New Acland Coal Mine Stage 3

Rapid Social Benefit-Cost Analysis

March 2015

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Executive Summary

This report presents the results of a rapid social benefit-cost analysis (SBCA) of a proposal by New Hope Group to develop a new coal mine in the Darling Downs region of southeast Queensland. The proposed mine will extend the operating life of the existing New Acland Coal Mine, which is due to close in 2017 when the resource becomes depleted. The proposed mine is estimated to enable mining to continue for another 12 years out to 2029.

The objective of the SBCA is to identify the major impacts of the mine from 'pit to port', quantify these impacts in dollar terms where possible, identify how benefits and costs are distributed across different stakeholders groups, and to draw evidence-based conclusions about the relative magnitude of impacts. Owing to the rapid nature of the assessment, costs and benefits assessed as minor are not included in the analysis.

The analysis draws on information contained in the Environmental Impact Statement approved by the Coordinator General and supplementary data from other sources where necessary.

The analysis finds that the project is expected to yield a positive Net Present Value (NPV) of $1.68 billion based on 'best bet' values for coal price, exchange rate, input costs and coal production. Net operating revenue from the mine dominates the benefits, and is estimated to be $1.73 billion NPV.

To be clear the NPV is an estimate of the additional value to the community if the project proceeds. How this benefit is distributed is not assessed. For example, we have not included royalty payments as a benefit although revenues to government are often advocated as benefits of mining projects. A royalty does not generate an economic benefit. The development and operation of the mine creates the economic benefit. Royalties and taxes determine the allocation the net impact among different stakeholders such as mine owners and all three levels of government.

While there are some negative impacts associated with the project (some of which are valued in the analysis and others that are assessed qualitatively), these are not sufficiently large to change the overall net positive result. Costs assessed as being material include:

- Greenhouse gas emissions ($27 million)
- Temporary displacement of agricultural production and impairment of the land for some agricultural enterprises following ($36 million)

While material, the costs imposed by the above impacts are not large when assessed in context to the size of benefits expected to be generated by the project.

Concerns have been raised in submissions to the EIS over certain environmental impacts that may arise as a result of the revised project, including increased noise and dust levels. Based on the information provided in the EIS, these impacts are not considered to be material. While a small number of properties surrounding the mining site may be affected, the mitigation measures to be implemented by NAC are expected to neutralise the impacts. Any residual impacts that may not neutralised by the mitigation measures are expected to be small. Also, the relocation of the rail loadout facility to a site further away from Jondaryan will reduce the dust and noise impacts for the town.

Similarly, there may be community concerns over the potential drawdown of groundwater. However, given that relatively few bores are expected to be affected and that NAC is committed to restore yields to landowners through bore modification, this is not considered a significant impact.

It is expected that most of the environmental and social impacts will be neutralised as a result of the mitigation measures proposed by NAC, although there may be a small, residual impact.

A sensitivity analysis was undertaken on the results, revealing that the coal price, exchange rate, mine output and mine operating costs are the major determinants to the overall estimated economic impact of the project. Although some variables can have a major impact on the NPV, in all cases the NPV remains positive. The lowest NPV for any sensitivity test is $468 million.

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Figures and Tables

1 Introduction

Synergies Economic Consulting (Synergies) has been engaged by the Department of Natural Resources and Mines (DNRM or 'the Department') to prepare a rapid Social Benefit-Cost Analysis (SBCA) to assess the overall impact of a proposed mine development on community wellbeing.

The Environmental Impact Statement (EIS) submitted by the proponent (New Hope Group), and approved by the Coordinator General, which contains information on an array of environmental, social and economic impacts. While the EIS presents insights about the nature and scale of impacts, there is no unifying framework adopted to compare costs and benefits with and without the mine.

The purpose of the rapid social benefit-cost analysis is to identify the major impacts of the mine from 'pit to port', quantify these impacts in dollar terms where possible, identify how benefits and costs are distributed across different stakeholders groups, and to draw evidence-based conclusions about the relative magnitude of impacts.

Nature of the proposed mine project

The proposal involves the development of a new coal mine (Acland Stage 3) in southeast Queensland's Darling Downs region, 177 km west of Brisbane. The proposed mine has an expected annual output of 7.5 Mt. It will extend the operating life of the existing New Acland Coal Mine, which is currently producing 5.2 Mt per annum but is due to close in 2017 when the resource becomes depleted. The proposed mine is estimated to enable mining to continue for another 12 years out to 2029.

The benefits of the proposed mine arise due to the retention of mining-related jobs, regional income, net operating revenues, royalties and so on. Further, because the annual output of the mine is somewhat greater than the existing mine, the economic contributions of the proposed mine would more than offset the loss in economic activity following the closure of the existing mine.

Against these benefits is a number of negative impacts, some more material than others. This rapid assessment focuses on the subset of impacts that are most significant, in terms of having a substantial impact on community wellbeing. For market impacts (changes in prices and costs for impacted parties) we draw on information contained in the EIS. For non-market impacts (social, environmental and public health) we determine significance using a set of guiding principles and criteria. Further details of our methods and assumptions are contained in chapter 2.

The report is structured as follows:

- Chapter 2 describes the methodology and assumptions applied in the analysis;

- Chapter 3 describes the key impacts of the revised Project and presents the results of the analysis;
- Chapter 4 discusses the sensitivity of the results; and
- Chapter 5 presents the key findings.

2 Methods and assumptions

2.1 Methodology

Costs and benefits of the project are evaluated using a standard, social benefit-cost framework. The evaluation constitutes a rapid application of SBCA that aims to identify (and value in dollar terms where possible) just the major impacts as opposed to a more detailed, comprehensive assessment of all impacts.

The evaluation involves the following steps:

- Baseline definition – conceptualise a relevant 'without project' baseline against which to measure the impacts of the project
- Impact identification
  - Tabulate and describe all the impacts identified in the EIS
  - Identify any additional impacts not represented in the EIS
  - Organise into costs and benefits
  - Distinguish between market and non-market impacts
  - Summarise key information contained in the EIS relating to each impact
  - Identify which stakeholder groups or industry sectors are impacted
- First pass assessment of those impacts that have greatest potential significance
- Valuation of significant market impacts
- Qualitative assessment of non-market impacts, noting those of greatest significance
- Consolidation of annual benefits and costs (those ascribed a dollar value) over a 15 year timeframe to produce an estimate of the net benefits of the project to the Queensland community in 2015 dollar value.

