



Centennial Coal



SPRINGVALE COLLIERY MINE EXTENSION PROJECT ECONOMIC IMPACT ASSESSMENT

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Prepared by



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EXECUTIVE SUMMARY

- Springvale Coal Pty Ltd (the Applicant) proposes to extend its mining operations, using longwall mining techniques, to the east and the southwest of its existing operations at Springvale Colliery located 15 km northwest of Lithgow. The proposed mine extension (the Project) will fall within Springvale Colliery's existing Colliery Holding. Springvale Colliery's (Springvale) current development consent will expire on 28 September 2014. The Applicant is seeking approval to continue mining beyond this date.
- This Economic Impact Assessment has been prepared as part of the Environmental Impact Statement (EIS) in relation to the application. The assessments contained herein are based on the findings included in specialist reports on the impacts required to be identified under the Director General's Requirements for this Project. The report seeks to address the social, economic and environmental effects surrounding the project from the perspective of a 'triple bottom line' reporting approach.
- The Project is classified as state significant development pursuant to *State Environmental Planning Policy (State and Regional Development) 2011*. As such, development consent is sought pursuant to Part 4, Division 4.1 of the *NSW Environmental Planning & Assessment Act 1979* (EP&A Act).
- Continuation of mining at Springvale will sustain employment for 310 permanent employees, and 50 contract positions engaged in construction activity over a staged program involving 3-month construction programs in 2017 and 2019. The mining industry is a crucial component of the Lithgow regional economy. The salaries paid to these employees and contractors provide significant economic stimulus and activity in the local and regional economies.
- The extension of mining at Springvale will also provide ongoing revenue streams to Federal (e.g. corporate income taxes), State (e.g. royalties, payroll tax) and Local (e.g. rates) governments over the period of operation.
- The proposed mine plan has been decided upon from amongst a number of alternatives. The decision criteria were based on maximising resource recovery, while simultaneously minimising the potential for impacts on land in the area, with particular regard to subsidence impacts. The approach seeks to achieve an optimal outcome for the regional and broader communities.



Surface impacts are predicted to be similar to those currently being experienced by the community and the environment as a result of the existing Springvale Colliery workings.

- The net economic benefit of the Project for the State and regional communities is positive, at a net present value (NPV) of \$824 million over the Project forecast period to 2039. The benefit-cost ratio (BCR) for the Project is also positive (11.6). Under altered sensitivity testing assumptions, the economics of the Project remain robust.
- There are a range of external costs and benefits associated with both the construction and operations phases of the Project. The proposed Project proposal includes a range of prospective controls and mitigation measures that either allow avoidance of certain impacts or mitigation of impacts that are unavoidable. Quantitative assessment of these impacts indicates that the positive aspects of the Project are greater than are the quantified assessments of the potential negative externalities. This report recognises that there is also an 'intrinsic value' component to individuals' perceptions of impacts, which is subjective and may not be accurately quantified.
- There may also be some cumulative impacts resulting from the Project in the regional context, however the proposed mining extension is consistent with other similar industrial activity in the area surrounding Springvale Colliery, including other mines and power generation facilities.
- With respect to the external impacts, Springvale Colliery and its advisers are engaged in a continuous process of stakeholder consultation and development of mitigation programs that will ameliorate impacts to the satisfaction of affected communities to the greatest practicable extent.



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ABBREVIATIONS

ABS:	Australian Bureau of Statistics
BAU:	Business as Usual
BCA:	Benefit-Cost Analysis
BCR:	Benefit-Cost Ratio
CO ₂ -e:	Carbon dioxide equivalent
DA:	Development Application
DGRs:	Director General's Requirements
DTIRIS:	Department Trade, Investment, Regional Infrastructure & Services
EIS:	Environmental Impact Statement
EMS:	Environmental Management System
EPA:	Environment Protection Authority
EVRI:	Environmental Valuation Reference Inventory
GDE:	Groundwater Dependent Ecosystem
GHG:	Greenhouse Gas/es
GVA:	Gross Value Added
I/O:	Input/Output
LCC:	Lithgow City Council
LGA:	Local Government Area
Mtpa:	Million tonnes per annum
NPV:	Net Present Value
ROM:	Run of Mine ('raw' coal)
SMEP:	Springvale Colliery Mine Extension Project
SLA:	Statistical Local Area
SSD:	State Significant Development
SSR:	Safe, serviceable and repairable
THPSS:	Temperate Highland Peat Swamps on Sandstone
tpa:	Tonnes per Annum
WDV:	Written down value



1. ECONOMIC ANALYSIS AND IMPACT ASSESSMENT: PURPOSE AND APPROACH

Springvale Coal Pty Ltd (the Applicant) proposes to extend its mining operations, using longwall mining techniques, to the east and the southwest of its existing operations at Springvale Colliery located 15 km northwest of Lithgow.

The proposed mine extension (the Project) will fall within Springvale Colliery's (Springvale) existing Colliery Holding. Springvale's current development consent will expire on 28 September 2014. The Applicant is seeking approval to continue mining beyond this date.

The Project is a State Significant Development in accordance with Clause 8 and Schedule 1 (Item 5) of *State Environmental Planning Policy (State and Regional Development) 2011*. As such the Applicant will be seeking approval under Part 4 Division 4.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

In relation to the development application, presentation of an economic assessment is a provision under Schedule 2 (7) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), associated with the EP&A Act, which requires, in particular:

(1)(c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure.

(1)(f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).

In November 2012, the Director General for the Department of Planning and Infrastructure issued Environmental Assessment Requirements for the Project. These requirements include provision of information on the social and economic



impacts of the application. Table 1 below details those requirements relevant to this assessment and where they have been addressed in this document.

Table 1 – Springvale Mine Extension Project – Director- General's Requirements

Requirements	Addressed in this Report
Potential direct and indirect economic benefits of the Project for local and regional communities and the State.	Section 3/4
A detailed description of the measures that would be implemented to minimise the adverse social and economic impacts of the Project including any infrastructure improvements or contributions and/or voluntary planning agreement or similar mechanism.	Section 4/Table 10 Appendix 1 Appendix 2
A detailed assessment of the costs and benefits of the development as a whole, and whether it would result in a net benefit for the NSW and regional communities.	Sections 3-5

This assessment addresses relevant economic impacts of the Project as provided for in these requirements. The approach to this assessment is to estimate the direct economic benefits and costs of the Project, as they relate to the State, regional and local communities. The extended regional economic benefits and costs of the Project are also considered.

In addition to the assessment of economic outcomes, the benefit or cost to the community of other aspects of the Project, such as social and environmental outcomes, are quantified where practicable. This element of the approach is consistent with the requirements of subclause 7(4) (d), Schedule 2 of the EP&A Regulation, which require consideration of the principles of ecologically sustainable development. This report seeks to address these requirements by providing a 'triple bottom line' reporting focus on the social, economic and environmental outcomes of the Project.



2. PROJECT BACKGROUND AND JUSTIFICATION

2.1 Applicant

Centennial Springvale Pty Ltd is the Applicant for the proposed Project. Springvale Colliery is managed by Centennial Springvale Pty Ltd under a joint venture arrangement between Centennial Springvale Pty Ltd and Springvale SK Kores Pty Ltd. Centennial Springvale Pty Ltd is 100% owned by Centennial Coal Company Pty Ltd. Centennial Coal Company Pty Ltd is a wholly owned subsidiary of Banpu Public Company Ltd, listed on the Thailand Stock Exchange.

Centennial supplies thermal and semi soft coking coal to domestic and export markets, providing NSW with coal for approximately 40% of the State's coal fired electricity.

2.2 Mine consents and operations information

Springvale Colliery's initial Development Consent (DA 11/92) was granted on 27 July 1992 pursuant to Section 101 of EP&A Act. Schedule 2, Condition 2 of DA 11/92) states: *'The duration of this consent is limited to twenty-one (21) years from the granting of the Coal Lease.'*

The relevant 'coal lease' being referred to in the Development Consent DA 11/92 and the supporting Environmental Impact Statement is ML1326. ML1326 was issued on 28 September 1993 and expires on 18 August 2024. In light of Schedule 2, Condition 2 DA/92 will expire on 28 September 2014.

Subsequent Section 102 modifications to DA 11/92 have also been approved and were primarily associated with modifications to the pit top, shaft sites, mine layout and surface coal conveyor installations.

Springvale is an underground coal mine producing high quality thermal coal which is supplied to both domestic and international markets. Domestically, Springvale has established long term contracts with two local power stations: Wallerawang and Mount Piper operated by EnergyAustralia. All coal is distributed to these sites via dedicated overland conveyors. The international market is accessed via Centennial's Lidsdale Siding rail loading facility.



The main components of Springvale operations are an underground longwall mine and development panels and supporting surface infrastructure within the Springvale pit top area and in the Newnes State Forest. Currently coal processing and distribution is managed by Springvale Coal Services, a separate Centennial business unit.

