



**Mining, Exploration
and Geoscience**
Department of Regional NSW

Dendrobium Mine Extension Project (SSI-33143123)

Resource & Economic Assessment

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Executive summary

Determination

Mining, Exploration and Geoscience (MEG) assessed the Dendrobium Mine Extension Project (SSI-33143123) (the Project). MEG considers that the Project will provide an appropriate return to the NSW Government.

Parameter	\$m (2022 dollars)
Total royalties	319
Net Present Value (NPV) royalties (7 percent discount rate)	180
Annual average royalties	29

In addition, the Project is expected to generate:

- 333 additional Full Time Equivalent (FTE) jobs with 557 FTE in 2028
- production value of \$4.63 billion in real terms (2022 dollars) with Net Present Value (NPV) of around \$2.45 billion
- royalties of \$319 million in real terms, \$180 million in NPV terms, and an annual average of \$29 million (real)
- capital investment of \$551.5 million in NPV terms
- net benefits to the Illawarra region and NSW of \$649.2 million in NPV terms
- extension of the life of the Dendrobium Mine from 2030 to 2041
- support for the ongoing viability of BlueScopes' Port Kembla Steelworks and the Port Kembla Coal Terminal; both of which are strategically significant and major employers in the Illawarra region.

The Project is considered to be an efficient use of resources.

If approved, the additional export income from the Project would contribute to the around A\$18 billion (2019-2020 financial year total) of coal exports annually from NSW, which represents around 45 percent of the state's merchandise goods exports.

If the Project does not proceed the economic benefits outlined above will not be realised.

The Project

Illawarra Coal Holdings Pty Ltd (Illawarra Metallurgical Coal) (IMC or the Proponent), a wholly owned subsidiary of South32 Limited, has submitted an application to extend the existing Dendrobium Mine. The Project would include the extraction of approximately 31.3 Million Tonnes (Mt) of additional Run-of-Mine (ROM) coal within the existing Dendrobium Mine Mining Leases.

The Project would be supported by the use and augmentation of the existing mine infrastructure.

The Project would:

- extend the life of mine from 2030 to 2041
- extract an additional 31.3 Mt of ROM coal
- extract an additional 26.9 Mt of product coal

Introduction

State significant infrastructure is regulated under the *Environmental Planning and Assessment Act 1979*, which requires a proponent to apply to the Department of Planning and Environment for development consent, supported by an Environmental Impact Assessment (EIS).

This Resource & Economic Assessment (REA) conducted for the Project by MEG assessed:

- the social and economic benefits to NSW including royalties, capital investment, revenues and jobs.
- the resource/reserve estimates stated in the proponent's EIS.
- if the Proposal is an efficient development of the resource, that resource recovery is optimised and waste minimised.
- if the Proposal will provide an appropriate return to NSW.

The objects of the *Mining Act 1992* are to encourage and facilitate the discovery and efficient development of mineral resources in NSW.

Of relevance to this REA are Section 3A Objects:

- to recognise and foster the significant social and economic benefits to NSW that result from the efficient development of mineral resources.
- to ensure an appropriate return to the State from mineral resources.

Clause 2.21 of the State Environmental Planning Policy (Resources and Energy) 2021 requires an efficient development and utilisation of minerals resources which will foster significant social and economic benefits.

Project overview

Current mining operations

The existing Dendrobium Mine is situated in the Southern Coalfield of the Sydney Basin, approximately seven kilometres west of Wollongong. IMC also operate the Appin mine near Wollongong, and the two mines share infrastructure where possible.

In a typical year IMC produces 4.5 Mt of coal, with a split of 5.9 Mt metallurgical coal and 0.8 Mt of thermal coal coming from the Dendrobium and Appin mines in the Wollongong area.

The Project would extend the life of the Dendrobium Mine to 2041 from the current planned end date in 2030 and result in production of an additional 31.3 Mt of ROM coal. The Project would provide the applicant with opportunities to improve the overall design of the Dendrobium mine, including improved sequencing to allow for degassing.

Previous Development Application (SSD-8194) refused by the Independent Planning Commission (IPC)

On 5 May 2021 the NSW Upper House agreed to a motion requesting the Project be declared as State Significant Infrastructure (SSI) enabling IMC to lodge an amended mine plan addressing the reasons for refusal for SSD-8194.