Further details of these steps are presented below.

2.1.1 Baseline for evaluation

When assessing economic impact of the proposed mine, the relevant baseline is a regional economy that is likely to retract as the existing mine closes. Thus, the economic value of the proposed mine is to prevent this retraction. Because output of the proposed mine is somewhat greater than the existing mine, the proposed mine

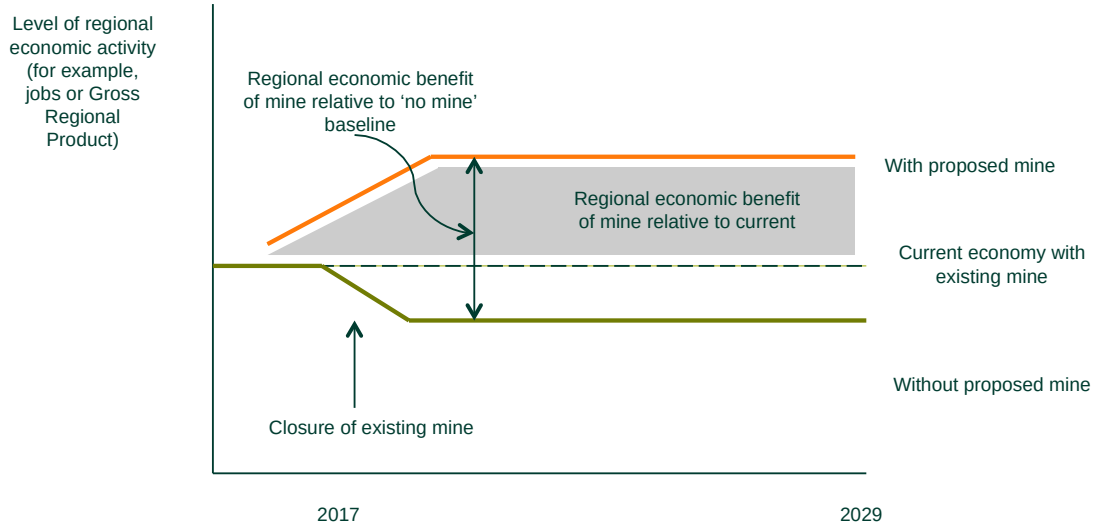
should more than offset the loss in economic activity associated with closure of the existing mine when its resource is depleted.

Given the above context, it is important to evaluate economic impact of the proposed mine relative to a "no new mine" scenario, which requires an understanding of what the regional economy of the Darling Downs would look like should the mine not proceed and the existing mine close. It is expected that the region would revert to a predominantly agricultural-based economy should the mine not proceed.

A conceptual diagram of regional economic output (measured either in terms of gross regional product or employment) under the "with mine" and "without" scenarios is presented in Figure 1. Also shown is the current level of economic output or activity in the region. The shaded area shows the impact of the mine relative to current conditions. The area between the "with" and "without" mine scenarios is the total impact.

To demonstrate why it is important to model the impacts using the correct baseline, consider the effect that the new mine will have on employment and the social impacts of this. Some of the "new" jobs created by proposed mine in the operational phase will actually be a carry over of existing workforce. This means that impacts on the *current* local property market (in terms of pushing up property prices and rental values) may only be minimal and reflect only the *additional* demand for housing because the demands of existing workers have already been factored into the housing market. However this does not represent an accurate picture of property market impacts if the mine does not proceed. The complete impact should be measured based on the accommodation demands of the total workforce employed directly and indirectly by the project, because in the absence of the project the current workforce could not be retained as the existing mine is scheduled to cease operations in 2017.

Figure 1 Conceptual diagram of economic impact with and without the proposed mine



Note: Scenarios are conceptual representations and are not based on actual data
Data source: Synergies

2.1.2 Impact identification

The second step of the process involved a review of the EIS to collate summary information on the nature, type and incidence of impacts arising from the project. Impacts were categorised as being either a cost or benefit of the project (relative to the 'without mine' baseline).

Many of the social and environmental impacts are difficult to evaluate in monetary terms because changes in the quality or supply of environmental goods and services (or cultural, public health, social cohesion and so on) are not traded in markets and therefore values and prices are not observable. Alternative techniques must be used to determine how the community values the impact of changes in these goods and services resulting from a project. For the purpose of this rapid analysis, non-market impacts are mostly assessed qualitatively (see section 2.1.4 for further information on our approach).

2.1.3 Valuation of market impacts

Values for market impacts were estimated based on information contained in the EIS and secondary sources of information, where necessary. Values were either taken directly from the EIS (where appropriate) or calculated.

2.1.4 Assessing the significance of non-market impacts

A number of criteria were used to gauge the significance of non-market impacts:

Cost of mitigating the impact

If the project is expected to cause significant environmental damage that will require rehabilitation to 'acceptable community standards', then this may be used as proxy for the dollar impact on community value (equivalent to the loss in community wellbeing had the damage been left untreated). However if mitigation costs are already accounted for in the project capital and operating budget, care needs to be taken not to double count by including mitigation costs as a cost of environmental damage. Only the residual impacts that may arise after mitigation works are undertaken should be counted.

Physical scale

All else being equal, large changes in the provision of non market goods or services are likely to be more relevant than small changes. For the rapid assessment, Synergies took the physical scale of impact cited in the EIS into account when assessing overall significance.

Proximity of impacts to population centres

As a general rule, non-market impacts that occur near to a population centre will have a greater impact on community wellbeing than those that occur in remote locations. This is particularly the case for "use values", which by definition require people to visit the site to derive value from the non-market good or service. Community value is usually underpinned by people having a degree of familiarity with the good in question, so people residing at great distance from the affected environmental resource are less likely to be familiar with the resource and therefore hold lower values for it.