Recently, a request for the issue of DGRs has been lodged by Centennial to upgrade the existing Springvale Coal Services, located at Blackman's Flat, and an application lodged on those terms. As part of this upgrade, it is proposed to amalgamate the existing coal processing and transport facilities and operations, currently undertaken as part of Springvale's Development Consent, with the consent for the proposed Springvale Coal Services. This is an administrative transfer of the existing infrastructure between two of Centennial's business units.

Springvale will employ approximately 310 full time employees on operations. There will also an estimated 50 construction positions associated with the development of additional surface infrastructure over a staged development program.

2.3 Description of proposed Project

The overall objective of this Project is to obtain approval for the Springvale Colliery Mine Extension Project for the continuation of mining at Springvale beyond 28 September 2014.

The Project will:

- in general, include all currently approved operations, facilities and infrastructure of the Springvale Mine, except as otherwise indicated in this EIS;
- continue to extract up to 4.5 million tonnes per annum (Mtpa) of ROM coal from the Lithgow Seam underlying the Project Application Area;
- extend the life of the mine for an additional 13 years with rehabilitation to be undertaken after this period;
- develop underground access headings and roadways from the current mining area to the east to allow access to the proposed mining areas;
- undertake secondary extraction by retreat longwall mining technique for the proposed longwalls LW416 to LW432 and LW501 to LW503;



- continue to use the existing ancillary surface facilities at the Springvale pit top;
- continue to manage the handling of ROM coal through a crusher and screening plant at the Springvale pit top, and the subsequent loading of the coal onto the existing overland conveyor system for despatch to offsite locations;
- continue to operate and maintain the existing ancillary surface infrastructure for ventilation, electricity, water, materials supply, and communications at the Springvale pit top and on Newnes Plateau;
- install and operate two additional dewatering bore facilities (Bores 9 and 10) on Newnes Plateau and the associated power and pipeline infrastructure, and upgrade the existing and construct two new sections of access tracks to Bores 9 and 10 facilities;
- construct a downcast ventilation borehole at the Bore 10 facility location;
- establish a mine services borehole area;
- continue to use the existing Springvale Delta Water Transfer Scheme (SDWTS);
- upgrade the existing SDWTS comprising construction of new sections of the trenched pipelines to increase the water delivery capacity of SDWTS from the existing 30 ML/day to up to 50 ML/day;
- manage predicted increase in mine inflows using a combination of direct water transfer to the Wallerawang Power Station, via the SDWTS, and discharge through Angus Place Colliery's licensed discharge point LDP001 and Springvale Mine's LDP009;
- continue to undertake existing and initiate new environmental monitoring programmes;
- continue exploration activities, predominantly borehole drilling to further refine the existing geological model;
- continue to operate 24 hours per day seven days per week, 52 weeks per year;
- continue to provide employment to a full time workforce of up to 310 employees;
- progressively rehabilitate disturbed areas at infrastructure sites no longer required for mining operations;
- undertake life-of-mine rehabilitation at the Springvale pit top and the Newnes Plateau infrastructure disturbance areas to create final landforms



commensurate with the surrounding areas and the relevant zonings of the respective areas; and

- transfer the operational management and physical infrastructure regarding coal processing and distribution infrastructure to the Western Coal Services Project (when approved). The exception to this is that it will be the development consent granted in respect of the Springvale Mine Extension Project (and not the development consent granted in respect of the Western Coal Services Project) which will continue to authorise the transport of up to 50,000 tonnes per annum of coal to local domestic customers by road haulage.

3. PROJECT ECONOMIC ANALYSIS

3.1 Focus of analysis

The critical focus of these analyses is on the economic impacts of the project for the State and the Lithgow City Council (LCC) Local Government Area (LGA) communities. As may be expected, Centennial Springvale has carried out a comprehensive internal financial appraisal of the Project. The financial appraisal process and its outputs are highly commercially sensitive. As such this material is unsuitable for presentation in a document which is intended for public exhibition and is excluded from this Economic Assessment on that basis. The economic aspects assessed in this report are those that allow the community to consider the project in the context of social, economic and biophysical factors that are relevant to them, as required under the EP&A Act.

Initially, there will be effects resulting from direct and derived economic activity associated with the development of supporting facilities for the Springvale Colliery Mine Extension, such as the surface infrastructure identified in Section 2.3. The principal economic impact of this element of the Project relates to providing employment of construction-related contractors.

There will also be ongoing direct economic effects associated with continued operations at Springvale. Prominent among these effects is the impact of continued economic activity induced by the incomes of retained employees, and commercial transactions between the mine and suppliers and other businesses. The economic stimulus provided by these activities also results in the flow of further activity in the



regional, state and national economies, as the goods and services required to support mining activity are produced and supplied. A further major economic outcome is the flow of royalties and various taxes into relevant government incomes, and their subsequent application to provision of public goods and services.

Springvale Colliery has conducted internal analyses in order to determine the financial and economic feasibility of several project options, particularly different mine plan options. The proposed Project represents the best of the alternatives considered from the perspective of economic efficiency and socially and environmentally sustainable operations.

The economic analysis presented in this assessment provides an overview of the conclusions of the comparative approach adopted by Centennial Springvale in respect of the most feasible Project options. The analysis requires certain assumptions to be made in relation to the expected outcomes of the Project, which are detailed in the appropriate sections of this report.

Centennial Springvale is in a position to provide the commercially sensitive information discussed previously on a confidential basis, as is provided for in the Planning NSW draft guidelines (2002) should this be required. Accordingly, this Economic Assessment presents the costs and benefits to the State and regional communities, with corporate financial outcomes excluded.

3.2 Discussion of project alternatives

In developing the preferred approach to the continuation of mining proposed in this Project Application, Springvale Colliery initially considered a broad range of project options. These alternatives were assessed from the perspective of ecologically sustainable development stipulated in the legislation governing this Project (refer to Section 1). The alternative project approaches principally differed on the basis of the planned mine layout and mining approach for each option. Through an internal project assessment process conducted by management, Springvale excluded various alternatives on the bases of:

- Economic feasibility;
- Ecological impacts management;
- Social and community impacts; and
- In some instances, combinations of these factors.



Ultimately, two project alternatives were identified that met feasibility requirements, with the final SMEP proposal being assessed as the better of these.

The alternative proposals are examined in greater detail in Section 3.4 and Appendix 1. This comparative assessment also includes consideration of the 'do nothing' or 'business as usual' (BAU) case. In this instance BAU fundamentally involves expiry of the existing mining consent in September 2014, effectively ending mining at Springvale Colliery.

3.3 Project-related economic evaluation

The benefit – cost analysis (BCA) data presented in this section are net present values (NPV), at an assumed discount rate of 7 per cent, except as otherwise noted¹.

3.3.1 Estimation of economic benefit

The key economic benefits that accrue to the local and State communities, as distinct from the proponent corporation, are:

- Salaries and wages paid to contract workers in the construction phase of the Project. These incomes then support additional activity in other sectors of the economy;
- Salaries and wages paid to full time employees at Springvale Colliery, with similar flow-on effects to those noted above;
- Royalties on product coal which are remitted to the State. These are then redistributed across the State community in the form of publicly-provided goods and services;
- A range of federally-levied taxes, a proportion of which is similarly redistributed across the State community. These taxes do not include provision for the carbon tax or the Mineral Resources Rent Tax (MRRT) due to uncertainty as to their continuity;
- Various State (e.g. payroll tax) and Local Government (e.g. council rates) taxes, rates and charges, which are disbursed in the provision of goods, services and facilities across State and local communities.

The construction of the supporting surface infrastructure will support an average of 50 contract employees at various stages over the period. Extended mining

¹ The economic appraisal principles employed herein are consistent with relevant parts of NSW Treasury/Planning NSW Cost Benefit Analysis for mining and coal seam gas proposals (2012) and NSW Treasury TPP07-6 Economic Appraisal Principles and Procedures Simplified.



operations resulting from the Project ensure the continuing employment of 310 persons employed at the mine. These effects are the source of significant direct and derived economic benefits and also have positive social and welfare benefits for the local communities in which these employees reside and spend a considerable proportion of their incomes.

In addition to these household income-related benefits, the royalties and taxes generated are also a source of benefit. Table 2 shows the valuation of these benefits, and the bases of the valuation for each.

Table 2: Estimate of economic benefit – Springvale Mine Extension Project

Economic Benefit	Estimation assumptions	Estimate
Construction-phase contractor incomes	Average 50 contract personnel required over staged 3 month construction program (2017 & 2019) @ ≈ \$65K p.a. each (pro rata).	Assessed NPV ≈ \$1.2m
Mine operation-stage sustained employment	Direct operations employment: 310 FTE positions.	Assessed NPV ≈ \$647 million.
NSW Government royalties	Based on assessed output over mine life extension period 2014-2039, and royalty rate of 7.2% ²	Assessed NPV ≈ \$201 million.
Federal taxes (corporate income taxes); State taxes (e.g. payroll tax); Local Government rates and charges		Assessed NPV ≈ \$22 million
Biodiversity offset provision	Refer to Appendix 2	Assessed NPV ≈ \$2.9 million
Project impact controls and mitigation provisions ³	Particulars included in Table 10, rehabilitation section.	Assessed NPV ≈ \$28 million
Total economic benefit		≈ \$902 million

² Deep underground coal (+400m) 6.2 per cent; **other underground coal 7.2 per cent**, open cut coal 8.2 per cent.

