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2. PROJECT RATIONALE AND ALTERNATIVES

2.1. PROJECT RATIONALE

Coal is a significant resource commodity for both Queensland and Australia. Australia is the largest exporter of coal in the world, with black coal export worth more than $50 billion in 2008–2009 (Australian Coal Association, 2008). In 2008–2009, Queensland alone exported 159 million tonnes of coal to 38 countries (Queensland Department of Employment, Economic Development and Innovation, 2010).

Queensland has a large resource of high-quality coal, with almost 33 billion tonnes of in-situ raw coal identified by drilling (Department of Mines and Energy, 2007). The Galilee Basin, located in central Queensland, contains large resources of thermal coal.

Black coal is projected to remain Australia's dominant energy export over the period until 2029-2030, accounting for around 49 % of the total growth in Australian energy exports (Syed *et. al.,* 2010). The projected annual growth rate of 2.4 % is based on the expectation that global demand for coal will continue to increase as a result of increased demand for electricity, particularly in Asian economies (Syed *et. al.,* 2010).

Although the remote location and lack of supporting infrastructure have historically precluded large-scale coal mining in the Galilee Basin, a number of mining proponents have recently proposed to construct rail infrastructure to the Abbot Point Coal Terminal (APCT). On June 6, 2012, the GVK-Hancock Coal rail alignment was approved by state government to allow third party access for the transportation of coal from the Galilee Basin to the APCT. Several utility providers have also recently proposed large-scale power and water supply projects to the Galilee Basin.

The capital expenditure for the South Galilee Coal Project (SGCP) is expected to be $4.2 billion over the life of the Project. Operational expenditure is expected to be approximately $21.7 billion over the 33 year operational mine life. This expenditure will represent a significant boost to the regional and state economy and is expected to contribute millions of dollars per annum to the Queensland Government in royalties and taxes, as well as freight and port charges. This contribution coupled with direct and indirect employment opportunities and associated spending, highlights the important social and economic benefits of the SGCP to the region, Queensland and Australia.

The potential social, economic and environmental benefits and impacts of the SGCP are discussed in this Environmental Impact Statement (EIS). Consideration of the principles of Ecologically Sustainable Development (ESD) constituted an integral component of the feasibility and planning stages of the SGCP and form the basis for the mitigation and management strategies proposed in this EIS.

2.1.1. Economic Benefits

Economic impacts of the SGCP are discussed in detail in **Section 18—Economic Environment** and **Appendix S—Economic Technical Report**. The benefits associated with the SGCP are significant and range from regional economic support through increased employment and provision of customs to businesses, to state and national benefits from resource royalties and taxes, export income and economic support for Australia's mining industry. A summary of the major economic benefits of the SGCP is provided below:

- the SGCP will contribute approximately $41.3 billion in additional industry output to the Queensland economy and boost gross state product by approximately $21.6 billion during the construction and operational phases
- the SGCP will contribute an estimated $23.5 billion to value added gross domestic product over the construction and operational period
- the SGCP is projected to result in up to 1,600 construction jobs, 1,288 operational jobs and 300 decommissioning jobs
- subject to exchange rate variations and coal price fluctuations over the life of the SGCP, the estimated royalty payments that will be made to the Queensland Government are estimated at $2.8 billion to $4.9 billion over the life of the Project
- the SGCP will contribute to Queensland Government revenue through payroll taxes, annual tenure rents, annual land tax liability, annual port dues and stamp duties
- the SGCP will contribute to Federal Government revenue through the Minerals Resource Rent Tax, company tax and Goods and Services Tax
- the value of production from the SGCP is projected at $702 million—$1.1 billion for the first four years, before increasing to $1.3—$2.0 billion in the subsequent 29 years. All of the production is assumed to be exported. Over its life, the SGCP will improve Australia's Balance of Payment by approximately $40 billion—$63 billion.

2.1.2. Social Benefits

A comprehensive assessment of the potential social impacts of the SGCP is provided in **Section 17—Social** and **Appendix Q—Social Impact Assessment**. The SGCP will benefit the local and regional areas through employment opportunities, increased personal income levels, economic flow-on effects and opportunities for business development/expansion in service and support industries.

