential requirements for the installation of a monitoring system were discussed.	<i>Chapter 18</i>
February 2011	Department of Planning and Infrastructure	EA Submitted	EA Submitted for consideration of Adequacy.	
November 2011	Department of Planning and Infrastructure	Letter	Formal response concerning adequacy of EA.	
29 March 2012	Department of Planning and Infrastructure	Meeting	A midpoint review was conducted to brief the DP&I on the 'Co-Design' process and the community findings compiled by 29th March 2012.	<i>Annex E</i>
3 May 2012	Department of Planning and Infrastructure	Meeting	Discussion regarding improving compliance management.	
8 May 2012	Sydney Catchment Authority	Meeting	Meeting to discuss LW 4 Water Management Plan and outstanding issues surrounding groundwater for the Major Project Expansion.	<i>Chapter 21 and Annex P</i>
24 May 2012	Department of Planning and Infrastructure	Meeting	Discussion regarding compliance and approvals approach.	
31 May 2012	Department of Trade and Investment, Division of Resources and Energy	Meeting	Discussion around Subsidence Monitoring for LW 4 and Wonga East going forward.	<i>Chapter 18 and Annex M</i>
5 June 2012	Roads and Maritime Services	Meeting	Monthly Technical Committee Meeting.	
10 July 2012	Roads and Maritime Services	Meeting	Monthly Technical Committee Meeting.	
14 June 2012	Department of Trade and Investment, Division of Resources and Energy	Meeting	Subsidence Management and outstanding issues surrounding the Major Project Expansion Pt3A.	<i>Chapter 18 and Annex M</i>
22 June 2012	Department of Planning and Infrastructure	Meeting	Discussion regarding the adequacy of LW 4 & 5 Pt3A mod with flow on issues to the Major Project Expansion Pt3A.	<i>Chapter 18 to 26, Annex M to Annex V</i>

Date	Agency	Method of Contact	Issues Raised	Section of report dealt with
26 June 2012	Sydney Catchment Authority	Meeting	Discussion regarding NRE catchment activities management.	
26 July 2012	Department of Planning and Infrastructure	Meeting	Regular monthly approvals update meeting.	
1 August 2012	Department of Trade and Investment, Division of Resources and Energy	Meeting	Detailed discussions regarding subsidence prediction methodologies and Pillar Run issues.	<i>Chapter 18, Annex G and Annex M</i>
7 August 2012	RV Community Consultative Committee	Meeting	Establishment meeting to advise CCC members of current state of RV Colliery operations and approvals.	<i>Chapter 5</i>
14 August 2012	Environmental Protection Authority	Meeting	Discussion with regard to actual and proposed improvements to surface dust management.	
16 August 2012	Dam Safety Committee	Meeting	Meeting regards the Major Project Expansion, Notification Areas and DSC information requirements.	
30 August 2012	Department of Planning and Infrastructure	Meeting	Regular monthly approvals update meeting.	
11 September 2012	Department of Planning and Infrastructure	Meeting	Discussion regarding NRE approvals issues.	
12 September 2012	Office of Environment and Heritage	Meeting	Discussions around the characterisation, assessment and monitoring requirements for the Major Project Expansion Pt3A.	
21 September 2012	Sydney Catchment Authority	Meeting	Technical Working Group Establishment Meeting.	

6.3 COMMUNITY CONSULTATION

6.3.1 Overview of Strategy

The community consultation strategy for the proposal was structured to provide open and transparent communication with the local community and key stakeholders throughout the environmental assessment process. The consultation strategy aimed to ensure that:

- the community was aware of the proposal and the environmental assessment process;
- there were multiple mechanisms for community participation and for ongoing communication and feedback;
- opportunities were provided for any queries to be addressed directly by the Project team to minimise the effects of incorrect information being passed through the community;
- community issues and concerns in relation to the Project were identified at an early stage of the environmental assessment;
- issues raised by the community were actively assessed and managed throughout the Project; and
- appropriate solutions and mitigation strategies were developed to minimise potential negative impacts associated with the Project.

