Centennial Coal

NORTHERN COAL LOGISTICS PROJECT

CENTENNIAL NORTHERN COAL SERVICES PTY LIMITED

ECONOMIC IMPACT ASSESSMENT

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Prepared by

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EXECUTIVE SUMMARY

- Centennial Northern Coal Services Pty Limited (Northern Coal Services) proposes the Northern Coal Logistics Project (the Project) on the western side of Lake Macquarie approximately 140 kilometres north of Sydney in New South Wales (NSW).
- The Project comprises both a continuation of existing operations and an upgrade to the surface coal handling and preparation facilities at Newstan Colliery and Mandalong Mine - Cooranbong Entry Site (Cooranbong Entry Site), along with existing private haul roads and rail loading infrastructure.
- 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).
- 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.
- On approval, the consent will provide 120 full time equivalent employment positions. At the peak of construction works up to 195 FTE construction contractors will be required. The mining industry is acknowledged as an important component of the regional economy. The salaries paid to these employees and contractors provide material economic stimulus and activity in the local and regional economies.
- As a function of its role in providing logistics services to Centennial's mines in the region, the Northern Coal Logistics Project will indirectly facilitate ongoing revenue streams to Federal (e.g. corporate income taxes), and direct tax and related revenues to State (e.g. royalties, payroll tax) and Local (e.g. rates) governments over the period of operation.
- The proposed Project, to a large extent, is a continuation of existing surface activities associated with the approved Newstan Colliery and Mandalong Mine operations. The majority of proposed operations and infrastructure

development are within existing development footprints. This facilitates management of impacts on land and water resources in the area.

- The net economic benefit of the Project for the State and regional communities is positive, at a net present value (NPV) of $334 million over the life of the Project. The benefit-cost ratio (BCR) for the Project is also positive (3.9). Under different sensitivity testing assumptions, the economics of the Project remain robust.
- There may also be some cumulative impacts resulting from the Project in the regional context, however the proposed activities are consistent with the current operations of Centennial's northern operations.
- With respect to the external impacts, Northern Coal Services and its specialist consultants are engaged in a continuous process of stakeholder consultation and development of management and mitigation programs. The intention of this process is to proactively address and ameliorate impacts to the satisfaction of affected communities, to the greatest practical 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
CPP:	Coal Processing Plant
DA:	Development Application
DGRs:	Director General's Requirements (NSW Department of Planning & Infrastructure)
DoE	Department of Environment (Commonwealth)
DTIRIS:	Department Trade, Investment, Regional Infrastructure & Services
EIS:	Environmental Impact Statement
EP&A:	Environment Planning and Assessment (Act and Regulation)
EVRI:	Environmental Valuation Reference Inventory
GHG:	Greenhouse Gas/es
GVA:	Gross Value Added
I/O:	Input/Output
LDP:	Licensed Discharge Point
LGA:	Local Government Area
LMCC:	Lake Macquarie City Council
LOM:	Life of Mine
Mtpa:	Million tonnes per annum
NCLP:	Northern Coal Logistics Project
NPV:	Net Present Value
OEH:	Office of Environment and Heritage (NSW)
PAA:	Project Application Area
PSNC:	Project Specific Noise Criteria
PV:	Present Value
REA:	Reject Emplacement Area
ROM:	Run of mine ('raw' coal)
SLA:	Statistical Local Area
SSD:	State Significant Development
tpa:	Tonnes per Annum
VE:	Value Engineering

1. ECONOMIC ANALYSIS AND IMPACT ASSESSMENT: PURPOSE AND APPROACH

Centennial Northern Coal Services Pty Limited (Northern Coal Services) proposes the Northern Coal Logistics Project (the Project) on the western side of Lake Macquarie approximately 140 kilometres north of Sydney in New South Wales (NSW). The Project comprises both a continuation of existing operations and an upgrade to the surface coal handling and preparation facilities at Newstan Colliery and Mandalong Mine - Cooranbong Entry Site (Cooranbong Entry Site), along with existing private haul roads and rail loading infrastructure. The facilities are integral to the on-going handling, processing and transport of coal from the underground workings of Newstan Colliery and Mandalong Mine (including the proposed Newstan Colliery Extension of Mining Project and Mandalong Southern Extension Project) into domestic and export markets.

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 Proponent is 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 (No. SSD 5145), 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).

On 20 March 2012, the Director General for the Department of Planning and Infrastructure issued revised Environmental Assessment Requirements (DGRs) for the Project under section 75F(3) of the EP&A Act. These DGRs were subsequently re-issued on 7 August 2013. These stipulate the provision of an economic

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

Table 1 – Northern Coal Logistics 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 9 Appendix 1
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 various 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 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 requires 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 Northern Coal Services Pty Limited (Northern Coal Services) is a wholly owned subsidiary of Centennial Coal Company Limited (Centennial). Centennial is a wholly owned subsidiary of Banpu Public Company Limited (Banpu).

Centennial has over 1,800 employees and is one of the largest underground coal producers in NSW. With coal mines supplying thermal and coking coal to domestic and export markets, Centennial is a major supplier to the NSW energy industry, fuelling approximately 40 percent of the State's coal-fired electricity. It has growing export capability, with approximately 40 percent of Centennial's coal being exported off-shore via the Port of Newcastle and Port Kembla in NSW.

2.2 Project Application Area description and background

The Project Application Area encapsulates approximately 503 hectares and, comprises:

- The existing Newstan Colliery Surface Site, encompassing the coal preparation and handling infrastructure, reject emplacement areas, water management infrastructure and rail loading infrastructure, near Fassifern. The exceptions to this are the mine ventilation shafts and ventilation fans, which form part of the Newstan Extension of Mining Project;
- The proposed extension to the Newstan Colliery Surface Site to accommodate new coal handling and processing infrastructure;
- The existing surface infrastructure at the Cooranbong Entry Site near Dora Creek, comprising the coal handling plant (CHP), coal stockpiles, workshop building and water management infrastructure. The exceptions to this are the mine ventilation shaft, ventilation fan and the Borehole Dam, which form part of the Mandalong Southern Extension Project;
- The existing Hawkmount Quarry comprising a disused quarry located immediately to the east of the Cooranbong Private Haul Road between Newstan Colliery Surface Site and Cooranbong Entry Site; and
- The existing Cooranbong Private Haul Road, Awaba Private Haul Road and Newstan-Eraring Private Haul Road, which link the Newstan Colliery Surface

Site, Awaba Colliery Surface Site, Cooranbong Entry Site and Eraring Power Station.