In response, IMC has reviewed the original mine plan and now proposes a significantly reduced mine plan submitted as State Significant Infrastructure (SSI) -33143123.

Revised project

IMC has re-designed the Project to reduce the overall footprint compared to the previous application, thereby reducing potential impacts through:

- approximately 60 percent reduction in longwall mining area
- approximately 78 percent reduction in peak annual surface water losses (from the previous application)
- no predicted connective fracturing from the seam-to-surface when using the Tammetta equation
- no longwall mining beneath 3rd, 4th and 5th order (or above) streams
- approximately 50 percent reduction in the length of 1st and 2nd order streams longwall mined beneath
- approximately 40 percent reduction in the number of swamps (listed as threatened) longwall mined beneath
- commitment to avoid longwall mining beneath identified key stream features

- reduction in the number of Aboriginal heritage sites directly mined beneath from 22 to six sites (with the likelihood of direct impacts to these six sites expected to be approximately 1 in 10, based on extensive monitoring of subsidence-related impacts to heritage sites)
- no longwall mining beneath previously identified high archaeological significance Aboriginal heritage sites
- longwall mining at least 400 metres (m) from named watercourses (i.e., the Avon River, Cordeaux River and Donald's Castle Creek)
- minimum longwall mining setback distance of 300 m from the Full Supply Level (FSL) of the Avon Dam
- minimum longwall mining setback distance of 1,000 m from dam walls
- use of existing infrastructure (namely the Dendrobium Pit Top, Kemira Valley Coal Loading Facility, Kemira Valley Rail Line, Dendrobium Coal Preparation Plant [CPP], Shaft Sites Nos 1, 2 and 3 and the West Cliff Stage 3 Coal Wash Emplacement Area), which would reduce the requirement for additional disturbance.

(Dendrobium Mine Extension Project – Environmental Impact Statement 2022)

Size and quality of the resource

The Project (Area 5) plans to mine the Bulli Seam from the Illawarra Coal Measures. The Bulli Seam is the top seam of the Illawarra Coal Measures. Above the Illawarra Coal Measures, the stratigraphy consists of sandstone, shale and claystone units of the Narrabeen Group which are overlain by the Hawkesbury Sandstone.

In the current mining area, Area 3, the Wongawilli seam is extracted. This seam is about 30 m below the Bulli Seam. The Wongawilli Seam in Area 5 is subject to igneous intrusions and is not viable for extraction.

The Bulli Seam in Area 5 is from 250 to 400 m in depth. The seam thickness is between 2.1 and 3.2 m. The seam has a regional dip to the north of 1.15 degrees.

The Proponent has completed coal resource and reserve estimation for the Project (Table 1), in accordance with the Australasian Code for Reporting Exploration results, Mineral Resources and Ore Reserves (the JORC Code). The JORC Code is an industry-standard professional code of practice that sets minimum standards for public reporting of mineral exploration results, mineral resources and ore reserves.

Table 1. Dendrobium Bulli Seam resources

Project	Measured (Mt)	Indicated (Mt)	Inferred (Mt)	Total (Mt)
South Bulli Resources	25	29	27	81

Extraction of the Bulli Seam will be by longwall mining. The cutting height will be, on average, approximately 2.8 m (maximum 3.2 m). The total ROM coal from the Project is estimated to be 31.3 Mt and 26.9 Mt of product coal.

The product coal from the Project would be a high-quality metallurgical coal suitable for use in steel production domestically and internationally. There would be a small portion of pulverised coal injection (PCI) product extracted in the later stages of Area 5 extraction. MEG is satisfied that the proposed product is achievable.

Resource recovery

The proponent proposes to extract the Area 5 resource via longwall method. Part of the current mining area, Area 3, has issues with high levels of methane gas. The proponent proposes to mine the remaining safe areas in Area 3 and then move to Area 5. Once Area 5 is complete, the proponent proposes to complete Area 3. This is dependent on the success of the gas drainage project.

The proponent proposes to extend the mine life at the Dendrobium Mine by 11 years, to December 2041. Dendrobium Mine's current consent ends on 31 December 2030.