³ ³ The benefit of the conservative mine plan proposed (NPV \$35 million) assumed as an environmental benefit to the community, is offset by the cost to the community of \$3 million in government revenues (royalties) foregone.



3.3.2 Estimation of economic costs

The Director General's Requirements (DGRs) issued by the DP&I for the Project identifies key issues that the EIS prepared for the Project must address. These relate to:

- Subsidence;
- Land resources;
- Water resources;
- Biodiversity;
- Heritage;
- Air quality;
- Greenhouse gases (GHG);
- Noise;
- Traffic and transport;
- Visual;
- Social and economic; and
- Rehabilitation.

Each of these matters is addressed within the EIS prepared for the Project, and the majority are the subject of specialist assessment reports appended to the EIS. A qualitative and quantitative analysis of these aspects of the Project is included in Table 10. The table also details prospective controls and mitigation commitments proposed by Springvale Colliery for addressing these impacts.

In order to estimate the net cost or benefit of the project, it is necessary to provide a monetised estimate of these impacts, based on specialist assessments of their magnitude, and relevant valuation methodologies, which are displayed in Table 3.

In relation to these valuations, three key points must be observed:

- Where possible, valuation methodologies are derived from studies accessed through relevant government bodies. This may be considered as placing some greater level of reliability on these studies;
- The identified valuation methodologies have been selected to as closely represent similar existing conditions *for this Project* as was achievable. However, in some instances the valuation methodologies are either more general, or related to projects of a different nature that retain some level of comparability. In this regard, it is important to emphasise that the present Project relates to the



development of a limited amount of industrial infrastructure and continued operations on a site, and in a geographic area that already features existing, similar infrastructure and activity, particularly that associated with present mining at Springvale. This fact of itself may be considered as a mitigating factor in terms of valuing the extent of impacts on social amenity in this area⁴.

- There remains an unquantified element of social impact. This may be described as the 'intrinsic value'⁵ of certain impacts or effects, as attributed by individual stakeholders. This aspect can be highly individualised and subjective and consequently may not be accurately quantified, as the estimation techniques applied, although based on valid methodologies, may not align with individual stakeholders' values.

⁴ In discussing regional and cumulative impacts, the Department of Planning and Infrastructure's *Guideline for the use of Cost Benefit Analysis in mining and coal seam gas proposals* (2012), focuses on land use changes in relation to strategic agricultural land. As the current Project does not change land use in the area in this context, it may be argued that cumulative impacts that might be associated with such a change are avoided or mitigated to some extent.

⁵ James Marshall & Co. (2013)



Table 3: Valuation methods – socioeconomic and biophysical impacts

Description	Methodology/Source of Valuation mechanism	Valuation measure/unit ⁶	Comment on application
Noise	Day B, Bateman I & Lake I (2010): “Estimating the Demand for Peace and Quiet Using Property Market Data” - Hedonic pricing (impact on dwelling values) EVRI reference number: 06153-105312	\$77 - \$202/dBA per annum (upper bound assumed for estimation)	Based on perceived changes in property valuations. Application based on number of affected receptors (5 residential receptors, 2.3 persons per household [Lithgow LGA, Census 2011]), 12 residents. 4 dBA night-time exceedances in adverse weather conditions at 2 receptors relating to pit top, mitigated by noise reduction strategies, therefore no exceedances of project specific noise limits. continued operational noise level assumed as 45 dBA. Upper bound applied in valuation.
Subsidence, soil and water	Streever WJ, Callaghan-Perry M, Searles A, Stevens T & Svoboda P (1998): “Public Attitudes and Values for Wetland Conservation in New South Wales, Australia” – simulated market price/WTP EVRI reference number 02309-0732	\$154/household per annum	Census 2011 data enumerates the number of households in Lithgow LGA as 7,787. Assumed from commencement of Springvale Mining Extension, 2014. Calculated for individually for each class of impact.
Traffic and transport	Evaluation included under other impact assessments	Not applicable	Air quality, noise and GHG emissions considered in relevant evaluations.
Air	DEC NSW (2005): “Health Costs of Air Pollution in the Greater Sydney Metropolitan Region” - cost of injury/replacement; WTP EVRI reference number: 07200-41439	\$243 - \$1,131 per capita per annum (upper bound assumed for estimation)	Valuation relates to all air pollution in Sydney GMR. Application herein relates 9 identified residential receptors, 2.3 persons per household (Lithgow LGA, 2011 Census), total ≈ 21 residents ⁷ .
Greenhouse gas (GHG)	Australian Government, Clean Energy Future http://www.cleanenergyfuture.gov.au/clean-energy-future/carbon-price/	\$23 per tonne/CO ₂ -e	Assumes incremental Scope 1 costs as assessed (26,720 t CO ₂ -e in any one year). Fixed cost assumed as a consequence of uncertainty regarding future pricing mechanism/s.

⁶ All values adjusted by three per cent per annum to allow for inflation.

⁷ The air quality report also identified nine (9) sensitive receptor locations on the Newnes Plateau, which relate to recreational users. These are not included in the analysis as (a) the numbers of such users are unknown, and (b) use of the area is assumed to be largely transient, thus limiting impacts.



Description	Methodology/Source of Valuation mechanism	Valuation measure/unit ⁸	Comment on application
Heritage	1. Allen Consulting Group (2005): "Valuing the Priceless: The Value of Heritage Protection in Australia" – choice modelling/WTP 2. Streever WJ, Callaghan-Perry M, Searles A, Stevens T & Svoboda P: "Public Attitudes and Values for Wetland Conservation in New South Wales, Australia" – simulated market price/WTP. EVRI Reference Number: 06153-105312	\$7.00 per capita p.a. for each 1,000 places protected	1. Assumes Census 2011 population count (Lithgow LGA) of 20,160, and 49 Aboriginal heritage sites. \$0.34 per capita. 2. Assumes conservation value of surface features (cliffs and pagodas) and associated ecological communities and features. Calculated as for Subsidence, soil & water.
Biodiversity	Land & Water Australia (2005): <i>Making Economic Valuation Work for Diversity Conservation</i> : Australian Government Department of Environment & Heritage: - simulated market price/ WTP	\$149/household per annum (preservation of 700 species –flora & fauna - VIC)	Implied cost of \$0.21 per species. Applied to 3 EECs, 3 threatened flora and 17 threatened fauna identified on or likely to occur in relevant areas of SMEP Project Area which may be affected, total \$4.83 per household p.a. 7,787 households (Lithgow LGA).
Visual	Curtis I.A. (2004): "Valuing Ecosystem Goods and Services: A New Approach Using a Surrogate Market and the Combination of Multiple Criteria Analysis and a Delphi Panel to Assign Weights to Attributes – actual market pricing. EVRI reference number: 0663 - 1365	\$1,044 - \$1,331/Ha per annum (upper bound assumed for estimation)	11.44 ha of vegetation removed (surface facilities) Upper bound applied in valuation.

⁸ All values adjusted by three per cent per annum to allow for inflation.



3.3.3 Physical area applied for estimation of impacts

As is required by the DGRs for this project certain impacts are necessarily considered in the context of NSW. However, the majority of environmental effects are considered as being relevant to the Lithgow LGA, or for impacts such as noise and air quality, to specific receptors such as certain residences in close proximity to operational sites as described in Table 3. The assessed impacts are detailed in Table 4.

A number of the estimates calculated may not be considered as meeting conventional assumptions of materiality. However, in the context that these estimates involve impacts on the various communities to which they are relevant, and may be sources of intrinsic value, described in the accompanying social impact assessment, they should be considered as material to those communities, and thus warrant inclusion in the assessment process.

Table 4: Economic valuation of social and environmental costs of Springvale Colliery Mine Extension Project

Economic cost	Estimation assumptions	Estimate of cost
Noise	Cost to community \$112,352 (2014 cost estimate)	Assessed NPV ≈ \$1.5M
Subsidence	Cost to community \$1,235,174 (2014 cost estimate)	Assessed NPV ≈ \$16.4M
Soil & land capability	Cost to community \$1,235,174 (2014 cost estimate)	Assessed NPV ≈ \$16.4M
Surface water & groundwater	Cost to community \$1,235,174 (2014 cost estimate)	Assessed NPV ≈ \$16.4M
Air	Cost to community \$24,464 (2014 cost estimate)	Assessed NPV ≈ \$ 324K
GHG emissions	Cost to community \$614,560 (2014 cost estimate)	Assessed NPV ≈ \$6.4M
Heritage	1. Archaeological heritage: Cost to community \$7,060 (2014 cost estimate). 2. Natural heritage: Cost to community \$1,235,174 (2014 cost estimate)	Assessed NPV ≈ \$94K Assessed NPV ≈ \$16.4M
Biodiversity ⁹¹⁰	Cost to community: \$37,611 (2014 cost estimate)	Assessed NPV ≈ \$ 3.5M
Visual amenity	Cost to community \$15,683 (2014 cost estimate)	Assessed NPV ≈ \$215K
Economic valuation of social and environmental cost		≈ \$ 78 Million

⁹ The valuation for subsidence and natural heritage also entail recognition of the value of possible biodiversity effects on significant surface features such as cliffs and pagodas and the ecological communities associated with these. This assumption is stated in Table 10.