The SGCP will also contribute to cumulative local/regional population growth, leading to impacts on infrastructure, community services (e.g. health, education, housing and accommodation) and non-mining industries.

2.1.3. Environmental Implications

Environmental implications of the SGCP are described in detail in **Section 6—Climate, Natural Hazards and Climate Change** to **Section 20—Matters of National Environmental Significance**. Mitigation and management measures are proposed to address potential environmental impacts.

2.1.4. Technical Feasibility and Commercial Viability

A detailed Pre-Feasibility Study (PFS) has been undertaken by the Proponent in order to assess the viability of the SGCP and propose an optimum development strategy and timeline to maximise return on investment.

The PFS considered and assessed the coal market, risk, geology, coal quality, mining methods, infrastructure and coal handling/processing requirements, transport options, project execution, environmental impacts, community engagement, capital and operating costs and legal and contractual aspects.

The PFS determined that the SGCP is both technically feasible and commercially viable. The Project's compatibility with relevant policy, planning and regulatory frameworks is described in **Section 3—Project Approvals.**

2.2. PROJECT ALTERNATIVES

A range of alternatives were considered during the planning process for the SGCP, including the 'no development' scenario. The selection of the proposed development options for each component of the SGCP was made in consideration of leading industry practices, energy efficiency opportunities and regulatory, environmental, social and economic assessment criteria. Discussion of the alternatives considered as part of the SGCP planning phase is provided in subsequent subsections.

2.2.1. Locality Alternatives

2.2.1.1. Mine Location

The location of the SGCP is dictated by the extent and quality of coal reserves identified within Exploration Permit for Coal (EPC) 1049 and 1180. The Mining Lease Application (MLA) 70453 was submitted based on the results of exploratory drilling which indicate that the primary area of coal resource potential is located in the northern portion of EPC 1049.

The location of the SGCP is therefore not considered to be an alternative warranting further assessment.

2.2.1.2. Coal Export Location

Although the Galilee Basin has historically experienced limited mining development due to its distance from a coal export terminal, a number of Galilee Basin proponents have proposed to construct a railway corridor to the APCT, with access to this infrastructure available to third party users.

The APCT, Australia's most northerly coal export port, has been selected by the State Government as the preferred site for the long-term expansion of Queensland's coal export capacity and the principal export terminal for the Galilee Basin. The APCT is proposed to be progressively expanded over the next several years.

The APCT has also been identified by all of the Galilee Basin mining proponents as their respective export terminal, although the Adani Group has also identified Dudgeon Point as a potential option.

For the reasons outlined above and due to likelihood of an effective supply chain from the Galilee Basin being developed (with third party rail access), (refer to **Section 2.2.2.8**), the APCT was determined to be the preferred coal export location. The proposed upgrade to the Central Line by QR National could potentially allow for the transportation of coal to other Queensland ports.

2.2.1.3. Infrastructure Location

The location of infrastructure proposed by other mining proponents and/or utility providers is outside of the Proponent's control. The Proponent's infrastructure design is, to a large degree, influenced or dictated by the location or design of external infrastructure (refer to **Section 2.2.2.8**).

2.2.1.4. Accommodation Village Location

Given the remote geographical location of the Galilee Basin and the region's limited capacity to supply an appropriately skilled workforce, the SGCP workforce will be almost exclusively Fly-In/Fly-Out (FIFO).

As the township of Alpha does not have adequate infrastructure or land available for housing required to support the proposed workforce, and to minimise potential social impacts, the SGCP workforce is proposed to be housed at an on-site accommodation village located in the north east of MLA 70453. The proposed accommodation village location (refer to **Section 4—Project Description**) has been selected to minimise visual, air quality, noise and vibration impacts associated with the mining operations.

Other than a small number of permanent personnel who would be required to relocate to Alpha (i.e. up to eight personnel during construction and up to six personnel during operations), no alternative accommodation locations have been considered.

2.2.2. Conceptual/Technological Alternatives

2.2.2.1. Product Type

Test work undertaken to date indicates that a range of product options could be produced, depending on specific market conditions. The preferred product coal (i.e. ash content of 13 % and gross calorific value of 6,250 kilocalories per kilogram gross as received) was selected on the basis of the cost-revenue matrix.