Size of population affected

The individual (per person) values held for an impact may be small but if thousands of people are affected, the aggregate impact could be large. Therefore it is important to assess the approximate size of population that is likely to be affected by a resource use change.

Presence or absence of substitutes

Previous non-market valuation studies have demonstrated that community values for environmental and social impacts are highly context-dependent. For example, if a mining project causes the closure of a nearby bush reserve previously used for recreation, this may impose significant non-market costs on the local community if there are no other, similar areas of bush for public recreation nearby. Alternatively, if many substitutes exist the impact may be quite minimal.

2.1.5 Consolidation of impacts

A project Net Present Value (NPV) calculated using the costs and benefits that were valued in 2015 dollar terms. The NPV measure represents the discounted sum of annual benefits and costs over the entire timeframe for the analysis (15 years). A positive NPV indicates that the project is expected to generate an overall increase in net welfare (subject to the non-priced intangible impacts not exceeding this amount). The expression net welfare means that while some stakeholder groups may be adversely affected, overall the Queensland community will be better off with the change than without the change.

2.2 Assumptions

Key assumptions underpinning the analysis are as follows:

- Synergies has based its analysis on technical information contained in the EIS. We have not reviewed the accuracy of this information;
- The existing mine will close in 2017 and the proposed mine will operate until 2029;
- The proposed mine will utilise much of the existing road, rail, handling and port infrastructure that is in place – but with additional capital expenditure required for some extra facilities to transport equipment and coal from the location of the new mine site;
- The proposed mine will utilise the existing workforce employed in the New Acland Mine, plus hire additional employees during the construction and operating phases (given the larger scale of the proposed mine);
- Labour for the operating phase will be sourced mostly from the local region, with only a small proportion of the workforce recruited from outside of region (other areas of the State). During the construction phase a larger proportion of the workforce will be recruited from out of region;
- Labour availability in the region is relatively constrained, with an unemployment rate of just 4.6%;
- New Acland Coal will construct a new 8 km rail spur and balloon loop as well as a new rail load-out facility to support transportation of coal off-site. Coal is currently transported off-site by trucks travelling approximately 17 km from the mine to the Jondaryan Rail Load-out Facility, which is located at a siding loop near Jondaryan off the Western Rail Line. The new rail load-out facility is planned to be located more than 8 kilometres northeast of Jondaryan, at the southern end of the new mining lease application for New Acland;

- The construction of the new rail spur and balloon loop is necessary to be able to support the increased production rate of up to 7.5 Mtpa from the revised project. The maximum number of trains will increase to 80 per week from a current maximum of 53 per week. This increased activity may require upgrades to the Western Rail Line;
- Timeframe of 15 years for the cost-benefit analysis; and
- All Net Present Value (NPV) calculations assume a real discount rate of 7%. The values in the project period are in real 2015 dollars. Values from years prior to 2014 have been inflated to 2014 dollars. The inflation rate for this estimation is assumed to be equal to the mid-point of the RBA inflation target band (2.5%). The benefits and costs have been modelled using calendar years.

3 Description and assessment of impacts

This chapter sets out the results of the rapid cost-benefit assessment. We start by categorising the types of impacts using a cost-benefit framework, and identifying the parties affected (positively or negatively) by the project. This is followed by an assessment of significance of each impact, either in terms of dollar values or qualitatively. The last section presents results of the Net Present Value calculation.

3.1 Overview of project impacts

Table 1 Categorisation of project benefits and costs

Impact type	Description	Parties impacted
Economic		
Benefits		
Net operating revenue of mine	Gross revenue from coal sales less all capital and operating costs associated with the mine, transport and handling.	Dividends to shareholders Taxes to Commonwealth Government Taxes and Royalties to Queensland Government
Value-added to supporting businesses	Economic surplus that accrues to input suppliers.	Input suppliers to the mine, including materials, services, downstream rail and port infrastructure services and so on.
Household income and consumption	Potential economic benefits to households from higher labour income.	Mine employees Businesses servicing additional household consumption
Costs		
Higher labour costs to competing industries	To the extent that labour supply in the region is fixed, additional demand for labour will push up the cost of labour.	Industry sectors that compete with the mine for labour – e.g. agriculture, manufacturing, retail and hospitality
Higher property rental values	The direct and indirect employment generated by the mine will increase the demand for accommodation in the region. This may push up property prices.	Households and businesses that are renting property
Requirement for additional public infrastructure and services	There may be a requirement for additional public infrastructure and services (health, education, roads, recreation etc.) to meet the needs of a higher regional population (relative to a no mine base case).	State, federal and local governments
Opportunity cost of agricultural land temporarily taken out of production	The site occupied by the mine will not be available for agricultural cropping, grazing or piggeries over the duration of the mine's life. The land will also incur an impairment cost as it will only be able to support grazing after mine closure.	Rural landholders
Water resource impacts	The mine will reduce groundwater availability for some landholders through aquifer drawdown.	Rural landholders, irrigators
Environmental and public health and safety costs		

Impact type	Description	Parties impacted
Greenhouse gas emissions	The construction, operation and decommissioning of the mine will increase the level greenhouse gas emissions.	Society
Air quality	The level of dust will increase in areas surrounding the mine and rail infrastructure.	Rural landholders, residents along the Western Rail Line.
Noise and vibration	The level of noise will increase in areas surrounding the mine and rail infrastructure.	Rural landholders, residents along the Western Rail Line.
Flood risk	The mine will increase flooding potential on some privately owned land, but mostly on land owned by the Acland Pastoral Company.	Rural landholders, Acland Pastoral Company
Terrestrial ecology	The construction of the mine requires clearing of vegetation and habitat.	Individuals that hold value for the preservation of terrestrial ecology
Aquatic ecology	Lagoon Creek receives discharges from the Mine as part of the Water Infrastructure Management system (regulated by the conditions set out in the mine's Environmental Authority).	Individuals that hold value for the preservation of aquatic ecology
Visual amenity	Some residences near the site will overlook the Project. There will also be a glow in the night sky visible from the surrounding region.	Rural landholders, residences in surrounding region
Social and cultural costs		
Cultural heritage impacts	The mine site will have no direct effect on cultural heritage places.	No parties impacted
Social impacts	There may be adverse social impacts including decreased housing affordability and increased commuter traffic resulting in congestion and inconvenience.	Residents of local communities, employees

3.2 Significance of benefits

3.2.1 Net operating revenue

One of the primary benefits of the project is the net revenue generated by the mine, which equal to gross revenue from sale of coal less all capital and operating costs incurred by the project, but before taxes and royalties. Net revenue (or profit) is subsequently distributed to shareholders (in the form of dividends), royalties and payroll tax to State Government, and company tax revenue to the Commonwealth Government.[1]

[1] These transfers do not affect the net impact of the project as they represent distributional impacts. If the revised project does not go ahead, the Commonwealth and Queensland governments will forego these income streams.