More detailed information on supporting infrastructure is contained in the Environmental Impact Statement.

2.3 Description of proposed Project

Northern Coal Services seeks a single new development consent for the Project to regulate the approved existing coal handling, processing and transport operations at the Newstan Colliery Surface Site, Cooranbong Entry Site and along the private haul roads, as well as to utilise existing and proposed new surface infrastructure. The primary components of the Project are to:

- Re-develop and upgrade the existing coal preparation and handling infrastructure at the Newstan Colliery Surface Site to enable continued utilisation for the receipt, handling and processing of up to 8 million tonnes per annum (Mtpa) ROM coal from the Newstan Colliery (up to 4.5 Mtpa), the Awaba Colliery (up to 0.88 Mtpa) and Mandalong Mine (up to 6 Mtpa);
- Continue to utilise the existing coal handling infrastructure at the Cooranbong Entry Site to enable the receipt, handling and processing of up to 6 Mtpa of ROM coal from Mandalong Mine;
- Increase the volume of coal transported from the Cooranbong Entry Site to Newstan Colliery Surface Site, via truck using existing private haul roads, from 4 Mtpa to up to 6 Mtpa;
- Increase the volume of coal transported from the Cooranbong Entry Site to Eraring Power Station, using the existing dedicated overland conveyor, from 4 Mtpa to up to 6 Mtpa;
- Increase the volume of coal transported from the Newstan Colliery Surface Site to Eraring Power Station, via truck using existing private haul roads, from 2 Mtpa to up to 4.5 Mtpa;
- Increase the volume of coal transported from the Newstan Colliery Surface Site rail loading facilities by train to the Port of Newcastle, Port Kembla and Vales Point Power Station for export from 3 Mtpa to up to 8 Mtpa;

- Continue to transport up to 0.5 Mtpa of middlings by truck via private haul roads from Newstan Colliery Surface Site to Cooranbong Entry Site for subsequent supply to the Eraring Power Station via a dedicated overland conveyor.
- Continue to transport up to 0.88 Mtpa of material (including coal and stone from construction activities undertaken as part of the Newstan Colliery Extension of Mining Project) by truck via private haul roads from the Awaba Colliery Surface Site to the reject emplacement areas at the Newstan Colliery Surface Site;
- Transport reject material from the Newstan Colliery Surface Site to the Newstan Colliery Northern Reject Emplacement Area (NREA), the Newstan Colliery Southern Reject Emplacement Area (SREA) and/or Hawkmount Quarry via existing private haul roads;
- Increase the volume of water discharged via licenced discharge points at the Newstan Colliery Surface Site and Cooranbong Entry Site;
- Provide employment for up to 120 full-time personnel;
- Provide a life of operation of 30 years from the granting of development consent; and
- Operate 24 hours per day, seven days per week.

2.4 Project Justification

The Project, in conjunction with Centennial's Mandalong Southern Extension Project and Newstan Extension of Mining Project proposals, stems from the long-term strategy Centennial has developed for its future operations in the Newcastle Coalfield to provide the infrastructure and flexibility required to meet future opportunities in both the domestic and export coal markets.

Newstan Colliery and Mandalong Mine represent a major component to the success of Centennial, producing approximately 50 percent of the company's annual run-of-mine (ROM) coal. The Newstan Extension of Mining Project proposes to extend Newstan Colliery's existing underground mining operations to access, develop and extraction additional coal reserves and increase the life of mine to 30 years from the granting of a new development consent. Similarly, the Mandalong Southern Extension Project proposed to extend Mandalong Mine's existing underground mining operations in order to access, develop and extract additional coal reserves and increase the life of mine to 25 years from the granting of a new mining lease.

The surface facilities of the Project, being the Newstan Colliery Surface Site, Cooranbong Entry Site, Hawkmount Quarry and the private haul roads, are integral to the on-going handling, processing and transport of coal from the underground working of Newstan Colliery and Mandalong Mine (including the proposed extension projects) into domestic and export markets. The objectives of the Project are:

- Allow for improved and flexible coal handling arrangements across Newstan Colliery and Mandalong Mine to deliver the range of coal products required to meet domestic and export markets demands;
- Maximise the use of existing surface infrastructure and equipment across Centennial's northern holdings;
- Secure increased employment and socio-economic flow-on benefits; and
- Continue to conduct coal handling, processing and transport operations in an environmentally responsible manner to ensure the potential for adverse impact is minimised.

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 Lake Macquarie LGA communities. Northern Coal Services has carried out a comprehensive internal financial appraisal of the Project and the alternatives to the proposed Project. The financial appraisal process and its outputs are highly commercially sensitive. As such this material is not considered suitable by the Company for presentation in a document which is intended for public exhibition and is excluded from this Economic Assessment on that basis. Northern Coal Services is in a position to provide this information on a confidential basis, as is provided for in the Planning NSW draft guidelines (2002) should this be required.

This Economic Assessment presents the costs and benefits to the State and regional communities, with corporate financial outcomes excluded. 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.

There will be direct economic effects associated with the operations of the Project over the 30-year life of the Project. Prominent among these effects is the impact of additional consumption and other economic activity induced by the incomes of the employees required for the Project's construction and operational activities, 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.

The infrastructure and services provided by the Project are key elements in the supply chain servicing domestic generators and export customers. In this regard it is important to note that although the flow of royalties and other taxes, rates and charges to public revenues cannot be directly attributed to the Project's operations, they are essential in facilitating market access. As such, the role of the Project in the national, state and regional economies is of strategic importance, as is reflected in the designation of the Project as State Significant Development (SSD).

As has been noted, Northern Coal Services has conducted internal analyses in order to determine the financial and economic feasibility of several project options, particularly different capital investment opportunities and infrastructure requirements. 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 Northern Coal Services in respect of the two most feasible Project options, and the continuation of operation on the current basis. 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.