¹⁰ The assessment is partially based on the methodology described in Table 3, and also a provision for a notional value for the risk of indirect impacts on the Newnes Plateau Shrub Swamps and Newnes Plateau Hanging Swamps (classified as Temperate Highland Peat Swamps on Sandstone [THPSS]). This provision adopts the value of proposed offsets (refer to Appendix 2) as a proxy for this component of the cost to the community.



3.3.4 Estimation of net economic benefit/cost

Table 5 displays the measures of net economic benefit of the Project for the State and regional communities, based on the benefit and cost assessments detailed in Tables 2 and 4.

Table 5: Estimate of Project net benefit/cost	
Economic benefit (PV)	\$902 million
Economic cost (PV)	\$78 million
Net Present Value (NPV)	\$824 million
Benefit-Cost Ratio (BCR)	11.6

The anticipated outcome of the project in terms of its net economic impacts on the State and regional communities is a positive quantified social and economic outcome of approximately \$824 million dollars

The benefits defined in the report exclude those to the corporate entities owning the mine. They include benefits and/or contributions to specific groups among the communities, such as employees, and to the community more broadly in the context of contributions aimed at addressing any impacts of the proposed mining activity. From this perspective, the benefits associated with managed continuation of an activity that is already ongoing in the region, are significantly greater than the possible costs. This differential is emphasised by the adoption of effective 'worst case' estimates for the impacts involved. This implies that there is some prospect that the impacts may be of lesser magnitude.

3.4 Sensitivity analyses – alternative Project options

Discussion of the process undertaken by Centennial Coal and Springvale Colliery to determine the preferred Project option is included in Section 3.2. Briefly, the process entailed a rigorous comparison of a variety of options in the context of the combination of economic, social and environmental factors associated with each option.

As a consequence of this process two feasible alternatives were determined. These were:



- **Option 1:** Development of underground access headings and roadways from the current mining area initially eastwards then to the south and south-west; and
- **Option 2:** Mining in longwalls in an east/west direction.

The preferred project (Option 1) was determined as the superior of the two. Option 2 requires a reorientation of the longwall. This option was eliminated on the basis that the potential longwall outage to make up for the development required to create reoriented mains was operationally and financially impractical, and would result in no reduced biophysical impacts.

In order to fully assess all possible outcomes in relation to Springvale Colliery, it is necessary to also consider a further possible outcome, which may be described as the business-as-usual (BAU) case. Under this scenario, the current mining consent would expire on 28 September 2014. This would result in cessation of mining and closure of Springvale Colliery. Consequently, all economic and associated social benefits would cease to be realised beyond this time, with the exception of that associated with a relatively brief period of decommissioning and rehabilitation activity, and subsequent periodic monitoring obligations.

Table 6 provides a comparison of the three options. The BAU assessment relates to mining in the period prior to expiration of the current mining lease.



Table 6: Sensitivity analysis – Project options - adjusted discount rates (NPV)

Project option component	Discount Rate 4% \$M	Discount Rate 7% \$M	Discount Rate 10% \$M
Option 1 (SMEP) total environmental impact cost	102	78	58
Option 1 (SMEP) total State and community benefit	970	902	853
Option 1 (SMEP) NPV	868	824	795
Option 2 total environmental impact cost	120	112	105
Option 2 total State and community benefit	1,019	940	903
Option 2 NPV	899	828	798
Option 3 (BAU) total environmental impact cost ¹¹	5	5	5
Option 3 (BAU) total State and community benefit	109	105	99
Option 3 (BAU) NPV	104	100	94

As the change in discount rates is proportional for each alternative case, the NPV of the proposed Project and that for the alternative option are superior to the BAU case in each instance. The foregone production (and the associated benefit of additional royalties) is evidenced in the slightly higher NPV for the alternative case. As is discussed in the assessment of social, economic and environmental costs, the alternative interpretation of this differential is that it represents potential environmental impacts avoided, such as those relating to possible subsidence or loss of biodiversity. There may be any number of possible scenarios that vary from the forecast relativities between revenues and costs. The manipulation of the discount rate within NSW Treasury financial appraisal guidelines provides some indication of the range covered by such possible variances and the associated project risk.

A further means of testing the strength of the economic case for the proposal is to adjust certain economic performance assumptions. In framing these test criteria, it is considered that capital and operating cost assumptions will behave in a relatively predictable manner, in the context of assumptions for inflation over time, which have been factored into the analysis. The most likely source of variation relates to coal prices, which may be comparatively volatile. Table 6 displays the output of this

¹¹ Assumes baseline costs in proportion to incremental costs of project



analysis, based on price assumptions derived from market data and revenue adjustments at ten and twenty per cent higher and lower. As is the case with the proceeding analysis, changes in revenue associated with price variances are reflected as changes in tax and royalty benefit to NSW.

Table 7: Sensitivity analysis - project options-adjusted revenue assumptions - (NPV)¹²

Evaluation Element	Option 1 (SMEP) \$M	Option 2 (\$M)	Option 3 (BAU) \$M
Base case ¹³	824	828	100
Revenue Δ 10%	846	854	110
Revenue Δ 20%	869	884	120
Revenue -10%	802	802	90
Revenue -20%	779	776	80

These separate analyses, based on adjustments to discount rates and also operating outcomes assumptions demonstrate the positive economic outcomes of the Project in a variety of scenarios. The Project outcomes are significantly greater than for the BAU case. Although this analysis examines a limited range of feasible outcomes from among a much broader range of potentialities, the social and economic outcomes are likely to be positive in most foreseeable eventualities.

3.5 Direct employment impacts of Springvale Colliery Mine Extension Project

With respect to the employment impacts of the Project, the total number of employees and contractors employed at Springvale will be 310 full-time personnel. The significant majority of these employees reside in the Lithgow LGA (refer to Section 4.4.1).

In addition, the construction program for the surface infrastructure associated with the project will result in the employment, on average, of 50 contractors over the staged construction period and subsequently on maintenance activity. As is the case with the assessment of project economics undertaken in previous sections, the

¹² At 7% discount rate.

¹³ Refer to Table 5.



underlying alternative outcome in respect of the Project is the loss of all existing positions and those required for Project-related works, as mine closure would become inevitable expiration of the current mine lease.

4. EXTENDED ECONOMIC IMPACT ANALYSIS

4.1 Approach

This analysis firstly identifies and where appropriate, quantifies the broader impacts of the Springvale Colliery Mine Extension Project. The effect of the stimulus provided to regional and broader economies by direct construction and operating activity and the associated impacts is then considered. A discussion of the application of multipliers to quantify the extended benefit/cost relativities of the proposal is then undertaken.

4.2 Regional context

Centennial's operations in the Lithgow and adjacent Mid-Western Regional Council LGAs are significant contributors to these regional economies, and those of contiguous LGAs, such as Bathurst and the Blue Mountains. As Springvale Colliery is situated in the Lithgow LGA, it is appropriate to focus on the recognised contribution of the mining industry to that particular regional economy.

4.2.1 Lithgow City Council Economic Development Strategy

The importance of the coal mining industry to the regional economy is explicit in Lithgow City Council's Economic Development Strategy (EDS) 2010-2014. This is substantiated by the following material included in the EDS;

- *"In 2006, the mining sector employed 10% of the total Lithgow resident workforce second only to the Retail sector at 11.2%" [emphasis added].*
- *"The largest employer in Lithgow Local Government Area is mining".*
- *"Only the mining sector had a greater percentage contribution to gross regional product (27%) than its share of employment (12%)¹⁴.*

Clearly the sector is of significant importance in the context of such a relatively small regional economy. The comparison of employment to output identified in the second point is indicative of a number of factors. Firstly, mining is relatively capital intensive,

¹⁴ Note that this figure refers to total employment in the mining sector in Lithgow. The former figure of ten per cent relates to the resident workforce of the LGA.



so the labour input may be comparatively lower. The EDS notes however that as much of the mining in the area is underground mining, this is relatively more labour intensive than open cut mining. Secondly, in terms of regional output, the sector stands out from the remainder of the local economy on the basis of its productivity and income effects relative to labour.

The EDS also notes that there is scope for expansion in the coal industry, however “there is still pressure for coal industry downsizing from efficiency rationalisation and this may ameliorate [*sic*] the benefits of increased exports” (p. 87). The proposal to continue mining at Springvale represents a commitment to maintaining operations and the associated employment in the Lithgow area.