In order to meet the information needs of different community groups, a range of consultation strategies were adopted. These included:

- a 1800 phone number staffed Monday to Friday throughout the Project. An email contact address was also established, where community members and stakeholders could write in raising their concerns;
- a series of newsletters distributed to the local area and to anyone registering interest in the Project; and
- a series of community meetings and information sessions held in the local community hall and advertised through the newsletter and local press.

In addition to the strategy outlined above to inform the community of this proposal, a Community Engagement Strategy was prepared by Twyfords (2012) for implementation of the Preliminary Works Project approval (see *Annex E*). The strategy is based on a 'Co-Design' process aimed to invite and involve the Community and Stakeholders of NRE to define the key principles, parameters, and processes to implement an effective Community Engagement Strategy.

The principles of this strategy are relevant to the Project as the concerns of the community and findings of the strategy are in keeping with the Preliminary Works Project approval.

The following methodology was used to help build a genuine partnership between the local community and stakeholders with NRE while meeting the needs of the DP&I *Guidelines for Establishing and Operating Community Consultative Committees for Mining Projects* (2007):

1. Identify stakeholders/community of interest and the role they can play in NRE's Community Engagement Strategy;
2. Interview key community stakeholders and research/understand their interests and experience of effective community engagement. Determine from the community what they believe constitutes 'effective community engagement';
3. Co-design the Community Engagement Strategy with a representative forum of its stakeholders, by exploring techniques to achieve the Community Engagement Principles drawn from Step 2 Community Interviews;
4. Meet with DP&I to review and discuss the NRE co-designed Community Engagement Strategy;
5. Using the outputs from above steps to prepare a draft Community Engagement Strategy and review with representatives from the community; and
6. Complete the Community Engagement Strategy and present to DP&I for comment and endorsement.

The main findings from the community members surrounding the Preliminary Works Project was that *"effective Community Engagement is about being a 'good neighbour' and that principles, rather than the technique, should guide the Community Engagement Strategy development"* (Twyfords 2012, (Annex E)).

The use of a Community Consultative Committee (CCC) that is commonly used in other mine sites was not selected as part of this strategy. NRE believes that a CCC at the core of the strategy would have a high risk in compromising both effective engagement, and effective business operation (Twyfords, 2012). . However with the granting of approval for Stage 1, the Preliminary Works Project The DP&I rejected this approach and required the formation of a Community Consultative Committee

A Community Consultative Committee for the NRE No.1 Colliery has been formed and provides a formal mechanism for considering and dealing with local community issues. A summary of the community consultation for this proposal is provided in *Table 6.2*.

Table 6.2 Community Consultation Summary

Date	Consultation	Purpose
April 2008	Newsletter 1	The newsletter outlined key community contact details (1800 number and email).
April 2008	Information Session 1	To provide an opportunity for the wider community to obtain information regarding the Project. It also provided a forum for issues of concern to be raised directly with Project team members. Representatives from both NRE and ERM were present to respond to questions. Community members were encouraged to register their interest to ensure that they received all future Project information.