3.2 Discussion of Project alternatives and determination of preferred Northern Coal Logistics Project proposal

In developing the preferred approach to the Project, there were a number of options available to Northern Coal Services. These chiefly related to determining the most efficient and effective operational model, supported by the appropriate infrastructure.

These options were assessed from the perspective of ecologically sustainable development stipulated in the legislation governing this Project (refer to Section 1). Through an internal project assessment process conducted by management, Centennial 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, four project alternatives were identified that met these feasibility requirements to varying degrees, with the final Northern Coal Logistics Project proposal being assessed as the best of these. The most feasible 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.

3.3 Project-related economic evaluation – Northern Coal Logistics Project (as proposed)

The benefit – cost analysis (BCA) focuses on the external benefits and costs of the Project as they relate to affected communities. Data presented in this section are present values (PV), at an assumed discount rate of 7 per cent, except as otherwise noted[1]. The Project has an estimated 'life' of 30 years, with the assumed timeframe for the project being 2015 to 2045 (including decommissioning and rehabilitation).

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 during construction activities. These incomes then support additional activity in other sectors of the economy;
- Salaries and wages paid to full time employees on the proposed Project, with similar flow-on effects to those noted above;

[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.

- Various State (e.g. payroll tax) and Local Government (e.g. council rates) taxes, rates and charges. These contribute to provision of further public goods, services and facilities.

Northern Coal Logistics operations will employ 120 FTE employees. Similar to Centennial's mines in the region, which the Project will support, these jobs will be the source of significant direct and derived economic benefit, and also have positive social and welfare benefits for the local communities in which these employees reside and spend a proportion of their incomes. At the peak of construction works up to 195 further positions will be created for construction contractors. These contractor positions also have positive extended economic benefit in the communities in which the employees reside.

Table 2 shows the valuation of these benefits, and the bases of the valuation for each. As noted, the Project also contributes to broader benefits, particularly in terms of public revenues associated with royalties and taxes, however these would be assessed in relation to direct mining operations, as opposed to these support functions and infrastructure.

The infrastructure upgrades and installation of the new infrastructure at the Newstan Colliery Surface Site will be progressively undertaken throughout the life of the Project as required to meet operational efficiencies and/or to ensure relevant air quality and noise amenity criteria are met. However, for the purposes of this economic assessment, the evaluation of additional construction-related employment assumes construction of all infrastructure will occur over a two-year period commencing 2015.

Table 2: Estimate of economic benefit – Northern Coal Logistics Project

Economic Benefit	Estimation assumptions	Estimate
Mine operation-stage additional/sustained employment.	Direct operations employment generated: 120 FTE positions. Construction contractor employment generated: 195 FTE positions.	Assessed PV ≈$381.6 million. Assessed PV ≈$23.3 million.
State taxes/Local Government rates & charges.	e.g. Payroll tax; land tax; council rates etc.	Assessed PV ≈ $26.9 million
Ecology impacts mitigation and compensatory measures.	Installation of Nest Boxes *Tetratheca juncea* translocation trial *Tetratheca juncea* research programme.	PV ≈ $250K
Project impact controls and mitigation and rehabilitation provisions.	Includes monitoring & mitigation activity, and clean water treatment plant operation	PV ≈ $12.9 million
On-site clean water diversion infrastructure construction.	One-off capital expenditure commitment relating to Newstan Colliery Surface Site.	PV ≈ $4.2 million
Total economic benefit	**≈ $449.1 million**	

3.3.2 Estimation of economic costs

The DGRs issued by the DP&I for the Project identify key issues that the EIS prepared for the Project must address. These relate to:

- Land resources;
- Water resources;
- Biodiversity;
- Heritage;
- Air quality;
- Greenhouse gases (GHG);
- Noise;
- Traffic and transport;
- Visual;
- Waste;
- Hazards;
- 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 9. The table also details prospective controls and mitigation measures proposed by Northern Coal Services 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 provide approaches which were the most appropriate for application to this Project as was achievable. In evaluating these social and environmental factors, it is observed that to the greatest achievable extent, infrastructure and operations have been contained to the existing infrastructure footprint. For example, new infrastructure will largely be developed on existing mine sites, and transport activity will be carried out using existing private haul roads.
- There remains an unquantified element of social impact. This may be described as the 'intrinsic value'[2] 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. It is noted that a number of specialist reports relating to the Project estimate no impacts, or very limited impacts. As a consequence, the valuations made in this report in respect of these specific matters may be considered as taking account of this less tangible aspect of impact.

[2] James Marshall & Co. (2013)

Table 3: Valuation methods – socioeconomic and biophysical impacts

Description	Methodology/Source of Valuation mechanism	Valuation measure/unit[3]	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	$79 - $208/dBA per annum (upper bound assumed for estimation)	Based on perceived changes in property valuations. Application based on number of potentially-affected receptors (1 residential receptor, 2.5 persons per household [Lake Macquarie West LSA, ABS Census 2011] ≈3 residents. Based on maximum predicted exceedance above background noise criterion (+2dBA). Upper bound applied in valuation.
Water resources, land and soil	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	$159/household per annum	Census 2011 data enumerates the number of households in Lake Macquarie West SLA as 22,552. Assumed from commencement of project works, 2015.
Traffic and transport	Evaluation included under other impact assessments	Not applicable	Air quality, noise and GHG emissions considered in evaluations for each of those impacts.
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	$250 - $1,165 per capita per annum (upper bound assumed for estimation)	Compliance with all air quality criteria at all receivers, dependent on implementation of all measures. Consequently, no air quality impacts are predicted.
Greenhouse gas (GHG)	Australian Government, Clean Energy Future http://www.cleanenergyfuture.gov.au/clean-energy-future/carbon-price/ [4]	$23 per tonne/$CO_2$-e	Assumes Scope 1 costs for proposed Project as assessed (141,306t CO_2-e in any one year). Fixed cost assumed over assessment period as a consequence of uncertainty regarding future pricing mechanism/s. Estimated to end 30-year project life

[3] All values adjusted by three percent per annum to allow for inflation.

[4] Despite the likely revocation of the carbon tax, the estimate above remains consistent with other comparative economies' carbon pricing assumptions, which were used to reference establishment of the carbon price (Garnaut, 2011).