2.2.2.2. Mining Method, Mine Plan and Orientation

The PFS established the target coal seams (D1 and D2 coal seams) and their characteristics.

The PFS identified the constraints acting on the selection of mining methods and mine plan. These constraints included the following:

- MLA 70453 boundary
- local geology and the limit of identified coal resources
- seam thickness, splits, dip and depth
- limit of oxidation line for the D1 seam
- standard industry mining practices
- geotechnical parameters.

A number of mining methods were identified as being potentially feasible for the SGCP and a summary of those considered in the PFS is provided in **Table 2-1**. Extensive modelling of mining options was undertaken to select the preferred methods and mine plans.

The following considerations were taken into account during the modelling process:

- site geology
- coal quality
- topographical considerations (e.g. drainage lines and other surface features)
- engineering constraints
- results of risk assessment and analysis
- resource recovery
- cost effectiveness
- safety
- regulatory requirements and leading industry practice
- existing industry experience
- environmental constraints and considerations.

Given the above constraints, it was determined that the most cost effective method of extracting the target seams was by using a combination of surface (i.e. conventional strip mining using draglines with pre-stripping undertaken by truck and shovel) and underground (i.e. longwall) mining methods. The adoption of a combined open-cut and underground operation has a number of advantages, including facilitating a realistic ramp-up to full production and mitigation of the longer development lead time for underground mining by the open-cut component.

Open-cut mining allows the full recovery of the in-situ resources, inclusive of smaller seams and plies that would be unviable using underground mining techniques.

Underground mining techniques result in reduced impacts on surface environmental and agricultural values due to the minimal surface disturbance. Mining induced subsidence may, however, result in impacts on surface environmental values, such as flora and fauna, cultural heritage, groundwater and surface water resources.

The conceptual mine plan has been developed on the basis of standard mining assumptions and the geological model. The design of the underground mining area includes a stand-off to avoid the identified Threatened Ecological Communities (refer to **Section 8—Nature Conservation**).

Further detailed planning and financial analysis will be undertaken as part of the Definitive Feasibility Study (DFS) process.

2.2.2.3. Mining Schedule

The proposed mining sequence has been developed to best accommodate the known timing of external infrastructure development and to facilitate a realistic and achievable ramp-up to full production (refer to **Section 4.5.2**).

Mine scheduling has been based on the geological model. The mining schedule assumes that D1 and D2 seam coal will be mined concurrently from different areas of the mine. This is expected to facilitate coal blending in order to achieve a more consistent feed to the Coal Handling and Preparation Plant (CHPP).

2.2.2.4. Delivery Strategy

The Proponent has considered a range of delivery strategies for the SGCP including 'build, own and operate', 'build, own, operate and transfer' and various contracting strategies. The selection of the most appropriate delivery strategy will be determined as part of the DFS process.

Table 2-1 Summary of Mining Method Alternatives

Method	Summary	Advantages	Disadvantages
Open-cut Mining Methods			
Strip mining	Overburden and coal are extracted in a series of 'strips' running parallel to each other, each mined, filled then rehabilitated successively.	• widely used and proven method • yields higher production per worker than underground coal mining • lower coal unit cost than underground mining due to use of large mechanised equipment with greater production capacity • generally greater recovery of coal than in an underground mine • safety, ventilation and working conditions • ability to progressively rehabilitate land as mining continues, therefore minimising environmental impact at any one time	• cost associated with handling, shaping and rehabilitating waste rock • affected by climatic conditions • greater surface disturbance relative to underground mining
Truck and shovel strip mining	Trucks and shovels used to remove overburden and extract the coal.	• commonly used where overburden is too deep to be excavated by draglines or where geotechnically unstable overburden would make dragline operations hazardous • allows for selective handling of waste material • either narrow or wide strips may be used (narrow strips offer more flexibility and can be used for steeply dripping deposits, whereas wide strips enable greater equipment mobility and provide more spaces for equipment to work) • provides flexibility and the ability to adjust production fleet in proportion to coal demand	• cost associated with handling, shaping and rehabilitating waste rock • many units are not readily mobile (e.g. power shovels, hydraulic excavators etc.) • hydraulic units may require more specialist maintenance • affected by climatic conditions • greater surface disturbance relative to underground mining