The Area 5 mine design is constrained by:

- the extent of Consolidated Coal Lease (CCL) 768 to the west and north
- the extent of the approved Area 3 to the east (subsided zone)
- igneous intrusions in the Bulli Seam to the north and east
- Avon Dam to the south and Avon River to the west.

After examination of the information provided, MEG considers the Project an efficient development of coal resources that provides an appropriate return to the State, giving due consideration to the constraints of the location.

Project economics

Revenue from the project and economic contribution to local industry

Over the life of the Project, assuming the majority of coal produced is metallurgical coal and a smaller proportion thermal coal, the Proponent has estimated the project would generate undiscounted revenues of A\$4.63 billion over 12 years, or A\$2.45 billion revenue in NPV terms using a 7 percent discount rate.

The Project would allow continuation of metallurgical coal supply to the BlueScope steelworks at the Port Kembla Steelworks site, near the Dendrobium Mine. The Dendrobium Mine has supplied metallurgical coal to the steelworks since operations began in 2002 of which is blended with coal from the neighbouring Appin Mine.

Coal supply from the Project would continue under the same agreement with BlueScope Port Kembla Steelworks. If metallurgical coal from the Project was not available to blend with coal from the Appin Mine, South32 could not continue to supply the same product the steelworks uses. BlueScope advised there are likely adverse implications for ongoing operations and the proposed No. 6 Blast Furnace Reline Project. BlueScope are reliant on IMC as there are no other metallurgical coal mines in NSW that currently have approval past 2033.

The Steelwork's No. 6 Blast Furnace Reline Project is expected to be completed and operational from 2026 with an expected life of approximately 20 years. The project however, requires certainty of continuation of coal supply throughout the life of the furnace and any disruption to current metallurgical coal supply could place uncertainty over viability of the extension of operations.

Additionally, the Project would continue to supply a proportion of coal exported through Port Kembla Coal Terminal (PKCT). This facility has been running under capacity for many years and without coal supplied from the Project, terminal throughput would further decline. In 2017-18 PKCT had throughput of 4.3 Mt, which is significantly below the PKCT maximum rated capacity of 18 Mtpa. Export throughput has improved in 2018-19 to be around 6.7 Mt, although still less than 50 percent of capacity.

There is a risk for IMC operations in the Illawarra region should the Project not go ahead. Under current operations, there are significant economies of scale from combining aspects of the Dendrobium and Appin mine's operations. If the expansion project were not to proceed, IMC will lose operational synergies with the higher production cost Appin operation.

Employment over the life of the Project

EY Consulting estimate that the Project will provide an average of 333 Full Time Equivalent (FTE) over the life of the project with 557 FTE in 2028.

It is also identified there is significant supply risk for BlueScope operations and the proposed No. 6 Blast Furnace reline project contingent on maintaining local sources of metallurgical coal. Ensuring continuity of supply is critical to ensuring financial viability for the No. 6 Blast Furnace project that is of significant size (A\$0.7 to A\$1 billion capex) and importance to the local economy. BlueScope currently employs around 3,000 people in the Illawarra Region and have estimated an additional 250 jobs would be created during construction of the No. 6 Blast Furnace Reline project.

Estimated economic benefits

The Project will generate:

- 333 additional Full Time Equivalent (FTE) jobs with 557 FTE in 2028
- A production value of \$4.63 billion in real terms (2022 dollars) with Net Present Value (NPV) of around \$2.45 billion
- royalties of \$319 million in real terms, \$180 million in NPV terms, and an annual average of \$29 million (real)
- capital investment of \$551.5 million in NPV terms
- net benefits to the Illawarra region and NSW of \$649.2 million in NPV terms
- extension of the life of the Dendrobium from 2030 to 2041
- support for the ongoing viability of BlueScopes' Port Kembla Steelworks and the Port Kembla Coal Terminal; both of which are strategically significant and major employers in the Illawarra region.

The EIS indicates that the Project would provide \$649.2 million net benefits to the Illawarra region and NSW over the period 2022-23 to 2033-34, in NPV terms using a discount rate of 7 percent. Implications for the Port Kembla Steelworks or Port Kembla Coal Terminal are not included in these estimates. The estimates of payments to NSW and local government are consistent with MEG's estimate of royalty payments though different because they are discounted from an earlier base year.