The calculations and assumptions used to estimate net revenue are presented below.

Gross revenue

Projections of annual gross revenues from the project are not contained in the EIS. Therefore, annual revenue has been estimated based on assumed annual production volumes and forecast coal prices. The project is assumed to increase production volumes gradually from 2017 to reach a level of 7.5 Mtpa in 2019, which is maintained until the end of the project.

Projected coal prices are based on the World Bank Commodities Price Forecast for Australian coal.[2] Since exchange rate forecasts for the project period are not publicly available, the historical 20-year average (Jan 1995 – Dec 2014) based on monthly exchange rates published by the Reserve Bank of Australia has been used to convert the price forecasts to Australian dollars.

On the basis of these assumptions, the present value of gross project revenue is $6.1 billion. A sensitivity analysis around the mine output, coal price and exchange rate is undertaken in chapter 4.

Capital costs

Capital costs associated with the construction of the project are contained in the EIS. The costs have been spread over the life of the project based on an assumed expenditure profile.[3] The majority of the capital costs occur in 2015, 2016 and 2017. Costs incurred post 2017 represent "sustaining capital" expenditures and on-going fleet capital expenses. Total capital costs are estimated to be approximately $767 million in present value terms.

Operating costs

Operating costs are provided in the EIS. As for capital costs, the operating costs have been spread over the life of the project based on an expenditure profile provided in the EIS.[4] The present value of operating costs is approximately $3.6 billion.

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[2] World Bank Commodities Price Forecast, Released: January 22, 2015, available from: http://www.worldbank.org/content/dam/Worldbank/GEP/GEP2015a/Price_Forecast.pdf

[3] The yearly expenditure profile is given on p. 19 of Chapter 17 (Economics) of the EIS.

[4] The yearly expenditure profile is given on p. 19 of Chapter 17 (Economics) of the EIS.

Estimated present value of net revenue

Based on the above cost and revenue information, the net profit to the project is estimated to be $1.747 billion in 2015 dollar terms. This is calculated by subtracting $3.57 billion in operating costs and $767 million in capital costs from a gross revenue of $6.084 billion (all expressed as present values).[5]

3.2.2 Benefits to input suppliers

Businesses supplying goods and services to the mine are direct beneficiaries of the project. The relevant benefit measure is the economic surpluses generated by these businesses. An approximation of these surpluses is the "indirect value added" estimate provided in the EIS (which was derived from an Input Output model).[6] This value is $2.5 billion in nominal terms. Synergies does not have access to the original model output so it is not possible to convert this to an annual value added and discount to a present value. Also Input Output models are known to significantly overstate impacts. Nevertheless, the EIS estimate indicates that the indirect value added benefit is likely to be significant after adjusting for the inherent deficiencies of Input Output model estimates.

Rail and port infrastructure owners and operators

The project will utilise the services of rail and port infrastructure providers to transport coal from mine to port. These service providers stand to benefit from the additional coal throughput, in the form of payments made by New Acland Coal for use of rail and port services. If the mine does not proceed, throughput would be considerably less. The significance of the proposed mine to the rail and port operators is discussed below.

The coal will be transported on the Western Rail Line to the bulk handling facility at the Port of Brisbane. The bulk handling facility is operated by Queensland Bulk Handling (QBH), a subsidiary of New Hope Group. The current capacity of the QBH Terminal is 12 Mtpa, with a stockpile capacity of 0.9 Mt of which 0.6 Mt tonnes are allocated to New Acland Coal (NAC). According to NAC, this is sufficient to meet the project's annual export requirements. A small percentage of coal will be distributed locally via the road network.

[5] Total project expenditure is $4.3 billion in present value terms, while the expenditure estimate cited in the EIS is $6.6 billion in nominal terms. The difference is due to discounting, which accounts for the time value of money.

[6] Value added is equal to the gross value of business sales less all variable costs less fixed costs, but excluding from fixed costs any payments to land, capital and owner operating labour.

The export throughput at QBH in 2013-14 was 7.9 Mtpa.[7] There are three coal mines currently using the terminal; the existing Acland mine, the Jeebropilly mine, and the Cameby Downs mine. If the revised Project does not go ahead there will be a reduction of throughput at the bulk terminal of approximately 5.2 Mtpa from the cease of operation of the existing New Acland coal mine.[8] While the lower level of throughput will reduce the terminal's operating costs, this is likely to be more than offset by loss in revenue from port charges, resulting in a net loss to QBH. The QBH may attempt to offset the loss by increasing port charges, however this is considered unlikely WQBH will be able to do this based on the competitiveness of the thermal coal market.

There is no obvious immediate demand for the available capacity at the bulk handling facility after cessation of the existing New Acland mine. Two proposed projects; the Collingwood Coal project and the Taroom Coal project by the North Surat Coal Pty Ltd,[9] are located in the Surat Basin and may utilise the QBH for export of coal in the future. However, the projects are currently in the approval process and unlikely to start operations within the assessment period of this report given the current coal prices and the longer haul to the port.

The Western Rail Line is part of the South West System (SWS) operated by Aurizon. In 2012-13, the SWS hauled 8.8 million tonnes of coal and 0.6 million tonnes of freight, demonstrating that coal is the main commodity hauled on this corridor. The other commodities include cotton, grain and livestock. Metropolitan passenger services also operate on this network, which is owned by Queensland Rail.