Date	Consultation	Purpose
October 2008	Newsletter 2	To provide the wider community with an overview of the Project and the environmental assessment process and ensure the community was kept up to date with the progress of the environmental assessment and Project development. The newsletter also advertised the date, time and location for the Project information session held at Corrimal Community Centre.
October 2008	Information Session 2	To provide a greater understanding of the scope of the assessment and the steps required to gain approval. To provide an opportunity for community feedback
December 2008	Newsletter 3	To provide feedback on the previous information session.
March 2009	Newsletter 4	To update the community of the progress of the Project and inform them on the next upcoming information session.
March 2009	Information Session 3	To keep the community informed of the Project progress and provide an opportunity for community feedback.
February 2010	Newsletter 5	To inform the local community of the upcoming information session at which preliminary assessment results were to be presented.
March 2010	Information Session 4	To provide some feedback to the community on the assessment so far and provide an opportunity for community feedback.
May 2010	Newsletter 6	To inform the local community of the upcoming information session at which NRE's plans to divide the Project into two stages were to be presented.
May 2010	Information Session 5	To advise the community of NRE's latest plans and the proposal to divide the Project into two stages, providing detail of Stage 1 Preliminary Works.
October 2010	Newsletter 7	To inform the local community of the upcoming information session at which the Environmental Assessment for the Preliminary Works Project was made available.
October 2010	Information Session 6	To present the Environmental Assessment for the Preliminary Works Project, during public exhibition period.
February 2012	Community Engagement Interviews	A series of 12 one-on-one interviews were conducted with a cross-section of the community from the Wongawilli and Bellambi/Corrimal areas as part of Community Engagement Strategy.
March 2012	Community Workshop	A series of three Community Co-Design Workshops were conducted with members from the Wongawilli and Bellambi/Corrimal communities to determine the community engagement strategy that will best support the 'good neighbour' principles raised by community members and draft the process(es) by which NRE and the community will work together on both mine and neighbour relations issues.
August 2012	Community Information Day	To inform the Public about the LW 4 & 5 and, main gate 6, 7 & 8 Pt3A modification application. Issues crossed over into Major Project Expansion project.
21 August 2012	Community Consultative Committee Meeting	Update of operations was provide to the Committee Members for dissemination to the broader community.
9 October 2012	Community Consultative Committee Meeting	Update of operations was provide to the Committee Members for dissemination to the broader community.

The majority of concerns raised at the information sessions relate to road haulage and noise and dust from the colliery. Water flows and water management in Bellambi Gully Creek downstream of the Russell Vale site have also raised some concern.

Ongoing consultation will be undertaken throughout the life of the Project to ensure the community remains informed of the mine's progress, the outcomes of the EA, and to provide an open forum for addressing questions, issues, concerns or complaints. Consultation will be in keeping with the Community Engagement Strategy developed by Twyfords (2012).

Table 6.3 lists the key issues raised by the community, which have been addressed as part of this Project.

Table 6.3 *Summary of Key Issues*

Issue Category	Specific Issues	How the issues are being addressed	Relevant section in the Environmental Assessment Report
Noise	<p>Noise related issues were commonly raised by people who attended the information session. The key issue relating to noise was the impact on amenity. Specific issues included:</p> <ul style="list-style-type: none"> • 200% increase in production is unacceptable to community; • concerns regarding the noise generated from current activities occurring at the Russell Vale site, particularly; <ul style="list-style-type: none"> • the pump in the dam which runs 24/7; • noise levels from trucks; • vehicle reversing alarms; • excessive noise from conveyor belt and fans; • the conveyor drive head; and • brake squeal. • concerns of increased operational noise with extension of the surface facilities to service the proposed extension of mining underground; and • requests for double glazed windows and insulation. 	<ul style="list-style-type: none"> • Since the commencement of consultation there have been a number of improvements at the Russell Vale site including the installation of a new vent fan, which has appreciably reduced noise emissions and the number of complaints regarding noise has now reduced substantially. • A new bund wall will be constructed along the northern boundary of the site (as part of the Stage 1 Preliminary Works Project) to mitigate noise in residential areas. • Old conveyors will be decommissioned when the Wonga Mains driveage is complete. • Comprehensive acoustics assessment has been undertaken to consider noise from the proposed increase in production both the Russell Vale site and Bellambi Lane. 	<i>Chapter 9</i>
Air Quality	<p>Air quality related issues were also a major concern for people attending the information sessions. Specific issues included:</p> <ul style="list-style-type: none"> • 200% increase in production is unacceptable to community; • water and cleaning (required by residents) due to dust; • dust levels are increasing; • dust in air can affect breathing, coal dust is a hazard (especially to asthma sufferers); • dust from truck haulage on residential properties, roads and in air; and • would like information on the health impact of coal dust. 	<ul style="list-style-type: none"> • Modelling indicates that the proposed surface works will result in improved air quality at the Russell Vale site due to infrastructure upgrades such as enclosed conveyors. • New conveyors will be covered. • Water sprays will continue to be used on the stockpile. • Trucks will be covered before leaving the site. • Opportunities to control dust and dust related issues, regarding truck movements will be investigated. 	<i>Chapter 10</i>