Description	Methodology/Source of Valuation mechanism	Valuation measure/unit[5]	Comment on application
Cultural Heritage	1. Allen Consulting Group (2005): "Valuing the Priceless: The Value of Heritage Protection in Australia" – choice modelling/WTP.	$7.21 per capita p.a. for each 1,000 places protected	1. There will be no disturbance of heritage associated with the Project, consequently no impacts will result.
Biodiversity	Land & Water Australia (2005): *Making Economic Valuation Work for Diversity Conservation:* Australian Government Department of Environment & Heritage: - simulated market price/ WTP	$153/household per annum (preservation of 700 species –flora & fauna - VIC)	Implied cost of $0.22 per species. Applied to 2 threatened flora and 4 threatened fauna species identified in Project Application Area which may be affected. $1.32 per household p.a. 22,552 households (Lake Macquarie West SLA).
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	$1,075 - $1,371/Ha per annum (upper bound assumed for estimation)	One affected receptor residence in relation to Newstan site, therefore Project disturbance area at Newstan of 7.5Ha assumed.

[5] All values adjusted by three percent per annum to allow for inflation. Adjustments for exchange rates (as applicable) assume exchange rate at time of publication of report.

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, in relation to the majority of the estimated environmental effects are considered as being relevant to that part of the Lake Macquarie LGA located west of Lake Macquarie or for impacts such as noise and air quality, to specific receptors such as certain residences in close proximity to Project infrastructure and operational sites, as detailed in Table 3. The extent of the assessment area is shown in Figure 1. The estimates are detailed in Table 4. These assume commencement of works in 2015.

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

Figure 1: Lake Macquarie (West) Statistical Local Area

Source: Australian Bureau of Statistics[6]

[6] http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/110054655?opendocument&navpos=230

Table 4: Economic valuation of incremental social and environmental costs of the Northern Coal Logistics Project

Social/environmental cost	Estimation assumptions	Estimate of cost
Noise and vibration	Cost to community $1,285 (2015 estimate)	Assessed PV ≈ $21K
Water resources, soil and land	Cost to community $3,693,341 (2015 estimate)	Assessed PV ≈ $59.8 million
Air	Nil impacts predicted	Nil
GHG emissions	Cost to community $3,340,930 (2015 estimate)	Assessed PV ≈ $54.2 million
Heritage	Nil impacts predicted	Nil
Biodiversity	Cost to community $30,662 (2015 estimate)	Assessed PV ≈ $497K
Visual amenity	Cost to community $10,591 (2015 estimate)	Assessed PV ≈ $171K
Hazards (bushfire)	Nil	Nil
Economic valuation of social and environmental cost		**≈ $114.7 million**

3.3.4 Estimation of net economic benefit/cost

Table 5 displays the overall 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)	**$449 million**
Economic cost (PV)	**$115 million**
Net Present Value (NPV)	**$334 million**
Benefit-Cost Ratio (BCR)	**3.9**

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 $334 million dollars.

The benefits defined in the report exclude those to the corporate entities owning and operating the infrastructure. They are benefits and/or contributions to specific groups among the communities, such as employees, and to the community more broadly, in the form of addressing any impacts that may arise from the proposed Project. 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 Northern Coal Services 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** – **Continuation of current operations (business as usual or 'BAU').** This option had the advantage of avoiding capital costs, additional surface disturbance and associated impacts, and adverse environmental and social impacts. However, BAU operations do not have sufficient capability to service Centennial's planned mine production in the northern region. Furthermore, opportunities to improve safety and emissions impacts such as air quality and noise cannot be realised, as is the case with increases in economic activity and social contributions in the region.
- **Option 2** – **Proposed Northern Coal Logistics Project.** The Project will provide capacity to manage Centennial's planned mine production and realise operational efficiencies and benefits in the areas of safety and environmental performance (e.g. reduced requirement for use of mobile plant, resulting in lower dust and GHG emissions). From Northern Coal Services' internal perspective, the Project entails capital and operational cost increases, which are potential sources of benefit to the regional community, and the necessity to increase the surface disturbance area of the Newstan Colliery Surface Site and Hawkmount Quarry.
- **Option 3 – 'Value Engineering' of Preferred Project (Option 2) – 8 Mtpa**. This approach entails modifications to the proposed Northern Coal Logistics Project to reduce capital costs and surface disturbance on the Newstan Colliery Surface Site. This would result in lesser capability to deliver improvements in environmental performance, as operations would remain more strongly reliant on mobile plant.

- **Option 4 - 'Value Engineering' of Preferred Project (Option 2) – 6 Mtpa.** This option would further reduce capital and operations costs, and surface disturbance. This alternative would result in lower yields of thermal and semi-soft coking coal (each six per cent lower), increase output of waste material and reduce potential for safety and environmental performance improvements.

The preferred project (Option 2) is the most viable and preferred option, and is thus the proposed Project. The subsequent analysis demonstrates that the beneficial outcomes to the relevant communities are greater than are the costs, particularly those associated with the need to increase the disturbance area at Newstan and Hawkmount Quarry.

In order to fully assess all possible outcomes in relation to the Northern Coal Logistics Project, it is necessary to also consider the business-as-usual (BAU) case. The alternative in this instance is to continue operations using current infrastructure. The alternative options assessed by Northern Coal Services are clearly considered as being more efficient than that used at present. Table 6 provides a comparison of the three options and the BAU case.

Some of the effects of the BAU case, such as the economic effects of incomes for the current 75 employees can be estimated from internal data and assumptions. However, estimation of the environmental impacts is more problematic. For example, given the long history of mining at Newstan Colliery, it is impractical to calculate a meaningful estimate for impacts such as those on biodiversity. As a consequence, the BAU estimates for these impacts in the analyses reported in Table 6 are proportionally based on the coal handling capacity of the existing coal logistics system (i.e. 4 Mtpa). A similar approach is taken for the 6 Mtpa 'value-engineered' option. In each instance, the three project option cases comprise the BAU plus the incremental impacts associated with each.