There are only two coal companies that currently utilise the SWS to transport coal to the Port of Brisbane; New Hope Coal (New Acland and Jeebropilly mines)[10] and Yancoal Australia (Cameby Downs mine).[11] Considering that the product coal from the New Acland Coal mine is 5.2 million tonnes per annum, the closure of this mine will significantly reduce the amount of coal transported on the SWS.

While the SWS would lose a significant proportion of the coal hauled if the proposed project does not proceed, other customers may fill the gap in the future. However, as described above, the two projects that are currently proposed in the region are unlikely to commence operation in several years.

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7 New Hope Corporation Limited (2014) Quarterly activities report 31 July 2014.

8 5.2 Mtpa is the maximum production of product coal at the existing mine.

9 Expected production of up to 6 Mtpa (Collingwood Coal project) and 8 Mtpa (Taroom Coal project).

10 New Hope Coal's New Oakland mine was closed down in early 2013.

11 Peabody Energy Australia used to operate in the region, however the company closed its Wilkie Creek mine in December 2013.

In conclusion, the closure of the existing mine if the revised Project does not go ahead will result in unutilised capacity for both rail and port infrastructure, a gap which is unlikely to be filled by other customers in the near future.

3.2.3 Benefits to households and consumers

The project will generate higher household income in the region as employment increases directly or indirectly by the additional mining activity. The relevant benefit measure for input to the cost-benefit analysis is the additional consumer surplus generated from the expenditure of this income. The economic modelling undertaken for the EIS does not estimate this measure. However, given that the mine is projected to provide 435 full time jobs at the peak of operations (mostly located in the region) and generate up to 1144 indirect jobs in mining-related businesses throughout Queensland, it is likely that the benefits to households will be significant (notwithstanding the fact that the 1144 indirect jobs derived using an Input Output model is likely to be an overestimate).

3.3 Significance of costs

3.3.1 Higher labour costs

The economic impact analysis contained in the EIS identifies the potential risk of rising labour costs for other businesses as a consequence of the mine but no modelling is undertaken to assess the materiality of this risk.[12] The EIS concludes that businesses competing with the mine for labour could experience higher labour costs, due to the relatively low unemployment rate in the region at the time of the study (4.9%) and the resulting effect of labour demand by the mine pushing up wages.

Synergies' view is that the mine will not have a significant impact on wage inflation because in an open region such as the Darling Downs, the mine will be able to attract labour from outside the region. Furthermore, the labour market has become less constrained since the EIS study was undertaken (due to fewer development projects progressing in the region).

3.3.2 Higher property rental costs

The EIS identifies a potential risk of property values increasing as a result of migration of people into the local area. While higher property values represent a capital gain to

[12] Chapter 17, page 32

property owners, rental tenants (households and businesses) would experience higher accommodation costs. On this matter, the EIS concludes that: "significant impacts on property values are not expected since the majority of the labour force during operation is expected to be sourced locally. Construction workers that are sourced from outside the local study area are not expected to relocate to the region".[13]

Synergies concurs with the view expressed in the EIS, at least in terms of changes in property values from current day levels. However, the real effect of the project will be to keep property values at their current levels for longer – as opposed to the 'without mine' scenario whereby the loss of 400 or so direct jobs (plus indirect jobs) in the local area may reduce property prices.

3.3.3 Requirement for additional public infrastructure and services

The revised Project will employ up to 260 workers during the construction phase. It is expected that 80% of the construction workers are sourced remotely and 20% from the regional study area. The operation of the mine will employ up to 435 workers. This is an increase of 135 employees compared to the existing New Acland mine. It is expected that 95% of the additional operational workforce will reside within the regional study area while 5% will be sourced remotely. As public infrastructure in the region is built a level of capacity sufficient to service the current population, only the impact of the additional workers has been considered.

The influx of remote workers during the construction phase may place additional demand on the public infrastructure and services in the region. However, in terms of public services it is unlikely that increased investment from local and state governments will be required as public services are 'lumpy' and likely to be able to handle a small increment in additional demand. The impact during the operational phase is expected to be minimal as the majority of workers are expected to be sourced within the region and likely to commute from their current residences. In terms of public infrastructure, there may be some additional road damage from increased traffic on local roads.

Overall, the revised project is expected to only have a minimal impact on public infrastructure and services in the region.

[13] Chapter 17, page 34

3.3.4 Opportunity cost of agricultural land

The revised project will result in lower agricultural output from cropping, grazing and piggeries. The foregone value from agricultural production (gross value) of was estimated in to EIS to equal $2.4M ($March 2014) per year. There is also an agricultural opportunity cost after the project is decommissioned due to the land being returned to a state suitable only suitable for grazing (not cropping or piggeries). The impact is estimated at $30.3M ($March 2014) in total in the EIS.

It should be noted that the use of gross values overstates the opportunity cost of agricultural land as it does not take into account the costs to the farmers.[14]

Based on the EIS estimates,[15] the estimated present value of the foregone value from agricultural production is $36 million.

3.3.5 Water resource impacts

The groundwater impact assessment found that groundwater drawdown will occur as a result of the revised Project, with the largest impacts occurring to the Walloon Coal Measures and Tertiary Basalt aquifers. The drawdown in these aquifers are predicted to be 5 m up to a 3 km boundary to the west of the project. While there will be some recovery of the groundwater level after decommissioning of the project, it will remain below pre-mining conditions in the long-term.

The drawdown of groundwater levels may affect rural landholders by reducing the amount of groundwater available for use in irrigation, stock watering or domestic use. Groundwater drawdown may also adversely affect attributes of the groundwater ecosystem valued by the community.

Certain private bores will experience a reduction in water level. The predicted drawdown from the project is between 1 and 2 meters in 37 bores and more than 2 meters in 40 bores. These bores are on property owned by approximately 50 landholders. The revised Project is not predicted to have a detrimental effect to the groundwater quality. NAC has made a commitment to provide 'Make Good' arrangements for users affected by the groundwater drawdown by providing alternative water supplies (e.g. by deepening existing bores or installing new bores).