Table 2-1 Summary of Mining Method Alternatives (cont)

Method	Summary	Advantages	Disadvantages
Conventional dragline operations	Open-cut mining undertaken using a dragline, a large piece of mobile equipment with a bucket suspended from a boom with wire hoist ropes. The dragline excavates a 'block' of overburden then proceeds to move backwards and remove the next block.	• cost effective method of removing overburden in terms of operating cost • enables direct cast onto spoil piles, minimising the need for trucks • suitable for digging harder material than truck and shovel operations	• limited flexibility • constrained by dig depth and dump height • requires detailed planning to be effective • high capital investment • affected by climatic conditions • greater surface disturbance relative to underground mining
Deep dragline or extended bench dragline method	Method used when the overburden depth or the strip width is too great for the dragline to sidecast the blasted overburden. The overburden can be used to create a bridge, on which the dragline can sit to extend its reach.	• relatively widely used method	• requires rehandling of material for the bridge • affected by climatic conditions • greater surface disturbance relative to underground mining
Bucket wheel excavators	Large machines which remove soil/rock from the face and dump it onto conveyor systems, which direct it towards the central core of the unit.	• capable of high production under the correct conditions • continuous system • lower operating costs than traditional truck and shovel systems	• requires relatively soft material to be effective • relatively inflexible • requires long and short-term planning • high capital investment • affected by climatic conditions • greater surface disturbance relative to underground mining
Crusher/conveyor systems	Continuous mining systems for removing, transporting and dumping upper weathered overburden.	• continuous system	• high capital investment • affected by climatic conditions • greater surface disturbance relative to underground mining

Table 2-1 Summary of Mining Method Alternatives (cont)

Method	Summary	Advantages	Disadvantages
Underground Mining Methods			
Longwall mining	A method of underground mining that involves the extraction of large blocks of coal, with the coal being mined on retreat in slices from the longwall face.	• highest coal recovery of methods considered • most common underground mining method currently used in Australia • high and consistent production rates • relative level of inherent safety	• high capital cost • significant development lead time required before economic coal tonnages are produced
Place change mining	A system of mining that involves using continuous miners to cut out a designated length of roadway and flitting to another working face in a predetermined sequence within the panel. A roof bolting machine then moves into the place left by the miner and installs roof support concurrently with coal production in another roadway.	• provides more flexibility in panel layout for variable or difficult ground conditions than longwall mining • highly productive first working development • small pillars improve resource recovery and allow for short distances for flitting of the Continuous Miner between working faces to maximise cutting time • minimises safety risks associated with caving	• overall productivity is generally less than can be achieved by longwall mining methods • small pillar size is generally not amenable to secondary extraction so the majority of the pillar area is sterilised from future resource recovery • widely used in South Africa and the United States, not as common in Australia
Wongawilli bord and pillar mining	A high recovery method of mining which involves a combination of first workings and secondary extraction of the first working pillars, the additional coal from the side split roadways and the recovery of the fenders.	• provides more flexibility in panel layout for variable or difficult ground conditions than longwall mining • excellent overall coal recovery potential (combination of first workings, secondary extraction of first working pillars and side split roadways and recovery of the fenders)	• safety risks • increased risk of loss of equipment through burial • highly cyclical production cycle (alternates between slower first working development and more rapid secondary extraction) • risk of production stoppages due to uncontrolled roof falls • method no longer used in Queensland and has limited use in New South Wales • highly specialised method which may pose challenges for establishing a workforce

2.2.2.5. Materials Handling and Processing

The materials handling equipment was chosen on the basis of its capacity to accommodate the proposed production rates and scheduling. The materials handling design has been developed to:

- minimise the generation of dust and fines
- avoid the use of gravity reclaim/dozer push, where practicable
- use automated stacking/reclaim equipment, where practicable
- allow for operational flexibility
- adopt modular arrangements
- allow for coal blending.

A number of alternative coal processing options were considered as part of the PFS assessment, depending on the product specification. These options included:

- wet processing plant configuration
- fines bypass option
- dry beneficiation option.