Issue Category	Specific Issues	How the issues are being addressed	Relevant section in the Environmental Assessment Report
Coal Transport/ Traffic	<p>Impact on traffic was an issue of concern commonly raised in the information sessions. Specific issues related to:</p> <ul style="list-style-type: none"> • strong objections to extended hours of trucking and increasing truck volumes; • quality of life if truck hours increased; • impacts of trucks and coal dust on the safety, health and sleep patterns of children; • truck driver behaviour including running red lights, speeding, squealing brakes and not properly covering loads; • road deterioration and upkeep; and • double glazing of windows will be required if any hours are extended. 	<ul style="list-style-type: none"> • NRE is collaborating with their trucking contractor to ensure the driver code of conduct is being adhered to. • Regular toolbox talks have been implemented. • Design of truck bodies being progressively upgraded to reduce noise and related impacts and increase operational efficiency. • NRE will implement a traffic/driver management protocol which includes: <ul style="list-style-type: none"> • trucking during PKCT approved hours; • obeying legal speed limits including a self-imposed 50km/hr speed limit along Bellambi Lane for all coal transport trucks; • ensuring drivers are vigilant regarding separation distances; • avoiding compression braking, Compression brakes must not be used on the approach to Port Kembla Rd/Springhill Rd lights when entering or exiting PKCT; • covering all loads; • washing all trucks prior to leaving the site; • reporting all vehicle faults to the owner; and • reporting all traffic incidents. 	Chapter 12 and Chapter 9
Water Management	<p>Issues of concern relating to water management included:</p> <ul style="list-style-type: none"> • concerns that the 1998 coal spill event could happen again; • pollution - less aquatic life in the streams than there used to be; • concerns about water quality in Bellambi Gully; • concerns about flooding in backyards; and • concerns about who is responsible for the water catchment of Cataract Dam. 	<ul style="list-style-type: none"> • A new Bellambi Gully Creek channel will be installed to better manage clean stormwater flows across the site is being constructed as part of the Preliminary Works Project (Stage 1). • An additional Sediment Management pond will be constructed and an assessment of water management and potential flood implications has been prepared. 	Chapters 3, 8 and 20

Issue Category	Specific Issues	How the issues are being addressed	Relevant section in the Environmental Assessment Report
Property Values, Acquisition & Compensation	<p>Although there was a recognition of the economic and employment benefits of the Project concerns were raised regarding:</p> <ul style="list-style-type: none"> property values; and compensation due to property value decrease (including a compensation fund be established for local residents). 	<ul style="list-style-type: none"> The proposed works will improve the efficiency of existing operations. 	<i>Chapter 28</i>
The Consultation Process	<p>There is general concern in regard to information about the proposal. This related to:</p> <ul style="list-style-type: none"> more regular communications; involvement of local MP in consultation; more sit down sessions where more people can have a say; want to be directly informed about when assessments are being publicly released and when submissions can be made; don't think their views are being listened to; and concerns about the provision of easily understandable information about health and disease impacts. 	<ul style="list-style-type: none"> The community consultation strategy was structured to provide open and transparent communication with the local community. Seven newsletters have been issued and 6 community meetings held. The community register allowed for those interested to be directly informed about upcoming sessions. All who have registered interest receive direct information by post or email. 	<i>Chapter 5</i>
Other	<p>Other concerns included;</p> <ul style="list-style-type: none"> want NRE to give something back to the community; and mine life and plans for rehabilitation post-mining. 	<ul style="list-style-type: none"> NRE will continue to provide support and funding to local community groups. Areas no longer required for operation will be rehabilitated progressively. 	<i>Chapter 27</i> <i>Chapter 16</i>