[14] 'Gross value' is defined as the value placed on production at the wholesale prices realised in the market place.

[15] For consistency in the analysis, the EIS estimates were inflated to $2015 values using an assumed inflation rate of 2.5%.

No Groundwater Dependent Ecosystems (GDEs) have been identified within or adjacent to the revised Project site. However, people in the community may feel a loss from a permanent reduction in groundwater level resulting from the project.

The impact resulting from the revised Project on groundwater has not been quantified in this analysis. However, based on the high-level assessment above, this is an impact of low significance given that relatively few bores are expected to be affected and that yields can be restored to landowners through bore modification.

3.3.6 Greenhouse gas emissions

Annual greenhouse gas (GHG) emissions resulting from the project have been estimated and are documented in the EIS. The EIS has considered emissions from the following sources:

- combustion of diesel in mining equipment and trucks
- consumption of electricity
- production of coal - fugitive emissions from open cut coal mining
- land clearing.

GHG emissions associated with coal consumption have been excluded from the analysis.

The current operation of the mine is estimated to result in GHG emissions of 128,615 tonnes CO2-e annually. The estimated GHG emissions from construction and operation of the revised Project are presented in Table 2.

Table 2 Greenhouse gas emissions from the revised Project

Phase of revised Project	T CO2-e
Construction	39,664
Operation	2,378,004

GHG emissions are likely to cause undesirable impacts on environment, economies and societies. The purpose of assigning a price on GHG emissions is to incorporate the costs of such external impacts in the benefit-cost analysis. Taxes on emissions and prices in emissions trading schemes are designed to, ideally, reflect the marginal damage cost caused by one extra unit of emissions.[16] The prices in emissions trading

[16] Bowen, A (2011). The case for carbon pricing. Policy brief, December 2011. Available from: http://www.lse.ac.uk/GranthamInstitute/publications/Policy/docs/PB_case-carbon-pricing_Bowen.pdf [Accessed 27 November 2013].

schemes have recently tended to cluster below US$12 per tonne of CO2 emitted.[17] Thus a price of carbon of US$12 per tonne of CO2 (A$15.75/t CO2) is considered appropriate for this analysis. Using this carbon price, the estimated present value of the costs associated with greenhouse gas emissions is $27 million.

3.3.7 Air quality

The revised Project will result in increased level of dust from a variety of sources including mining, coal transportation, mine and infrastructure construction, decommissioning of mining areas and infrastructure, exhaust emissions and nitrous oxides from blasting. However, the decommissioning of the Jondaryan Rail Loadout Facility and removing the coal stockpiles include a reduced potential for dust and noise impacts at Jondaryan.

The air quality impact assessment of the EIS identifies 44 locations which have the potential to be impacted by air emissions from the project (sensitive receptors). The sensitive receptors around the revised Project are generally residences.

Air dispersion modelling for the revised Project has predicted air quality will exceed the target level in the *Queensland Environmental Protection (Air) Policy 2008* (EPP (Air)) at 6 of the 44 sensitive receptors. NAC has proposed a comprehensive air quality management strategy to manage potential air quality impacts from the revised Project. Provided NAC successfully implements this management strategy, the revised Project is expected to comply with the ambient air quality objectives in the EPP (Air).

Additional rail movements from the revised Project may increase the level of fugitive coal dust emissions along the rail line. However, this is considered unlikely due to the design of the Train Loadout Facility (TLF) which will include a veneering system and other features intended to reduce potential coal dust emissions. Furthermore, a South West System Coal Dust Management Plan (CDMP) has been prepared by South West System (SWS) supply chain members to mitigate and manage coal dust on the South West System rail corridor.

Overall, based on information contained in the EIS, it would appear that the proposed mitigation measures to be adopted by NAC will reduce the potential effects of the mine on air quality to a level where this is no longer a material impact in terms of health risk and cost to the community. If the mitigation costs are included in the project expenditure used to calculate net revenue, then the cost of this impact is included in our analysis.

[17] World Bank Group

3.3.8 Noise and vibration

Similarly to the impact on air quality, the project will result in an increased level of noise from construction and operation of the mine, as well as along the rail line. The level of noise associated with the Jondaryan Rail Loadout Facility is expected to decrease as the load-out facility is moved further away from Jondaryan.

Noise guidelines in Queensland are specified in the Environmental Protection (Noise) Policy 2008 (EPP (Noise)). The noise impact assessment found the revised Project is expected to comply with the objectives in the EPP (Noise) by implementing noise management and mitigation measures including reduced night time operation and using attenuated equipment.

Rail noise levels from the rail spur and balloon loop are predicted to be below the Queensland Rail noise criteria. Furthermore, noise impacts associated with the construction of the rail spur and balloon loop are expected to be minimal because construction will occur in during the day and the separation distances between construction activities and the sensitive receptors.

A number of submissions to the EIS raised concerns with noise impacts associated with the transportation of product coal along the West Moreton rail line. The noise impact assessment determined that rail noise impacts comply with the Queensland Rail criteria. Based on the above, there is a potential that increased noise levels as a result of the revised Project will create some nuisance to residents along the West Moreton rail line and the impact is considered of low significance.

3.3.9 Surface water

The project site is located within the Lagoon Creek catchment of the greater Condamine River catchment. NAC is not proposing to divert or alter the Lagoon Creek channel. Controlled discharges to the environment of mine impacted water will be limited in frequency and duration and are not expected to adversely affect water quality, aquatic ecology and downstream water users.

The development of flood protection levees (to protect the mine's pit areas from flooding) and the rail spur for the project will result in an increased flooding potential. This would largely affect land owned by the New Hope Group's Acland Pastoral Company and is not expected to have a significant impact on the existing flood regime. A parcel of 0.5 ha of privately owned land is predicted to experience increased flood potential (150 mm for the 1 in 100 Annual Exceedance Probability). The project is not predicted to increase flooding in Jondaryan.