These options were evaluated to determine the alternative that would deliver the best outcome on a cost revenue basis. The SGCP CHPP will use a conventional wet beneficiation process, using proven technology that is used extensively throughout the Australian coal industry.

2.2.2.6. Waste Management and Disposal

2.2.2.6.1. Waste Rock and Coal Rejects

Disposal of mine waste will be the single largest cost for the open-cut operation so considerable planning has been undertaken to optimise waste disposal.

Waste rock will be removed by the draglines and spoiled in previously mined strips.

Fine rejects will be thickened and dewatered in belt press filters. Combined coarse and fine rejects will be trucked and placed in the waste rock emplacement facility.

Alternative reject management and disposal options considered include:

- electrodewatering
- Kalgoorlie filter
- screen bowl centrifuge
- chamber press filter
- geofabric tube
- vacuum filtration equipment

- pumped co-disposal
- tailings re-flocculation system
- screw press filter
- tube press filter
- tailings dam impoundment deep cone thickener.

These alternatives were discounted due to one or more of the following:

- lack of previous implementation
- poor historical performance
- historical maintenance issues
- high operating costs
- high labour intensity
- low throughput
- excessive water consumption
- significant surface disturbance.

The selected option utilises proven technology and will allow tailings to be disposed of in the waste rock emplacement facilities along with the coarse reject material.

2.2.2.6.2. General Wastes

Due to the remote location of the SGCP, waste treatment and disposal options are limited.

With the exception of recyclable waste which will be transported off-site by recycling contractors, waste will be either treated on-site (e.g. sewage waste and waste water will be treated as described in **Section 4.11.3**) or disposed of in an on-site landfill designed and managed to the appropriate legislative standards.

2.2.2.7. Water Management

Water management is described in detail in **Section 4—Project Description** and **Section 9—Water Resources**.

One permanent stream diversion will be required to divert runoff around the open-cut mining area and protect the open pits from flooding. Sapling Creek will be diverted into Dead Horse Creek to the south. A number of alternatives were considered, including an option not to mine Sapling Creek. The selected option is considered the most appropriate given the topographical constraints and economic factors. Detailed assessment and design for the diversion will be undertaken as part of the DFS process.

It will also be necessary to construct drainage channels to carry excess clean surface runoff around the outer precincts of the open-cut mining area into Tallarenha Creek.

2.2.2.8. *Infrastructure*

2.2.2.8.1. *Power Supply*

Ergon Energy's existing local 22 kilovolt (kV) diesel power station is operating at full capacity.

Given the existing capacity constraints and the lack of alternative power supplies, the Proponent proposes to source electricity for the SGCP operations from Powerlink Queensland's Galilee Basin Transmission Project as described in **Section 2.2.3**.

However, as the Galilee Basin Transmission Project is not anticipated to be complete until 2014, construction power will be supplied by diesel-powered generators.

2.2.2.8.2. *Water Supply*

On-site bore water is expected to provide adequate supply for the construction period.

The peak water demand for the operation of the SGCP (i.e. 3,000 megalitres per annum (ML/a)) requires an off-site water source capable of supplying this volume of raw water.

As described in **Section 2.1**, the Galilee Basin is characterised by poorly developed resources infrastructure. As no commercially viable alternative is currently available to meet the water demand of the SGCP, the Proponent proposes to source raw water from an external water supply. Potable water will be treated on-site.

As described in **Section 4.10.2**, after Year 12, the allocation of raw water may need to be supplemented with a minimal amount of additional water in order to meet peak demand. This water may be obtained from the following sources:

- obtaining additional water from the external water supply
- rainwater capture/tank water
- runoff from undisturbed areas
- runoff from disturbed areas
- dewatering from underground operations groundwater abstraction.

It is expected that water will be sourced from a combination of the above sources. Investigations to optimise use of process water through recycling and developing more water efficient coal processing methodologies will be ongoing at the site.

2.2.2.8.3. *Product Transport Infrastructure*

The APCT has been identified as the preferred export terminal for SGCP product coal. Given the remote location of the Galilee Basin, rail was considered the most commercially viable option for transporting product coal.