Table 6: Sensitivity analysis of impacts – Project options - adjusted discount rates (NPV)[7]

Project option component	Discount Rate 4% $M	Discount Rate 7% $M	Discount Rate 10% $M
Option 1 (BAU) estimated social and environmental cost	88	57	40
Option 1 (BAU) estimated State, regional and local benefit	340	218	150
Option 1 (BAU) estimated NPV	252	161	110
BCR	3.9	3.8	3.8
Option 2 (**NCLP**) estimated social and environmental cost	264	**172**	120
Option 2 (**NCLP**) estimated State, regional and local benefit	957	**613**	423
Option 2 (**NCLP**) estimated NPV	693	**442**	303
BCR	3.6	**3.6**	3.5
Option 3 (VE 8Mtpa) estimated social and environmental cost	263	172	120
Option 3 (VE 8Mtpa) estimated State, regional and local benefit	674	433	299
Option 3 (VE 8Mtpa) estimated NPV	411	261	179
BCR	2.6	2.5	2.5
Option 3 (VE 6Mtpa) estimated social and environmental cost	220	143	100
Option 3 (VE 6Mtpa) estimated State, regional and local benefit	428	276	191
Option 3 (VE 6Mtpa) estimated NPV	208	133	91
BCR	1.9	1.9	1.9

The analyses in Table 6 comprise two components. Firstly, the different options are based on changes in capacity assumptions for each option. The second element is the adjustment for discount rates.

Comparison of the three columns for each option permits review of the changes in discount rate assumptions. Under the sensitivity assumptions recommended in various NSW Planning and Treasury documents, it is apparent from the BCRs, that the BAU case and the preferred Project are similar, with the alternative project options being less attractive in terms of the balance between socioeconomic benefits and costs. Comparing all four options on the basis of the centre (7 per cent) column,

[7] In Table 7, the Northern Coal Logistics Project is abbreviated to NCLP. 'Value engineering' options are abbreviated to 'VE'

illustrates the difference in outcomes on the basis of throughput capacity of the coal logistics system. Again, the BCRs are comparable for the BAU and preferred Project cases, and lower for the other two project options. Although the BCR for the BAU case is marginally higher, the NPV of the preferred Project option is clearly superior.

3.5 Direct employment impacts of the Northern Coal Logistics Project

The Project will provide employment for 120 FTE positions. Information gathered by Centennial Coal indicates that the majority of current, and it is expected additional employees, reside in the Lake Macquarie region. These positions therefore have positive direct and indirect effects on local and regional economies and communities.

4. EXTENDED ECONOMIC IMPACT ANALYSIS

4.1 Approach

This analysis identifies and, where appropriate, quantifies the broader impacts of the Project. The effects of the stimulus provided to regional and broader economies by direct construction and operating activity and the additional impacts are then considered. This analysis is then extended to the application of multipliers to quantify the extended benefit/cost relativities of the proposal.

4.2 Regional context

As is the case with the contiguous Hunter and Central Coast LGAs, Lake Macquarie is a large and diversified economy. Mining and related industries are important elements of the regional economy. It is noted that these associated industries range from suppliers of goods and services, to the large and specialised transport and logistics sector which services the coal industry.

4.2.1 Lake Macquarie City Council Economic Development Documents

The Lake Macquarie City Council (LMCC) website notes that mining accounts for two (2) percent of employment in the LGA. The website also states that mining has historically been a key part of the regional economy and that '*mining and mining-related businesses are still intrinsic to the region's economic strength*'. Additionally, the presence of significant coal-fired electricity generation infrastructure (Eraring and Vales Point power stations) and associated distribution infrastructure may be considered as demonstrating the requirement for coal production in order to maintain services.

4.2.2 Community information, consultation and impact assessment

Within the local communities (in particular Fassifern and Awaba), Centennial Coal is described as being a source of change to the local environment. For example, residents of Fassifern and Blackalls Park and others with an interest in LT Creek (for example the LT Creek Sustainable Neighbourhood Committee), described changes to the environment over the years, including additional dust and pollution of LT Creek.

A survey undertaken by the LT Creek Sustainable Neighbourhood has identified reasons that residents like living in the area, which are:

- Peace and quiet;
- Proximity to lake, creeks, and bush land;
- Proximity to amenities; shops, doctors etc.; and
- Having good neighbours.

It was also identified that the most important environmental issues in the neighbourhood are:

- Litter;
- Siltation, water pollution, and urban run-off ;
- Mining and air pollution; and
- Storm water and drainage infrastructure.

Along with LT Creek, dust and noise generated from the mines' operations and those along the haul roads and rail corridors have also been raised as concerns. Despite the mines' long histories, the change in the composition of residents (i.e. people moving into the existing residential area for lifestyle reasons and areas where new residential development is occurring) is creating the potential for land use conflict, regardless of approvals that are in place and whether Centennial Coal is the cause of the identified changes.

A long term consultation strategy has been employed for Centennial Coal's activities throughout its northern region. The potential for social impacts has been identified as an outcome of this consultation and assessed against the elements of the Project

including the various specialist reports prepared to support the Environmental Impact Statement (EIS). As a result the primary stakeholder groups are defined as:

- Any resident whose property will be directly impacted upon by the location of infrastructure. Impacts include visual, noise, odour, access, etc.
- Change in general social amenity brought about by noise, dust, air quality and visual impacts, even if residents are not directly impacted upon.
- Reduced access to previously publicly accessible areas.
- Residents and groups who have been impacted upon by the existing operations of Newstan who will experience impacts from the proposal. This includes Blackalls Park and Fassifern residents and interest groups such as the LT Creek Sustainable Neighbourhood Committee.

The potential for change to the social amenity of the area caused by the Project relate to be noise, air quality, water quality and visual impacts. This is because:

- The Project is largely a continuation of existing surface activities associated with the approved Newstan Colliery and Mandalong Mine operations.
- The only additional surface disturbance proposed is two relatively small areas at the existing Newstan Colliery Surface Site (7.5 hectares) and the existing Hawkmount Quarry (13.9 hectares). All other existing and proposed operational areas within the Project Application Area are already highly disturbed and developed.
- Noise, air quality and visual impacts will exceed the Project Application Area boundary.

The SIA has found that the overall impact of the Project is generally contained within the Project Application Area. There is:

- No requirement to purchase property as a means of managing impact on social amenity.
- Generally no impact on surrounding land use.
- No notable change is predicted to the social and economic profile of the community except for the potential for incidental economic benefit via localised spending as a result of construction related employment / ongoing employment.
- No change to the social fabric of the area.
- No change to how residents or visitors utilise the area.