While the flooding may result in lower productivity of the affected land, the impact resulting from the project is considered of low significance for community wellbeing due to the limited extent of the impact and the low number of people affected. NAC is also currently in discussions with the owner of the affected parcel of land regarding this impact and will seek to reduce this impact to zero through detailed design or through a compensation agreement with the land owner. It is concluded that increased flood risk is not a significant impact.

3.3.10 Terrestrial ecology

The project will result in clearing of 142.9 ha of remnant vegetation. This will impact:

- Nine regional ecosystems, of which three are listed as 'endangered' and five are 'of concern';
- Two threatened ecological communities; and
- The Koala (there will be clearing of some Koala habitat) and the Grey-headed flying fox.

The community may hold value for preserving natural habitat and leaving the terrestrial ecology undisturbed, which can be estimated through surveys asking people how much they would be willing to pay to avoid habitat loss. However, for the purpose of this rapid BCA, community value for habitat loss has not been estimated.

While there will be clearing of vegetation and habitat for the project, there will be many areas of equivalent remnant vegetation left unaffected. Furthermore, NAC is committed to mitigate the adverse impacts on flora and fauna by creating a biodiversity offset, relocating threatened species, and rehabilitating disturbed areas. These mitigation measures are unlikely to completely eliminate the environmental impacts of the revised project. Nevertheless, the residual impact is considered to be of low significance.

3.3.11 Aquatic ecology

The aquatic ecology study area is located downstream of the Mine in Lagoon Creek and receives discharges from the Mine as part of the Water Infrastructure Management system (regulated by the conditions set out in the mine's EA). Lagoon Creek supports a low diversity of macroinvertebrates, which is similar to other systems impacted by high levels of disturbance from clearing and agricultural land use. The ecological and physical status of Lagoon Creek is classified as 'poor' to 'very poor'.

The Endangered, Vulnerable and Near Threatened (EVNT) species Murray Cod, or its potential habitat, was identified within a 25 km radius. However, the presence of Murray Cod in Lagoon Creek near the study area is considered unlikely.

NAC has proposed mitigation strategies to provide a suite of management actions to avoid or minimise the potential impacts of the project and to maintain the aquatic values of Lagoon Creek. The incremental impact of the project is expected to be minimal.

3.3.12 Visual amenity

The project will alter the existing environment during excavation and removal of vegetation. The visual amenity impact assessment found that 8 of 44 sensitive receptors would have an expansive view of the works of the project. Sensitive receptors within Acland would also have views of the project site due to its proximity, but mitigation measures such as vegetation screening will minimise visual impacts.

Primarily, traffic on Oakey-Cooyar would have the highest level of visibility over the project site. However, as the traffic is considered as a temporary receptor, impacts are considered to be minor.

Night lighting is expected to create a glow in the night sky that will be visible from the surrounding region and nearby residences. However, as the Mine already provides some luminance in the night sky, it is unlikely that the revised Project will substantially increase the existing visual impact of night time glow. The impacts on fauna from night lighting are expected to be minimal due to the location and extent of remnant vegetation.

Based on the small number of residences affected, the low severity of the impact and the mitigation measures proposed by NAC, the impact of the project on visual amenity is considered of low significance.

3.3.13 Cultural heritage impacts

The EIS identified 12 cultural places located in and surrounding Acland. One of these is the Acland No.2 Colliery, which is also registered as a place of heritage value on the Queensland Heritage Register. The project will not directly impact any of the identified cultural places. To satisfy its obligations as an owner of a Queensland Heritage listed site, the NHG has developed the Acland Colliery Conservation Management Plan for the Acland No.2 Colliery.

As required under the *Aboriginal Cultural Heritage Act 2003* (ACH Act), NAC has prepared a cultural heritage management plan (CHMP). NAC has also committed to

cultural heritage awareness training for all personnel and contractors throughout the revised project. The project is not considered to adversely impact cultural heritage as the revised project will not directly affect the identified cultural sites and NAC has mitigation measures in place.

3.3.14 Social impacts

The EIS identifies some potential adverse impacts on the local community as a result of the project including decreased housing affordability, increased commuter traffic and deterioration of roads. NAC is proposing to implement management measures to help reduce the potential impact on employees and nearby communities.

The potential negative impacts on the local community as a result of the revised Project are considered to be minor due to the relatively small incremental increase in workers and activity compared to the current situation.

3.4 Results of rapid Social Benefit-Cost Analysis

Table 3 summarises the net impact of the project on the Australian economy generally and the disaggregation of that impact by major stakeholder groups.

Table 3 Social Cost-Benefit analysis of impacts

Impact	NPV (million)
Mining net revenue	$1,747
Foregone use of agricultural land, including impairment	-$36
Greenhouse gas emissions	-$27
Total Net Impact	**$1,684**

This analysis demonstrated the proposed project will result in a net increase in social welfare of $1,684 million in NPV terms. To be clear this is the estimate in dollar terms of the additional value to the community if the project proceeds. How this benefit is distributed is not assessed. For example, we have not included royalty payments as a benefit although revenues to government are often advocated as benefits of mining projects. A royalty does not generate an economic benefit. The development and operation of the mine creates the economic benefit. Royalties and taxes determine the allocation the net impact among different stakeholders such as mine owners and all three levels of government.

The impacts described in chapter 3 that have not been quantified are generally considered of low significance provided that NAC appropriately implements the mitigation measures described in the EIS.

The costs of these mitigation measures should be included in the project costs. Otherwise, the costs of potential adverse environmental and social impacts would not be represented in the overall assessment of the impacts of the project.

A disaggregation of project costs is not publicly available and it has been assumed for the purpose of this analysis that mitigation costs are included in the project costs. It should be noted that if this assumption is incorrect, the cost of the project has been understated. Nevertheless, the aggregate cost of these unpriced impacts are unlikely to offset the large positive NPV presented in Table 3 above. A sensitivity analysis of the quantified results of the analysis is given in chapter 4.

Table 4 illustrates how the revised Project will affect different stakeholders.