As described in **Section 2.2.3**, the SGCP would not support its own rail line connecting to the APCT, and instead the Proponent proposes third-party access to a common user rail component from the Galilee Basin to the APCT. Waratah Coal Pty Ltd, the GVK Group, Adani Mining Pty Ltd and QR National Ltd have proposed to construct rail infrastructure to the APCT. On June 6, 2012, the GVK-Hancock Coal rail alignment was approved by state government to allow third party access for the transportation of coal from the Galilee Basin to the APCT. Third party use of an already proposed rail line significantly mitigates the environmental, social and property impacts of rail line development and avoids duplication of impacts. The GVK-Hancock Coal rail alignment was approved by state government to allow third party access for the transportation of coal from the Galilee Basin to the APCT.

Although the location of infrastructure proposed by other proponents and/or utility providers is outside the Proponent's control, each common user rail proposal has included an assessment of alignment alternatives and co-location opportunities.

A number of alternative alignments have been considered for the SGCP rail spur component. The proposed alignment has been selected on the basis of:

- consultation with affected stakeholders
- potential to minimise property impacts
- minimising impact on surface water runoff
- geotechnical and engineering design requirements
- avoidance of sensitive environmental areas, where practicable.

2.2.2.8.4. Workforce Transport Infrastructure

As described in **Section 2.2.1.4**, the SGCP workforce will be almost exclusively FIFO. Given the cost associated with constructing and operating an on-site airport and the proximity of the Alpha Aerodrome, the Proponent proposes to utilise the existing aerodrome facilities.

Consultation undertaken with the local community, Department of Transport and Main Roads and the Queensland Police Service indicates that road transport should be minimised wherever practicable, in order to minimise impacts on road infrastructure and road safety. For this reason, drive-in/drive-out and bus-in/bus-out alternatives from within the wider region were not considered further.

The FIFO workforce will be transported from the Alpha Aerodrome to the SGCP and between the on-site accommodation village and the mining area by bus.

The small number of personnel who reside in the Alpha area will travel to work via private vehicle, with the drive time restricted to 20 minutes.

2.2.2.8.5. Workforce Accommodation

As described in **Section 2.2.1.4**, the township of Alpha does not have adequate infrastructure or housing facilities to support the proposed workforce. Consequently, other than a small number of permanent personnel who would be required to relocate to Alpha (i.e. up to eight personnel during construction and up to six personnel during operations), no alternatives to the on-site accommodation village have been considered.

The construction workforce will be housed in the accommodation village. Following the construction period, the village will be modified to form a permanent accommodation village. The village has been sized for the peak overlap between construction and operational phases of 1,600 personnel.

The accommodation village will utilise pre-fabricated components where practicable, in order to minimise disturbance and waste associated with its construction.

2.2.3. Co-Location Opportunities

The relationship between the SGCP and other mining and/or infrastructure projects in the region is described in **Section 1—Introduction** and **Section 4—Project Description.** Infrastructure developments proposed by other proponents in the vicinity of the SGCP are described in **Section 2.2** and **Section 4—Project Description**. In order to minimise the environmental, social and property impacts associated with the SGCP, the Proponent has considered opportunities for co-location of Project infrastructure with existing or publicly-known proposed infrastructure, where practicable. Shared infrastructure use or co-location proposed as part of the SGCP includes:

- The potential for the SGCP to secure interim and long-term port capacity at GVK's Abbot Point Terminal 3 (T3). Any long-term access would be subject to GVK obtaining approvals to expand the capacity of T3.
- The SGCP would not support its own rail line connecting to the APCT, and instead the Proponent proposes third-party access to a common user rail component from the Galilee Basin to the APCT. Waratah Coal Pty Ltd, the GVK Group, Adani Mining Pty Ltd and QR National Ltd have indicated to the Proponent that their respective proposed rail infrastructure will be open to third party access. On June 6, 2012, the GVK-Hancock Coal rail alignment was approved by state government to allow third party access for the transportation of coal from the Galilee Basin to the APCT. Third party use of an already proposed rail line significantly mitigates the environmental, social and property impacts of rail line development and avoids duplication of impacts. The Proponent will work cooperatively with other proponents to coordinate or enhance impact mitigation measures already proposed for rail transport on the common user rail line.