Social impact relates to the degree of change that is brought about by the Project. These impacts may be real or perceived. For example, despite noise and air quality criteria being met, any change to the environment that is brought about by noise and dust is usually regarded by affected residents as an adverse impact. Residential social amenity is sometimes defined by the intrinsic value that residents (and visitors) place on an area – i.e. what factors have attracted residents to live in the area and are these factors adversely impacted upon as an outcome of the Project. These factors include but are not limited to the residential and rural character, existing land use, access to services and facilities and visual amenity. The valuation methods applied in this report are intended to take into account the subjective and individualised nature of these intrinsic values, which otherwise may not be adequately considered.

4.3 Extended economic impacts

An estimate of the extended economic impacts associated with the proposed construction works at Newstan Colliery Surface Site and the ongoing operations of the Project 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 economy[8]. There are certain limitations to the application of I/O multipliers. These are also acknowledged by ABS[9]. 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) [10] 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 7.

[8] 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*;
[9] For example ABS Cat No 1301.0, *Year Book Australia, 2002*
[10] *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 >

Table 7: 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 components of income to labour, plus the gross operating surplus of the corporate entity, which is directly attributed to the mines serviced by the Project, as opposed to the Project itself. Due to the foreign ownership of Centennial's mines and associated infrastructure, 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 identified[11]. These are relevant for assessment of the impacts of the initial stimulus associated with the construction works required for the Project, which will require up to 195 contract employees at peak construction.

Table 8: 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. 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 may 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

[11] 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.

employment supported in the broader economy as a result of the demand for additional goods and services generated by 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). These principles are reiterated in the Project DGRs. This report adopts a 'triple bottom line' approach to 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 9.

Tables 3 and 4 respectively identified the bases for quantifying the environmental impacts identified in the DGRs, and the relevant estimates for the Project. Table 9 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 employed by Northern Coal Services in managing and mitigating the externality impacts of the Project.

Table 9: Economic Impact Assessment – Summary Table

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Northern Coal Logistics Project construction & operations **Consultant: Aigis Group**	The project will result in an overall positive economic contribution at a State, regional and also at the local community level.	Direct existing positions maintained beyond current mine approval: 120. Assessed PV (all positions): ≈ $188 million. Construction phase contractor employment 195: PV ≈ $23.3 million. Additional state/local government taxes, rates & charges: PV ≈ $33 million Additional economic activity in regional economy associated with mine and employee expenditure. Economic and employment contribution of mining in local economy acknowledged in LMCC documents.	Negative impacts not anticipated in respect of economic outcomes.	Nil required

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Soil and land capability **Consultant: SLR Consulting**	Study Area 1 (Newstan disturbance area) is characterised by remnant vegetation that has not been previously used for agricultural purposes. Study Area 2 is a relict council quarry and is classified as 'Disturbed Terrain', indicating the land is not suitable for agriculture due to severe limitations associated with previous disturbance. The assessment found no biophysical strategic agricultural land within the Study Areas.	Majority of disturbance areas located on degraded land, reducing significant expansion beyond existing industrial footprints.	Notional cost to the community: $3,693,341 per annum (2015 price) as per combined estimation methodology in Table 4. PV: ≈ $58.9 million	**Prospective Controls:** Project design elements. **Mitigation Measures:** Refer to Section 5, Soil and Land Capability Assessment

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Water resources **Consultant: GHD**	The potential impacts of the Project were identified to be associated with the management of increased groundwater and the need to keep underground storages at a managed low level. To mitigate discharge via LDP017, an increase of 3 ML/day is required to be discharged from LDP001 at Newstan Colliery Surface Site totalling a predicted 14.5 ML/day discharge requirement from LDP001 at Newstan Colliery Surface Site as a result of the Project. Additionally, increased discharges through LDP001 at the Cooranbong Entry Site and the current discharge average of 1.59ML/day is proposed to increase to an average of approximately 8 ML/day by the end of mining in 2036. Downstream assessments of water quality and aquatic ecology from LDP001 at the Newstan Colliery Surface Site indicate that the Main By-Wash Dam is a sufficient mixing zone for mine water discharge from LDP001 and that Site Specific Trigger Values are generally met at the outlet of the Main By-Wash Dam (WMP3). The management of the existing Fassifern underground storage located at Newstan is unlikely to affect the existing surrounding licenced groundwater bore users with minimal drawdown prediction.	Piping of LT Creek around CHPP to avoid impacts on water quality (2015): $2,298,148 Construction of clean water diversion drainage infrastructure around additional stockpile area (2015): $2,482,760 Annual treatment of ground and surface water to improve water quality prior to discharge (2014): $400,000	Notional cost to the community of possible impacts: $3,693,341 per annum (2015 price) as per combined estimation methodology in Table 4. PV: ≈ $58.9 million	**Prospective Controls** 1. Piping works downstream of the By-Wash Dam will likely reduce the deterioration in water quality at monitoring points SP003, SP004 and WMP7. 2. Newstan Colliery has commissioned a conventional water treatment plant at Newstan to treat all water prior to discharge at LDP001. **Mitigation Measures** 1.Increased retention of underground mine water will assist in the reduction of metal concentrations discharges 2. Monitoring of water quality, water quantity and macrointerverbrae are to be continued focusing on discharges from Cooranbong Entry Site, and the monitoring of the environment downstream of the site around Muddy Lake. 3. Potential construction phase impacts to be mitigated through erosion and sediment control plans, monitoring and appropriate construction staging.