These sustained operational and additional construction-related positions are regionally important. The EDS emphasises the potential for severe impacts on the local economy that are likely to result from any premature curtailment of mining activity, as is exemplified in the following statements from the EDS:

- *“The major concern here is that many of these mining jobs are concentrated into a handful of businesses hence, as has been experienced in the past, any job losses tend to be on a large scale and hence may have an immediate impact upon the community”*
- *“This may have an impact upon the level of disposable income available to the Lithgow Resident Workforce in the future should the number of people in the mining industry decline further”.*
- *“This industry sector [mining] has also been shown as having a propensity to fluctuate mainly due to its sensitivity to international market forces. A critical impact of this is local business being heavily reliant upon a relatively small proportion of the community which has disposable income but one which can also be severely affected by changes to employment status. These families can also be considered as transient due to the specialised nature of their skills base. In other words a workforce with niche skills such as those in the mining industry are [*sic*] more likely to move from one region to another for work taking their disposable income with them”.*

The sustainability of the mining sector and its related employment is clearly vital to the broader economic wellbeing of the area. As is established throughout this



economic assessment, the proposed project will have a direct and positive impact on economic sustainability over the period in which coal resources can be economically extracted, both directly for employees and their households and indirectly for the broader regional economy. The content of the EDS indicates that LCC is cognisant of the finite nature of mining in the area and its conclusions are evidently that the regional economy will continue to remain reliant on the role of the mining industry for some time.

The LCC EDS supports a conclusion that employment provided by Springvale Colliery is a critical component of the regional economy. As is disclosed in Table 2, Springvale Colliery employees' salaries are estimated at around \$626 million over the proposed extended mining period. Contractor salaries are additional to this estimate. The 'pay packet effect' of these incomes on the local economy is very significant, as is substantiated by LCC's assessment of the local economy and its reliance on these households' disposable incomes.

The extent of the 'pay packet effect' in relation to Springvale Colliery is clear from the output of an employee survey conducted by the mine, which produced the following relevant findings:

- Nearly 76% of employees live in the Lithgow Local Government Area and nearly 80% of these employees live in the major townships of Lithgow, Wallerawang and Portland.
- On average, each employee surveyed spends 33.0% of their weekly income in their local residential community.

These data indicate the importance of the mine to the economy and the social fabric of the region. SMEP will ensure the continued operation of Springvale and as such has an integral role in ensuring that these employment levels are maintained. Ongoing operation of mine will ensure that these employment levels are maintained for the extended life of the mine.

4.2.2 Community consultation

Centennial Coal undertook community consultations in 2012 in relation to a range of projects (Western Coal Services Upgrade, Springvale Colliery and Angus Place



Colliery developments). Issues raised by the community in relation to the wider regional developments include:

- general visual impacts, particularly from open cut mining;
- intensification of mining activities; and
- the recognition of impacts from sources other than Centennial such as other mining operations and the two power stations.

Community information sessions to update on progress for the Angus Place and Springvale Mine Extension Projects and Lidsdale Siding Upgrade were undertaken in March 2013. In relation to mining activities on the Newnes Plateau the following points were raised:

- Sensitive ecology.
- Structural geology of the Newnes Plateau.
- Maintaining the 'environmental architecture'.

These matters are addressed in the relevant specialist reports comprising parts of the EIS. They are also quantified in the relevant sections of this report.

The consultation process also resulted in the following observations:

- There is a strong connection to mining in areas such as Lithgow, Wallerawang and Portland however this connection is not shared across the entire LGA. There has been an increasing population in rural areas and the connections that many of these landholders have to the LGA are its natural assets.
- Despite the connection to power and mining, residents do not want to be adversely impacted upon by industry when they are not at work.
- Identified benefits arising from mining such as construction of additional infrastructure, maintenance of existing, and creation of additional jobs etc. do not always outweigh the impact on community amenity even if the industry (e.g. mine) operates within approved limits.

These findings raise an important issue. Notwithstanding attempts to quantify environmental and economic effects from the perspective of their impact on the



relevant communities, there remains an 'intrinsic value' component¹⁵. This element of social value relates to individual value judgements on impacts. It is subjective and cannot be accurately quantified, but must be recognised as an aspect of social impact.

4.3 Extended economic impacts

An estimate of the extended economic impacts associated with the construction works on the Springvale Colliery Mine Extension Project, and the ongoing operation of the mine, can be derived using input-output (I/O) multipliers. The methodology is a commonly-used approach to providing an approximation of the economic effects of one industry's activities across the rest of the economy¹⁶. There are certain limitations to the application of I/O multipliers. These are also acknowledged by ABS¹⁷. The practical effect of these limitations is that the output of multiplier analysis can only be considered as *indicative* of outcomes that may result from economic stimuli.

The NSW Department of Trade, Investment, Regional Infrastructure and Services (Division of Resources and Energy)¹⁸ identified output and employment multipliers for mining and related services. While acknowledging the aforementioned limitations on multiplier analysis, the application of the relevant NSW Government Department's declared multipliers adds validity to the analysis. The relevant multipliers are displayed in Table 8.

Table 8: Type 2A Multipliers – mining and services

Description	Multiplier value
Output Multiplier – mining & services	2.136
Gross Value Added Multiplier – mining & services	4.099
Income Multiplier – mining & services	2.839
Employment Multiplier – mining & services	3.977

The relatively large GVA multiplier in this instance demonstrates the importance of incomes generated by the relevant project. It should be noted that GVA comprises all

¹⁵ James Marshall & Co. (2013)

¹⁶ A detailed discussion on interpretation and limitations of multiplier analysis is included in ABS Cat No 5246.0; *Information Paper Australian National Accounts Introduction to Input-Output Multipliers*;

¹⁷ For example ABS Cat No 1301.0, *Year Book Australia, 2002*

¹⁸ *The Contribution of Primary Industries to the NSW Economy, Key Data 2012*:

<http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0010/427645/Contribution-of-primary-industries-key-data-2012.pdf>



components of income to labour, plus the gross operating surplus of the corporate entity. Due to the foreign ownership of Centennial, the latter will accrue beyond NSW; however, the former would be concentrated in the State and the immediate region. In addition to these mining multipliers, similar multipliers for construction activity were also identified¹⁹. These are relevant for assessment of the impacts of the stimulus associated with the various construction works required for the Project.

Table 9: Type 2A Multipliers – construction

Description	Multiplier value
Output Multiplier – construction	2.694
Gross Value Added Multiplier - construction	4.369
Income Multiplier - construction	2.899
Employment Multiplier – construction	2.727

In this instance the GVA multiplier would have wider geographic impacts in terms of economic activity, as suppliers and contractors may be more likely to originate beyond the immediate region, given the specialised nature of the infrastructure being constructed. That notwithstanding, Centennial Coal practice is to invite all locally-based tenderers for relevant works to identify themselves as such, with a view to ensure that opportunities to retain work locally are offered.

As the stimulus to the economy is equivalent to the additional activity and output associated with both construction and operational phases of the project, the net benefit of the Project would result in extended economic effects of approximately 2.1 to 4.4 times the initial stimulus, dependent on the economic measure being considered. Employment of the magnitude of approximately 2.7 to 4 times the economic stimulus would result. These indirect positions represent employment supported in the broader economy as a result of the demand for additional goods and services related to the Project.

4.4 Ecologically sustainable development reporting: quantitative and qualitative assessment of social, economic and environmental impacts

The legislation governing this Project requires consideration of the principles of ecologically sustainable development in the design and implementation of such a project (refer to Section 1). This report adopts a ‘triple bottom line’ approach to

¹⁹ The original source of the DTIRIS multipliers is ABS Cat. No. 5246.0 (as above). GVA multiplier derived from ABS Cat No, 5246.0 & Multipliers for Culture-Related Industries, CMC SWG, Canberra.



assessing and reporting these impacts. The approach is intended to provide an integrated assessment of the social, economic and environmental impacts of the Project, with the interdependencies between each of these aspects taken into consideration. The output of this approach is included in Table 10.

Tables 2 and 3 respectively identified the bases for quantifying the environmental impacts contained in the DGRs, and the relevant estimates for the Project. Table 10 compares the benefit and cost impacts in the context of those quantified assessments and also key qualitative aspects of each impact, with particular emphasis on the matters identified through the community consultation process and local government economic profile documents. In addition, the table also identifies the policies and specific actions proposed by Centennial in managing and mitigating the externality impacts of the Project.