Table 4 Stakeholder impacts

Stakeholder	Description of impact	Net Impact	
		Positive	Negative
Resource owner	Shareholders will benefit from the project by the value of the expected net revenues	✓	
Local community	The local community will benefit from employment opportunities, economic growth, enhanced opportunities for existing businesses to supply the project, and new businesses for the local community. The Jondaryan Rail Loadout Facility is also move further away, reducing the level of dust and air pollution to the local community. While there might be certain negative impacts on the local community such as – among other factors - additional pressure on infrastructure and services and potential negative impacts on some landholders near the mining site, the net impact on the local community is expected to be positive.	✓	
People impacted by climate change	There is a negative impact from increased greenhouse gas emissions.		✓
Existing land users	The major land use in the mining lease area is grazing and homesteads. There is a negative impact to the extent that some existing land users cannot use the land as they currently do during mining.		✓
Other regional industries	Opportunities exist for other industries to supply inputs to the project.	✓	
Port and rail infrastructure providers	Providers of port and rail infrastructure services will benefit as a result of the additional revenue associated with the increased tonnages of coal that will be transported in the region.	✓	
Queensland Government	The Queensland Government will benefit directly from the revenue generated from the scheme and by the contribution of the scheme to its development objectives for the region.	✓	
Commonwealth Government	The Commonwealth government benefits through increased taxation revenue.	✓	

4 Sensitivity analysis

The sensitivity analysis was undertaken in relation to the following parameters:

- discount rate;
- coal prices;
- exchange rate (used to convert coal price forecasts to AUD);
- total mine life output;
- mine operating costs; and
- mine capital costs.

The results of the sensitivity analysis are discussed below. The coal price, exchange rate, mine output and mine operating costs are the major determinants to the overall estimated economic impact of the project. Although some variables can have a major impact on the NPV, in all cases the NPV remains positive. The lowest NPV for any sensitivity test is $468 million.

4.1 Discount rate

The sensitivity of the overall NPV to adjustments in the discount rate is presented in Table 5. The results show that the discount rate does not have a significant impact on the overall project NPV.

Table 5 Discount rate - percentage change in overall project NPV

Parameter	Base Value	Minimum value	% Δ	Maximum value	% Δ
Discount rate	7%	4%	33.66	10%	-24.83

4.2 Coal prices

The assumed coal price in the analysis are based on the World Bank Group commodity price forecasts. The NPV is sensitive in response changes in the coal prices. A 20% decrease in prices would lower the NPV by 72.23%. Correspondingly, an increase in prices by 20% would increase the NPV by 72.23%. The data series of coal prices for the different scenarios are given in Table 6.

Table 6 Coal prices – sensitivity analysis

Year	-20%	Base value $/mt ($US2015)	+20%
2015	57.4	71.7	86.1
2016	58.7	73.3	88.0
2017	60.0	75.0	90.0
2018	61.5	76.9	92.3
2019	63.0	78.7	94.5
2020	64.5	80.7	96.8
2021	66.2	82.7	99.2
2022	67.7	84.6	101.6
2023	69.3	86.7	104.0
2024	71.0	88.7	106.4
2025	72.6	90.7	108.9

Note: Price assumed constant from 2025 onwards

4.3 Exchange rate

Changes to the exchange rate would significantly affect the NPV of the revised Project. Due to lack of information on expected future exchange rate values, a 20-year historical average was used and assumed constant over the project period.

The results of the sensitivity analysis is given in

Table 7 Exchange rate - percentage change in overall project NPV

Parameter	Base Value	-20%	% Δ	+20%	% Δ
Exchange rate	0.77	0.62	90.28%	0.93	-60.19%

4.4 Total mine life output

The assumed volume of coal sold in each year is assumed to equal the maximum output of the mine (7.5 Mtpa) in most years of the analysis. This may overstate the benefits of the proposed mine and sensitivity analysis has been performed for 10% and 20% lower output (see Table 8). The NPV is sensitive in response to the level of output from the mine; a decrease by 10% and 20% would decrease the NPV by 36.11% and 72.23%, respectively.

Table 8 Mine output – sensitivity analysis

Year	Base value (Mtpa)	-10%	-20%
2017	5.00	4.50	4.00
2018	6.67	6.00	5.33
2019	7.50	6.75	6.00

Note: Production assumed to remain at 7.5 Mtpa from 2019 onwards

4.5 Costs

The NPV is more sensitive to changes in operating costs than to changes in capital costs. The results of the sensitivity analysis are given in Table 9.

Table 9 Capital and operating costs - percentage change in overall project NPV

Parameter	Base Value	-20%	% Δ	+20%	% Δ
Mine operating costs	2.7 billion	2.5 billion	42.39%	3.0 billion	-42.39%
Mine construction costs	638 million	574 million	9.10%	701 million	-9.10%

5 Conclusion

A rapid Social Benefit-Cost Analysis has been undertaken to identify the major impacts of the New Acland Coal mine Stage 3 from 'pit to port' and assess the overall impact of the proposed mine development on community wellbeing. The key impacts of the revised Project were identified and analysed.

Net operating revenue of mine and the opportunity cost of agricultural land are the most significant impacts. There is also a significant cost to the community as a result of increased greenhouse gas emissions. It is considered that most of the environmental and social impacts will be neutralised as a result of the mitigation measures proposed by NAC, although there may be a small, residual impact.

The analysis finds that the project is expected to yield a positive Net Present Value (NPV) of $1.68 billion based on 'best bet' values for coal price, exchange rate, input costs and coal production. Net operating revenue from the mine dominates the benefits, and is estimated to be $1.75 billion NPV.

To be clear the NPV is an estimate of the additional value to the community if the project proceeds. How this benefit is distributed is not assessed. For example, we have not included royalty payments as a benefit although revenues to government are often advocated as benefits of mining projects. A royalty does not generate an economic benefit. The development and operation of the mine creates the economic benefit. Royalties and taxes determine the allocation the net impact among different stakeholders such as mine owners and all three levels of government.

Sensitivity analysis revealed that the coal price, exchange rate, mine output and mine operating costs are the major determinants to the overall estimated economic impact of the project. However, variations of these inputs of up to 20% difference still yields a large, positive NPV.