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Biodiversity **Terrestrial Ecology** **Consultant: RPS**	**TERRESTRIAL ECOLOGY (FLORA & FAUNA):** The Project will result in approximately 21.4 Ha of disturbance, of which 12.63 Ha is already cleared/disturbed and 8.75 Ha of remnant native vegetation in varying condition. The project is likely to remove potential habitat for threatened fauna species Four threatened fauna species and two threatened flora species were recorded. As a result of the redesign of the Project to avoid impacting threatened flora, one individual of *G. parviflora* and 376 clumps of *T. juncea* will be removed within the proposed disturbance area at the Newstan Colliery Surface Site. Three EECs occur or are likely to occur within the riparian zone downstream of Hawkmount Quarry. Surface water assessment indicates that changes are not substantial enough to cause modification to the ecosystems or morphology of the downstream watercourses.	Refer to Section 7.1 (avoidance measures), Flora & Fauna Assessment. Benefit to community of mitigation and compensatory measures strategy PV: $250K	Notional cost of possible loss of biodiversity (upper bound) 2015: $30,662. PV: ≈ $497K	**Prospective controls:** Refer to Section 7.1 (avoidance measures), Flora & Fauna Assessment. **Mitigation Measures:** Refer to Section 7.2 (mitigation measures), Flora & Fauna Assessment.

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Heritage: **Consultant:** **RPS**	There are three historic heritage items identified in, or partially within, the Project Application Area. These items listed in the Lake Macquarie Local Environment Plan 2004 (Schedule 4) are: a section of the Great Northern Railway; Eraring Power Station; and Bat Alley (part of the Newstan Colliery potential archaeological site). These historic heritage items, while in the PAA, are outside the disturbance areas and will not be impacted by the Project. There is one Aboriginal heritage site identified within the Project Application Area, being a scarred tree at Hawkmount Quarry. Northern Coal Services has committed to undertaking all appropriate measures to protect this Aboriginal site from the development works and, as such, the Project does not pose a risk of harm to the site.	N/A	No disturbance of Aboriginal or historic heritage sites. No cost to community anticipated.	**Prospective Controls:** Avoidance of AHIMS 45-7-0324 Employees and contractors appraised of their obligations under the relevant legislation (heritage induction). **Mitigation Measures:** Suspension of works and conduct of survey should any Aboriginal or European heritage items be assessed.

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Air **Consultant: SLR Consulting**	The dispersion modelling exercise for the Project indicates that annual deposited dust, TSP, PM_{10}, $PM_{2.5}$ and 99^{th} percentile odour concentrations were unlikely to exceed relevant criteria. 24-hour average PM_{10} may exceed criterion at one receptor, however infrastructure upgrades will be undertaken to ensure compliance at this receptor for all operational scenarios.	Monitoring and mitigation activities included in annual works associated with Environmental Management System. Total PV ≈ $12.9 million	Compliance with all air quality criteria at all receivers, dependent on implementation of all measures. Consequently, no air quality impacts are predicted.	**Prospective Controls & Mitigation Measures:** Refer to Section 8.9, Air Quality Impact Assessment.
GHG **Consultant: BDM Resources**	The primary sources of scope 1 GHG emissions for the Project are fugitive emissions from coal stockpiles and diesel fuel combustion for transport and stationary energy purposes. It has been calculated that the annual scope 1 emissions for the Project are 141,306 tonnes of carbon dioxide equivalents per annum (t CO_2-e pa) (assumes a maximum of 8Mtpa of coal stockpiled per year). Over a life-of-project (LOP) of 30 years this equates to 4,239,180 t CO_2-e.	Monitoring and mitigation activities included in annual works associated with Environmental Management System. Total PV ≈ $12.9 million	Assumed cost of $23/tonne CO_2-e. Notional cost per annum of Scope 1 emissions (2015): $3,340,930 PV: ≈ $54.2 million	**Prospective Controls and Mitigation Measures:** The Project will use the latest in coal handling technology and management practices to achieve a highly efficient operation. By virtue of design, every opportunity has been taken to capture economically viable efficiency improvements.

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Noise & Vibration **Consultant:** **SLR Consulting**	The rail noise levels associated with the Project are predicted to increase the day LAeq(15hour) by up to 0.7 dBA and night-time LAeq(9hour) by up to 1.1 dBA. This negligible noise level increase will not be noticeable by most people. The noise modeling results demonstrate that once the mitigation measures to the existing CPP and transfer tower are completed, the Project can continue to operate with manual loading of trains with the only minor exceedances predicted at one receptor at night during a temperature inversion. All other Project elements within criteria. As modeling has been undertaken based on a worst case operational scenario, these exceedances are not predicted to occur all the time.	Monitoring and mitigation activities included in annual works associated with Environmental Management System. Total PV ≈ $12.9 million	Notional cost to one (1) affected residential receptor based on maximum increase above background noise criteria (+2dBA), (2015): $1,285. PV: ≈ $21K	**Prospective Controls** A real time noise monitor is currently being installed. The real time noise monitor is currently scheduled to be operational in 2014. **Mitigation Measures** Refer to Section 15, Noise and Vibration Impact Assessment.

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Traffic and transport **Consultant: Intersect Traffic**	Based on this traffic impact assessment it is recommended that the Northern Coal Logistics Project can be supported without any requirement for upgrading of the external road network. Additional traffic generated by the Project will not adversely impact on the efficiency and safety of the local road network around the Project Application Area.	All coal transport activity associated with the Project will occur on the existing rail lines to the Port of Newcastle, Port Kembla and/or Vales Point Power Station, as well as existing privately owned infrastructure e.g. haul roads, conveyors. Therefore the transportation of coal will not have any impact on the local and State road networks in the vicinity of the PAA.	Potential notional and actual costs to community captured in noise, air, and GHG emissions estimates. Additional rail trips will have an impact on the local road network in the vicinity of level crossings at Glebe Road Adamstown and Clyde Street Hamilton. Impact cannot be quantified as this is dependent on timetabling determined by City Rail and RailCorp NSW. Resolution of this issue may require a regional solution, which needs to be considered at a more strategic planning level than for individual projects.	**Prospective Controls:** Nil required **Mitigation Measures:** Nil required

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Bushfire Risk **Consultant: Kleinfelder/ Ecobiological**	The forest vegetation surrounding the Project sites has the potential to support maximum fire intensity and to put at risk the safety of staff and attending emergency personnel, as well as the potential to damage the integrity of the constructions. The most common form of [site-related] ignition in the area would be sparks generated from hot works and plant/equipment used in construction activities (e.g. exhausts and sparks of vehicles, maintenance works such as welding or landscape management). Actions of employees and contractors, and malfunctioning equipment and motors may also result in fire ignition.	Establishment of Asset Protection Zone; maintenance of vehicles, plant and equipment; training and supervision of staff minimise the likelihood of a fire event originating in the PAA and/or operational areas.	No impacts or costs anticipated.	**Prospective Controls:** 1. Establishment of an Asset Protection Zone. 2. Identifying safe access & egress 3. Identify water supplies and access services for firefighters 4. Incorporate above into Emergency Management Systems.