Table 10: Economic Impact Assessment – Summary Table

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Springvale Colliery supporting Infrastructure construction and commissioning Consultant: Aigis Group	The project will result in an overall positive economic contribution at a State, regional and also to the local community level.	Direct construction employment: Average 50 contract personnel @ ≈ \$65K (pro-rata). Assessed PV ≈ \$1.2 million	Nil Some specialised works may require contracting with providers from outside the local region, in which case the regional economy will experience lesser beneficial stimulus.	Nil required. Local contractors tendering will have the opportunity to identify themselves as being locally based
Springvale Colliery extended operations Consultant; Aigis Group	The project will result in an overall positive economic contribution at a State, regional and also to the local community level.	1. Direct employment positions maintained beyond current mine approval: 310. Assessed PV (all positions): ≈ \$647 million NSW Government royalty income from extended mining: PV ≈ \$201 million Additional federal/ state/local government taxes, rates & charges: PV ≈ \$22 million Economic importance of mining in local economy recognised by LCC.	Nil	Nil required



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Subsidence Consultant: MSEC	Assessments indicate that the levels of impact on the natural and built features can be managed by the preparation and implementation of the appropriate management strategies.	1. Mining layout designed to exclude majority of cliffs and pagoda complexes from angle of draw from longwalls. 2. The widths of the proposed longwalls have been narrowed, so as to reduce the potential impacts on the swamps. 3. Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: PV ≈ \$34 million (implied avoidance of impacts equated with the value of royalties on foregone production of less conservative mine plan) 4. Socioeconomic benefit of reparations relating to mitigation commitments: 2013 price \$750K (remediation) - \$1 million (restoration) per swamp. 8 shrub swamps (Sunnyside East, Carne West, Gang Gang South, Gang Gang East, Pine, Pine Upper, Paddys Creek and Marangaroo Swamps) + 20 hanging swamps in Extension Area). (PV not calculated as estimate is contingent and timing (if required) uncertain)	1. Notional cost to community: \$1,235,174 per annum (2014 price) as per combined estimation methodology in Table 3. PV: ≈ \$16.4 million 2. There are some rock formations which are located directly above the proposed longwalls. The proposed mining is likely to result in some fracturing in these features. It is expected that the impacts on these rock formations would represent less than 3% of total exposed rock face areas. 4. Some cracking could occur in the swamps resulting from extraction of the proposed longwalls previous experience of mining in the area indicate that the likelihood and extents of these impacts are low. 5. \$34 million (PV) in public revenue (royalty) foregone due to conservative mine plan.	Prospective Controls: 1. Mine plan designed to reduce likelihood of impacts on significant surface features (pagodas and cliffs and associated ecological environs and biodiversity). Mitigation Measures: Possible remediation activities: 1. Infilling of surface cracks with soil or other suitable materials. 2. Locally regrading and recompacting the surface. 3. Erosion protection, such as planting of additional vegetation



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Land use, soil & agriculture Consultant: SLR Consulting Australia	No biophysical strategic agricultural land is present within the Project Application Area; however, according to the site specific assessment Soil Type 3b (24 hectares) is potential BSAL. The post-disturbance Land and Soil Capability classes and Agricultural Suitability classes determined for the Project Application Area are the same as the pre-disturbance classes. Due to the nature of the Project, the only surface impacts likely to impact on the classification of land resources are primarily associated with subsidence. The impacts of the proposed Project on soil resources within the PAA are expected to be negligible.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Notional cost to the community: \$1,235,174 per annum (2014 price) as per combined estimation methodology in Table 3. PV: ≈ \$16.4 million	Prospective Controls: Mine and infrastructure designed to minimise land and soil disturbance. Mitigation Measures: 1. Refer to Sections 5.1.3 and 5.1.4 of SMEP Soil and Land Capability Assessment. 2. Progressive rehabilitation of relevant sites.



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Water Resources Consultant: RPS	1. Groundwater: No detrimental impacts are anticipated on any other groundwater users in the area. No deterioration of quality of groundwater inflows have been observed due to current mining operations, and consequently none are predicted due to the proposed development. No detrimental impacts to groundwater quality are expected within the shallow groundwater aquifer or within swamps. 2. Surface water: The proposed extension includes minor new and /or upgraded infrastructure, which construction and operation is not expected to impact on surface water across the region. Impacts on the surface water features at the Newnes Plateau are either localised and contained, or introduce little change to the current surface water environment, which is considered healthy and undisturbed. Increase of the discharge volumes of mine water make at LDP0001 will not have a considerable effect on existing flow regimes nor on water quality.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Notional cost to the community: \$1,235,174 per annum (2014 price) PV: ≈ \$16.4 million	Prospective Controls Groundwater: Refer to SECTION 9.1, SMEP GROUNDWATER IMPACT ASSESSMENT Surface water: Refer to TABLE 9.1 SMEP - SURFACE WATER IMPACT ASSESSMENT Mitigation Measures Groundwater: Refer to SECTION 9.1, SMEP GROUNDWATER IMPACT ASSESSMENT Surface water: Refer to TABLE 9.1 SMEP - SURFACE WATER IMPACT ASSESSMENT



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Biodiversity Consultant: RPS	The project is unlikely to have a significant impact on threatened species or EECs as a result of proposed longwall mining. The Project will remove approximately 11.44 ha of woodland vegetation, which is potential habitat for a number of threatened fauna species. The location of the proposed clearing footprint incorporated significant avoidance measures, including the use of existing tracks and design modification to avoid threatened flora and EECs. Several mitigation measures will be employed to ameliorate those unavoidable impacts that would result from clearing.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section). Socioeconomic benefit of proposed biodiversity offset package relating to Temperate Highland Peat Swamps on Sandstone (THPSS): Value of proposed land offset and associated land management program (refer to Appendix 2): PV ≈ 2.9 million 2013 price \$750K (remediation) - \$1 million (restoration) per swamp. 3 shrub swamps (Tri-Star, Twin Gully & Trail 6). Up to \$3 million + 14 hanging swamps in Extension Area. (PV not calculated as estimate is contingent and timing (if required) uncertain)	Land clearing for works and infrastructure limited to 11.44 Ha, ≈ 0.2% of the total project area. Notional cost of loss of biodiversity (upper bound) 2014: \$37,611. PV: ≈ \$499K + cost of offset lands and land management program as a proxy value for potential impacts on THPSS: \$2.9 million (Refer to Appendix 2) Total \$3.4 million Three Endangered Ecological Communities (EEC) were recorded within the Project Application Area A total of 12 threatened plant species listed under the TSC Act and/or EPBC Act have potential to occur within the Project Application Area, of these, three were recorded. A total of 40 threatened fauna species listed under the TSC Act and/or EPBC Act have potential to occur within the Project Application Area, of these, 17 have been recorded within the Project Application Area	Prospective controls: 1. Mine plan designed to reduce likelihood of impacts on significant surface features (swamps, pagodas and cliffs and associated ecological environs and biodiversity). Land clearing for works and infrastructure limited to 11.44 ha, ≈ 0.2% of the total project area²⁰. Refer to Section 5.1, SMEP FLORA AND FAUNA ASSESSMENT REPORT Mitigation Measures: Refer to Section 5.1, SMEP FLORA AND FAUNA ASSESSMENT REPORT Provision for remediation of swamps - \$750K per swamp as required. Provision for restoration of swamps - \$1 million per swamp as required. Biodiversity offset (refer to Appendix 2)

²⁰ 5,811 Ha.



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Heritage Consultant: RPS	ARCHAEOLOGICAL 1. A search of the (AHIMS) identified a total of 49 registered sites within the boundary of the Project Application Area. 14 were within the four study areas which encompassed proposed disturbance by both surface works and mining subsidence. 2. Of the 14 sites, it was considered that three were at potential risk of harm from mine subsidence and no sites will be affected by proposed surface works 3. Likelihood of significant impacts on site #45-1-0084 and site 45-1-2756 (duplicate 45-1-2757) is relatively low (MSEC 2013: 93-94. Site #45-1-0137 is predicted to experience very low level subsidence, which is highly unlikely to result in any harm to the shelter. NATURAL²¹ 1. Whilst the cliffs and pagoda complexes could experience low levels of subsidence, they are not expected to experience any significant conventional tilts, curvatures or strains. These features are located along the valley sides and, therefore, are not expected to experience the valley related upsidence or compressive strains due to valley closure. 2. It is unlikely, therefore, that the cliffs and pagoda complexes would experience any adverse impacts resulting from the extraction of the proposed longwalls. 3. Whilst some cracking could occur in the swamps resulting from the extraction of the proposed longwalls, the previous experience of mining beneath swamps at Angus Place and Springvale and in the Southern Coalfield indicate that the likelihoods and extents of these impacts are small.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Value of land offsets (refer to Appendix 2) also relevant to natural heritage management. Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Archaeological heritage: Notional cost to community (Lithgow LGA), 2014: \$7,060 per annum. PV: ≈ \$94K Natural heritage: Notional cost to the community: \$1,235,174 per annum (2014 price) PV: ≈ \$16.4million Total: ≈ \$16.5 million	Prospective Controls 1. Refer to Section 9.3, Cultural Heritage Impact Assessment Lithgow Local Government Area 2. Mine plan designed to reduce likelihood of impacts on significant surface features (pagodas and cliffs and associated ecological environs). Mitigation Measures Refer to Section 9.3, Cultural Heritage Impact Assessment Lithgow Local Government Area Biodiversity offset (refer to Appendix 2)

²¹ MSEC (2013)



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Air Consultant: SLR Consulting Australia	The predicted results showed that the proposed SMEP is unlikely to cause any exceedances of the relevant ambient air quality criteria for TSP, PM₁₀ and PM_{2.5} concentrations or dust deposition at any identified surrounding sensitive receptors when considering Project construction, operation and site rehabilitation.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	9 identified residential/receptor properties, assumed population of 21 individual residents²²/receptors. Notional cost to community (2014): \$24,464 per annum. PV: ≈ \$324K	Prospective Controls: Minimisation of exposed areas. Dust containment fixtures fitted to fixed plant and equipment (e.g. conveyors). Mitigation Measures: 1. Water spraying 2. Ceasing work during adverse weather conditions
GHG Consultant: SLR Consulting Australia	Total lifetime direct (Scope 1) emissions from the Project are estimated to be approximately 26,720 t CO₂-e in any one year. Comparison of Project emissions totals indicates that the SMEP is likely to represent approximately 0.02% of NSW GHG emissions when compared to the latest available emissions data (2010) Scope 1) and 0.005% of Australian GHG emissions (Scope 1).	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Assumed cost of \$23/tonne CO₂-e. Notional cost per annum of Scope 1 emissions (2014): \$614,560 PV: ≈ \$6.4 million	Prospective Controls: 1. Cost effective measures to improve energy efficiency 2. Regular maintenance of plant and equipment to minimise fuel consumption 3. Consideration of energy efficiency in plant and equipment selection phase

²² ABS 2011 Census data: Persons per household for Lithgow LGA: 2.3 persons/household.