Table 2 Summary of economic benefits

Economic benefits to NSW	NPV (\$m)
Direct benefits	
<i>Profits accruing to NSW based shareholders</i>	35.1
<i>Company income tax attributable to NSW</i>	81.6
<i>Payments to the NSW and local Government</i>	176.6
Total direct benefits attributable to NSW	293.3
Indirect benefits	
<i>Increase in wages above a reservation wages</i>	231.1
<i>Supplier profits</i>	132.9
Total indirect benefits attributable to NSW	364.1
Environmental Costs	
<i>Greenhouse gas emissions</i>	0.15
<i>PM2.5 air quality impacts</i>	8.0
Total environmental costs	8.15
Net economic benefit attributable to NSW	649.2

Royalty calculation

Assumptions

The Project is a proposed underground mine, of which, a royalty rate of 7.2 percent applies to saleable production as all Project extraction areas are less than 400 metres in depth. These rates are applicable to the net disposal value. Net disposal value is the price received per tonne minus any allowable deductions. The main allowable deduction is for coal beneficiation, which is \$3.50 per tonne for coal subjected to a full washing cycle, \$2.00 per tonne for coal subjected to a simple washing process, or \$0.50 per tonne for coal that is washed and screened.

As a majority of the ROM coal is subject to the full washing cycle, a deduction of \$3.50 per tonne from the value of coal produced applies. A deduction for levies also applies which amounts to no more than \$1.00 per tonne. Hence, allowable deductions for royalty for the Project are \$4.50 per tonne.

One of the most important assumptions in the calculation of future royalty is the estimate of a future coal price. Most of the coal from the Project is expected to be metallurgical coal, and

small proportions are expected to be thermal and PCI coal. A review of coal quality information by MEG suggests this is achievable.

Coal price forecasting is inherently difficult and over the project life variations in coal prices are expected. The average price, used by the Proponent, is in the range A\$177-A\$180 a tonne for export and domestic metallurgical coal, around A\$124 for PCI coal and around A\$89 a tonne for the export thermal coal. Given that Consensus Economics’ contract real price projections, in February 2022 for the period to 2027 to 2031 for metallurgical coal was A\$193 a tonne, and A\$96 for thermal coal (0.75 AUD/US exchange rate), MEG considers the proponent’s price projections to be conservative, as they were prepared prior to extent of the Ukraine conflict becoming fully known.

Another important aspect of future royalty calculation is estimating future annual production. Based on information provided by the proponent, MEG has estimated that if the Project is approved, around 27 Mt of product coal could be economically mined over the life of the Project.

Using these parameters, MEG has projected that the Project would provide NSW with royalties of around A\$319 million real terms and around A\$180 million in NPV terms using a 7 percent discount rate, over the period 2024-2034. Average royalties payable to NSW Government from the Project would be around A\$29 million a year in real terms.

Total royalties estimate

Using the above assumptions and parameters, MEG has calculated that the State will receive:

Table 3 Summary of estimated royalties

Parameter	\$m (2022 dollars)
Total royalties received (real)	319
Net Present Value (NPV) royalties (7 percent discount rate, real)	180
Annual estimated average royalties (real)	29

Departmental Assessment

Assessed by	Unit	Branch
Assessing Officer: Gwen Stefani Senior Geologist	Assessment & Advice	Geological Survey of NSW
Assessing Officer: Bryan Whitlock Senior Resources Analyst	Resource Economics	Strategy, Performance & Industry Development
Assessing Officer: Adam Banister Senior Advisor	Industry Advisory & Mining Concierge Industry Development	Strategy, Performance & Industry Development

Approvals

Approved by	Signature	Date
Approving Officer: Dr Kevin Ruming Director Strategic Geoscience Assessment & Advice	Approved in CM9	8 June 2022
Approving Officer: Julie Robertson Director Performance - Strategy Performance and Industry Development	Approved in CM9	27 May 2022
Approving Officer: Yvette Lloyd Director Industry Development	Approved in CM9	10 June 2022
Endorsing Officer: Tony Linnane A/Executive Director Strategy, Performance & Industry Development	Endorsed in CM9	14 June 2022