Impact	Environmental Assessment Commentary	Social and Economic Benefits	Social & Economic Costs/impacts	Description of Environmental Controls & Mitigation Measures
Visual **Consultant: Green Bean Design**	The Project will have a low to negligible impact on private residential dwellings beyond the PAA, due to screening influence of sloping and ridgeline landforms, and moderate to dense tree cover. The magnitude of potential landscape effect associated with the Project has been determined as low A single rural residential dwelling has existing views across portions of the Newstan Colliery Surface Site, including the approved SREA. Views toward proposed infrastructure associated with the Northern Coal Logistics Project will occur, and be partially mitigated, within the context of the existing Newstan Colliery Surface Site.	Containment of the majority of the Project on existing operational footprint will result in reduced impacts on existing receptors.	Notional cost to community of continued presence of existing and new infrastructure (2015): $10,591 per annum. NPV: ≈ $171K	**Prospective Controls/ Mitigation Measures:** 1.The colour and texture of new structures in the Project Application Area should be dark in tone and utilise non-reflective materials where possible. This would potentially minimise the visual contrast. 2. Lighting associated with the Northern Coal Logistics Project should be designed to avoid direct line of sight from areas surrounding the site where possible. 3. Where feasible and practical, landscape works such as shrub and tree planting would be undertaken to increase the level of existing screening potential to proposed project infrastructure within the Project Application Area, including planting along Miller Road.

4.5 Summary

There are several sources of benefit associated with the proposed Project. From the perspective of Northern Coal Services and the Centennial mines that it will service, there is commercial benefit with associated with delivering coal to customers. Similarly, the workforce required for the Project will also benefit those employees' households. In addition, 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 activity of these employees in local and regional economies. There is also social and economic benefit to the broader state and national economies. These benefits relate to royalties and taxes that will flow to government and ultimately to the provision of public services and goods.

The external impacts reported in Table 9 must also be considered in the context of similar industrial usage in the area. Although there are issues to be considered in terms of cumulative impacts (section 5), the Project is consistent with existing mining and power generation activity in the immediate area of western Lake Macquarie. As a result of the Project planning 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.

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 Relevant projects

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

As a service provider to Centennial's mines in the region, the Project forms part of those operations. It should also be recognised that the Project, to a large extent, is seeking a continuation of existing surface activities associated with the approved

Newstan Colliery and Mandalong Mine operations. To the extent that the Project extends coal handling and transport activity, there is the potential to contribute to the cumulative impacts of these other operations. The extents of expected impacts in the context of these other operations are advised in the specialist reports forming part of this EIS. Also included in those reports, and outlined in Table 11 are the range of proposed prospective controls and mitigation measures and commitments that will be employed on the Project's various infrastructure sites to manage any impacts generated, thus limiting any incremental contribution to cumulative impacts where possible.

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, employees on the Project's operations and construction activity and their households will directly benefit. Other individuals and businesses in the regional and State economies will indirectly benefit from derived consumption and direct expenditure by Northern Coal Services. These broader derived benefits are discussed in preceding sections.

As the Project has a forecast 'life' of 30 years, it will be a source of long-term employment opportunities in the region. These will result in positive wealth impacts over the longer-term resulting from this employment, including accumulation of assets such as residential property and superannuation. These can positively affect the long-term economic stability of Northern Coal Services' 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 managed and/or mitigated by Northern Coal Services to the greatest practicable extent. As is identified in the assessment of these non-financial impacts, Northern Coal Service has evolving policies and procedures in place to ensure that management of impacts takes into account the most current and effective technologies and practices.

6. CONCLUSION

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 Project is positive. With respect to environmental impacts, to an extent the Project replicates existing operations. However, as is substantiated in the specialist reports and the quantitative and qualitative analyses in this report, Northern Coal Services has largely confined additional infrastructure (i.e. re-development and upgrade of the Newstan Colliery Surface Site and use of Hawkmount Quarry as a rejects emplacement areas) to existing development/disturbance footprints.

This approach to minimising environmental impacts should be considered in combination with the beneficial economic and social contributions of the Project. The positive stimuli that the Project will provide in the local community and through the economic and export activity it will facilitate in the broader economy, support a conclusion that the net social, economic and environmental impacts of the Project to the local, regional and NSW communities, and to the national economy, will also be beneficial.

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Appendix 1: Comparative economic analysis of project alternatives Northern Coal Logistics Project 2015-2045[12].

Assessment component	Option 1 BAU (NPV) $'000	Option 2: Preferred NCLP (NPV) $'000	Option 3: VE 8Mtpa (NPV) $'000	Option 3: VE 6Mtpa (NPV) $'000
Operational and construction employment	187,652	**569,454**	397,721	248,141
State Government taxes	11,472	**20,782**	11,995	4,344
Local Government rates & charges	6,095	**6,095**	6,095	6,095
Biodiversity mitigation and compensation	0	**250**	0	0
Project impact controls and mitigation commitments	12,940	**12,940**	12,940	12,940
Project water impacts mitigation infrastructure	-	**4,175**	4,175	4,175
Estimated Social, Economic and Environmental benefit	**218,159**	**613,697**	**432,926**	**275,696**
Noise	10	**21**	21	17
Water resources, soil and land capability	29,903	**59,806**	59,806	44,855
Air	-	**-**	-	-
GHG emissions	27,049	**54,099**	54,099	40,575
Heritage	-	**-**	-	-
Biodiversity	248	**497**	248	248
Visual amenity	86	**171**	86	86
Estimated Social, Economic and Environmental cost of Project	**57,296**	**114,594**	**114,260**	**85,782**
Add BAU costs	**-**	**57,296**	**57,296**	**57,296**
NET ESTIMATED SOCIAL, ECONOMIC AND ENVIRONMENTAL BENEFIT/ (COST)	**160,863**	**441,807**	**261,370**	**132,618**

[12] At discount rate of 7 per cent. NCLP: Northern Coal Logistics Project; VE: Value Engineering.