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Noise Consultant: SLR Consulting Australia	Noise modelling has indicated that noise emissions associated with the SMEP are predicted to exceed the PSNLs by up to 4dBA during the night-time period under adverse meteorological conditions. Pit top noise reduction strategies initiated, therefore no exceedances of project specific noise limits Noise modelling has indicated that construction noise impacts associated with the proposed new infrastructure will be negligible at the nearest noise sensitive receivers. Traffic generated by the construction and operation of the SMEP is predicted to be within the NSW Road Noise Policy (RNP) criteria at all receiver locations. Vibration levels from the construction and operation of the SMEP is predicted to be negligible and significantly below levels of human perception at the nearest residential receivers.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Notional cost to residential receptors based on continuing background noise (45dBA). (2014): \$112,352. PV: ≈ \$1.5 million	Prospective Controls: Noise containment fixtures fitted to fixed plant and equipment (conveyors etc.) Train workers to use equipment in ways to minimise noise; ▪ operate the mobile plant in a quiet, efficient manner; ▪ switch off vehicles and plant equipment when not in use; ▪ keep plant and equipment well maintained including regular inspections and maintenance of equipment to ensure it is in good working order, and equipment not to be operated until it is maintained or repaired; and ▪ for equipment with enclosures, ensure door and seals are well maintained and kept closed.



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Traffic and transport Consultant: ARC Traffic + Transport	With the application of consultant's recommendations, the Project is supportable from an access and traffic perspective. The Project will not alter the characteristics of the existing Pit Top traffic generation. No additional traffic would be generated by the Project to the local and sub-regional traffic network which provides access to the Pit Top via the intersection of Castlereagh Highway & Mine Access Road. The traffic generated by the construction and operation of the Newnes State Forest (NSF) Project Sites would not significantly impact the operation of the NSF road network or the NSF access intersections at Clarence and north Lithgow.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Notional and actual costs to community captured in noise, air, and GHG emissions estimates (Tables 3, 4 & 10).	Prospective Controls: 1. Preparation and implementation of Construction and Operational Traffic Management Plans with FCNSW and LCC. 2. All heavy vehicle trips to/from NSF Project Sites be undertaken in daylight hours (6am to 6pm). 3. Regular maintenance of overland conveyor system such that the potential for contingency coal road transport to be required is minimal. 4. Agreement with FCNSW to limit new access tracks and adjacent infrastructure corridors to 5m + 5m Mitigation Measures: 1. Each infrastructure corridor to be remediated after installation (all supporting infrastructure installed underground). 2. The right turn treatment Castlereagh Highway to Mine Access Road be upgraded from the existing auxiliary right treatment to a channelised right treatment.



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Visual Consultant: Golder Associates	Pit Top: As the Project involves no changes at the pit top, the views from identified receptors and any other fixed or transient viewpoints will remain unchanged. Residents will continue to see parts of the pit top during day and night. However, there will be no additional visual impact to the existing operations. Following cessation of mining at Springvale, the pit top will be dismantled and the site rehabilitated to a mixture of grassland and woodland interspersed with water management structures. Following rehabilitation, the view from the Springvale Lane receptors will revert back to a more natural view. Newnes Plateau: (Two new dewatering boreholes) are at the end of minor, terminating 4wd tracks and will be decommissioned on completion of mining, with the facilities dismantled and sites rehabilitated to native woodland. The long term visual effect following successful rehabilitation is negligible. Mine services borehole compound (clearing and installed plant) will be noticeable from Glowworm Tunnel Road. On cessation of mining, the mine services compound will be dismantled and rehabilitated to native woodland, providing a negligible long-term visual impact.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Included in annual environmental compliance & works provision (refer to Rehabilitation section).	Notional cost to community of continued presence of existing infrastructure and new infrastructure: \$15,683 per annum (2014). PV: ≈ \$208K	Prospective Controls: Project design: 1. Elevated conveyors at the pit top have been clad in neutral coloured steel sheeting. 2. Lights at the pit top have been designed and installed to minimise light spill and direct shining towards receptors. 3. Newnes Plateau pipelines and power lines will be buried and the clearing corridor promptly revegetated Mitigation Measures: 1. Pit top rehabilitation plan provides for revegetation with native woodland and grasslands. 2. Newnes Plateau infrastructure will be progressively dismantled and rehabilitated to an appropriate land use as identified with the rehabilitation technical report.



Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/Impacts	Description of Environmental Controls & Mitigation Measures
Rehabilitation & decommissioning Consultant: SLR Consulting Australia	Rehabilitation activities will be undertaken both progressively and at the end of the mine life (LOM). Partial rehabilitation of the disturbed areas following construction of the proposed infrastructure on Newnes Plateau (Bores 9 & 10, dewatering facilities). LOM rehabilitation to include rehabilitation of all infrastructure areas and the pit top and on Newnes Plateau.	Socioeconomic benefit of avoided or reduced impacts relating to implementation of prospective controls: Socioeconomic benefit of reparations relating to mitigation commitments: Annual environmental compliance and works provision: \$3 million (2014 price). PV ≈ \$28 million	No additional social or economic costs are anticipated in respect of rehabilitation. Some short term activity will be required to carry out progressive and LOM rehabilitation activities, but overall outcomes (return of sites to remediated conditions) are positive.	Prospective Controls: Mining closure plan to be established and implemented - 5 years to + 10 years of mine closure Mitigation Measures: All rehabilitation activities are considered as part of mitigation commitments.



4.5 Summary

There are several sources of benefit associated with the proposed Springvale Colliery Mine Extension Project. From Centennial's perspective, there are benefits in terms of continued operation of Springvale and the associated commercial benefit. Similarly, the workforce that will be sustained by the Project will also benefit employees' households. Also, the incomes which they derive will result in further induced benefit across the regional community, as a result of the 'pay packet effect' of the consumption and other economic activity of these employees in local and regional economies.

The negative external impacts reported in Table 10 must also be considered in the context of the existing use of Springvale and other similar industrial usage in the area. Largely as a result of the detailed preliminary planning process and development of mitigation strategies, the negative impacts associated with the Project proposal are of significantly lesser magnitude than the benefits that will be generated by the Project, particularly in the regional context described in the LCC EDS.

5. ADDITIONAL REQUIREMENTS

5.1 Cumulative impacts

As part of the assessment of such a project, the DGRs require that impacts of the existing regional situation, and in particular any other concurrent expansion or application that may cumulatively increase impacts in the area be considered. In assessing cumulative impacts, it is important to recognise that these principally affect resident persons, households or others accessing the region under observation.

5.1.1 Relationship Between the Proposed Springvale Coal Services Upgrade Project and the Springvale Mine Extension Project

In addition to the extension of mining at Springvale, the Project application also seeks to consolidate operational management of coal processing and distribution infrastructure with Springvale Coal Services. This approach is also relevant to Angus Place Colliery and other potential Centennial Coal projects in the area. This initiative would allow managerial and locational centralization of logistics functions, thus avoiding unnecessary duplication and impacts across multiple sites.



5.1.2 Other relevant projects

Other relevant existing and pending applications in respect of the Lithgow LGA at present are as follows:

- Existing Wallerawang power station including approval for a Development Application (024/11DA) in July 2011 for new storage silos;
- Existing Mount Piper power station including the following applications:
 - Application for a Western Rail Coal Unloader (06_0271) approved in June 2009;
 - Application for a new Base Load Power Station (MP 09_0119) approved in January 2010; and
 - Application for the Ash Emplacement project under part 3A (MP 09_0186) not yet determined.
- Activities such as those related to forestry operations and recreational activities (such as motorised vehicles on the Newnes State Forest);
- Existing Angus Place Colliery including a pending application for extension of mining and associated infrastructure, including surface facilities on the Newnes Plateau.
- Existing Pine Dale Mine including:
 - Part 3A approval in 2011 for the Yarraboldy extension of an open cut mine; and
 - A request for DGRs was lodged in December 2011 for an additional and larger extension to the open cut mine.
- The Lidsdale Siding Upgrade Project is a Centennial project to improve rail loading facilities including a reclaim tunnel and train track extension, near Wallerawang;
- Expansion of Invincible Mine is part of the Coalpac Consolidation project 10_0178 and includes an extension to the north by open cut and high wall mining.

The SMEP has the potential to contribute to these cumulative impacts. However, findings of the specialist reports on impacts of Springvale's extended operation indicate that these will be similar in nature to current operations at the mine. As a



consequence, it may be concluded that there will be no incremental change in contributions to these impacts in the context of the current baseline impact levels.

5.2 Intra-generational and intergenerational equity

The Project has direct implications for both intra-generational and intergenerational equity. With respect to the intra-generational benefits, those individuals and households benefitting from direct and indirect effects of Springvale Colliery's operations will continue to do so due to the extension of the mine's life. The broader derived benefits are discussed in preceding sections.

These socio-economic considerations are also relevant to the issue of intergenerational equity. Clearly, an extension of mine life by up to 25 years will provide future as well as immediate employment opportunities and the incomes and economic stimulus that these provide. There are also wealth impacts to be considered, to the extent that these can affect the long-term economic stability of employees' households, and have a reductive effect on future reliance on publicly financed welfare structures.

The intra- and intergenerational impacts of the proposal in terms of environmental risks will be actively mitigated by Springvale Colliery to the greatest practicable extent. As is identified in the assessment of these non-financial impacts, Centennial continues to work on ongoing improvement of policies and procedures in order to ensure that management of impacts takes into account the most current, effective technologies and practices.

6. SUMMARY

As was discussed in Section 1, this report has sought to assess social, economic and environmental aspects of the project, from a 'triple bottom line' perspective. The results of financially quantifying these three interdependent groups of impacts indicate that the overall social and economic impact of the Springvale Colliery Mine Extension Project is positive. Specialist reports indicate that with appropriate management as proposed, environmental impacts will not escalate as a consequence of the extension of mining. A detailed suite of prospective control mechanisms is proposed by Springvale Colliery to reduce avoidable impacts. Unavoidable impacts are addressed to the greatest practicable extent by a range of



specific mitigation measures and the offset strategy detailed in Appendix 2. When this approach to minimising environmental impacts is considered in combination with the beneficial economic and social contributions Springvale produces in the local community, it is concluded that the net impact of the project to the local, regional and NSW communities, and to the national economy, will also be positive.



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Appendix 1: Comparative economic analysis of project alternatives APMEP proposal 2014-2039.

Assessment component	Preferred Option: SMEP as proposed (NPV) \$'000	Option 2 (NPV) \$'000	Option 3: 'Do nothing'/BAU (NPV) \$'000
Construction-phase contractor incomes	1,200	1,200	0
Mine operation-stage additional/sustained employment (full time and contract)	647,000	647,000	43,000
Federal taxes (corporate income taxes); State taxes (e.g. payroll tax); Local Government rates and charges	22,000	26,000	1,400
NSW government royalties	201,000	235,000	55,000
Biodiversity offset provision	2,930	2,930	0
Project impact controls and mitigation commitments	28,000	28,000	2,500
Total assessed Social, Economic and Environmental benefit	≈ 902,000	≈ 940,000	≈ 105,000
Noise	1,500	1,500	105
Subsidence	16,400	50,400	1,100
Soil & land capability	16,400	16,400	1,100
Surface water & groundwater	16,400	16,400	1,100
Air	324	324	25
GHG emissions	6,400	6,400	540
Heritage (Archaeological & Natural)	16,500	16,500	1,100
Biodiversity	3,500	3,500	35
Visual amenity	208	208	15
Total assessed Social, Economic and Environmental cost	≈ 78,000	≈ 112,000	≈ 5,100
NET ASSESSED SOCIAL, ECONOMIC AND ENVIRONMENTAL COST	≈ 824,000	≈ 828,000	≈ 100,000



Appendix 2: Description of Centennial Coal Biodiversity Offset Strategy Springvale Colliery & Angus Place Colliery Mine Extension Projects

Angus Place and Springvale Proposed Biodiversity Strategy

Through the adoption of avoidance measures, including where possible, placing surface infrastructure outside habitat for threatened species, shortening longwall blocks and narrowing longwall widths; Centennial has minimised the potential impacts to threatened species and endangered ecological communities.

Despite this, there is the potential for activities undertaken as part of these Projects to directly impact the habitat for threatened species and indirectly impact the endangered ecological communities that comprise Temperate Highland Peat Swamps on Sandstone (Newnes Plateau Shrub Swamps and Newnes Plateau Hanging Swamps). Centennial has developed a Biodiversity Strategy that considers both these direct and indirect impacts.

Direct Offset Package:

The Angus Place Extension Project will clear 23.25 hectares of native vegetation. The Springvale Extension Project will clear 11.44 hectares of native vegetation. No endangered ecological communities will be cleared.

Whilst Centennial has established that the impacts on swamp communities on the Newnes Plateau are negligible (that is, within pre-mining or natural variations), Centennial acknowledges that the potential for indirect impacts presents a level of uncertainty that to some stakeholders may be unacceptable.

The Springvale Extension Project proposes to mine under 76.57 hectares of THPSS.

The Angus Place Extension Project proposed to mine under 20.04 hectares of THPSS.

The total area of THPSS to be mined under is 96.61 hectares.

To compensate for the residual impacts to THPSS, it is intended to provide an offset of up to 105 hectares of land owned by Centennial Airly Pty Limited. This land is located adjacent to the Capertee National Park and within proximity of the Muggii Murum-Ban State Conservation Area. This land includes the critically endangered ecological community Capertee Rough-barked Apple-Redgum-Yellow Box Grassy



Woodlands and habitat for the threatened Gang Gang Cockatoo, Swift Parrot and Regent Honeyeater.

This land will be placed under a restrictive covenant (or similar) to provide for in perpetuity conservation. The restrictive covenant will place restrictions on future land use commensurate with conservation outcomes.

The covenant will be supported by a Land Management Plan that may include commitments to:

- Manage weeds and feral animals, establish and maintain fencing to exclude stock (incorporated into a regional pest management strategy).
- Establish the completion criteria required to achieve an improved biodiversity outcome on the land such that once criteria are met, Centennial's conservation obligation will have been realised.
- Working with the Hawkesbury-Nepean Catchment Management Authority and National Parks and Wildlife to establish habitat suitable for the Gang Gang Cockatoo, Swift Parrot and Regent Honeyeater on this land.

Centennial will continue to consult with Office of Environment and Heritage and the Federal Department of the Environment to continue to refine this package.

Supplementary Measures to Support Conservation Outcomes

Centennial intends to continue consultation with the Office of Environment and Heritage and the Federal Department of the Environment regarding the following potential research activities:

- Contributing research funding towards furthering recovery plans for threatened species that are endemic to shrub swamp communities. This research may include mapping the extent of species distribution in a regional context, include trials for the establishment of species habitat, studies of the nature, form and function of species within the landscape, methods to communicate research findings, and short and long term goals to measure the effectiveness of the research.
- Working with community groups to provide remediation advice and in kind support, for the active rehabilitation of shrub swamp communities impacted by other anthropogenic activities (for example, four wheel drive tracks) on the Newnes Plateau.



- Developing a research program in consultation with Forests NSW, the Office of Environment and Heritage and the Office of Water Science into the hydrology of shrub swamp communities.

Centennial acknowledges that the existing approval condition requiring both the Angus Place and Springvale operations to develop and implement a *Persoonia hindii* Research and Management Plan is ongoing; the outcomes of this research and monitoring program will provide information to inform future management decisions regarding potential impacts to *Persoonia hindii*. To mitigate the unlikely event that this research program does not achieve the expected outcomes, the biodiversity package within this EIS includes consideration of *Persoonia hindii* and satisfy the requirement to provide additional offsets.

Monitoring Program

Centennial has invested considerable research and monitoring effort on the Newnes Plateau over the last 15 years of mining operations. In particular, Centennial's investment has focussed on monitoring the THPSS. The biodiversity strategy described above will enable Centennial to redirect this monitoring investment towards improving those conservation outcomes.

Centennial will continue to support research into rapid mapping techniques, defining vegetation community boundaries and understanding hydrological needs of swamp communities.

Centennial's existing and future monitoring programs will be redefined to focus on establishing these conservation outcomes.

Summary of Biodiversity Strategy

Centennial will continue to consult with Office of Environment and Heritage and the Federal Department of the Environment to continue to refine the Biodiversity Strategy. This Strategy, combined with the current measures taken to avoid and minimise impacts, will compensate for the residual impacts, enhance biodiversity outcomes, conserve high conservation species and communities and will enable focussed effort on improving understanding of the biodiversity values on the Newnes Plateau.



Approach to valuation of related costs and benefits in economic assessments

The approach to valuing the risk of indirect impacts to THPSSs is to attribute the relevant proportion of the full value of the package (land value and land management costs as described) to each of the mines. This attribution is on the basis of the relative area of THPSS undermined for each project. The key data are:

Project site	THPSS area undermined (Ha)	Proportion of total %
Total	96.61	100
Springvale Colliery	76.57	79
Angus Place Colliery	20.04	21

In terms of the land management provision, the commencement of the program is assumed to commence in 2016. As a result, estimates included in the report are present values based on that assumption. The present land valuation and estimate of land management costs are:

- Land value: \$3,125,955
- Land management costs: \$1,706,250 (five years).