- As described in **Section 4.9**, electricity for the SGCP will be sourced from Powerlink Queensland's Galilee Basin Transmission Project. This infrastructure Project will supply power to a substation north of the SGCP (proposed Surbiton Hill Substation). This infrastructure is also proposed to be utilised by other mining proponents in the Galilee Basin. The Proponent will be responsible for the construction of a 132 kV electricity transmission line from the proposed Waratah/SGCP Substation to the northern boundary of MLA 70453. A portion of the electricity transmission line will align with the SGCP infrastructure corridor along Saltbush Road. As described in **Section 17—Social**, the Proponent is signatory to a cooperative agreement between Galilee Basin proponents to negotiate electricity supply arrangements that minimise duplication and environmental or property impacts.
- As described in **Section 4.10.2**, the majority of raw water for the SGCP will be provided from an external water supply.
- As described in **Section 4.6.3**, the SGCP workforce will fly in to and out from the Alpha Aerodrome. The Alpha Aerodrome is expected to be upgraded by the Barcaldine Regional Council or the air service provider and is also proposed to be used for workforce transport by other Galilee Basin mining proponents. Proposed collaborative approaches with other mining proponents to mitigate potential social impacts are described in **Section 17—Social**.
- As described in **Section 4—Project Description**, the Proponent proposes to utilise the existing Central Line Railway to transport the majority of the SGCP construction materials and equipment, where practicable, in order to increase efficiency and minimise potential impacts associated with road transport. It is also anticipated that the majority of consumables and equipment required during operations would be transported to site on the proposed common user rail component. Proposed approaches to mitigate the potential impacts of increased rail transport are described in **Section 14—Transport**.

2.2.4. Consequences of Not Proceeding with the SGCP

The consequences of not proceeding with the SGCP include that a major coal resource would remain undeveloped and the socio-economic benefits associated with the development of the SGCP would not be achieved.

The socio-economic benefits associated with the SGCP would be considerable and are summarised as:

- up to approximately 1,600 jobs during the construction phase, 1,288 jobs during the operational phase and 300 jobs during the decommissioning phase

- expected average employee salaries of $139.3 million per annum into the Queensland economy during the peak operational phase
- significant export income for the State of up to approximately $40.3—$62.7 billion over the life of the SGCP
- significant State and Federal Government royalties and taxes
- the economic opportunity associated with developing a coal resource that is viable and in demand creates indirect local and regional community employment opportunities.

In addition, the transport of SGCP product coal on the common user rail component from the Galilee Basin to the APCT will provide strategic and financial support to other mining proponents. Should the SGCP not go ahead, this benefit would not be realised, potentially making supply of services to the Galilee Basin uneconomic.

2.3. ECOLOGICALLY SUSTAINABLE DEVELOPMENT

The National Strategy for Ecologically Sustainable Development (ESD Steering Committee, 1992) defines ESD as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".

The guiding principles of ESD include:

- integrating long and short-term economic, environmental, social and equity considerations
- accounting properly for the economic costs of environmental degradation
- accepting that each generation is responsible for the welfare of future generations
- understanding environmental risk and uncertainty
- understanding the global scale of environmental issues.

The principles of ESD are reflected in Commonwealth legislation. Section 3A of the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) provides the principles of ESD:

(a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations

(b) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation

(c) the principle of inter-generational equity-that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations

(d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making

(e) improved valuation, pricing and incentive mechanisms should be promoted.

Section 136 of the *EPBC Act* states that:

(1) In deciding whether or not to approve the taking of an action, and what conditions to attach to an approval, the Minister must consider the following, so far as they are not inconsistent with any other requirement of this Subdivision:

(a) matters relevant to any matter protected by a provision of Part 3 that the Minister has decided is a controlling provision for the action

(b) economic and social matters.

Factors to be taken into account

(2) In considering those matters, the Minister must take into account:

(a) the principles of ecologically sustainable development …

Section 391 of the *EPBC Act* provides that the Minister must consider the precautionary principle in making decisions.

The principles of ESD have also been incorporated into the Queensland *Environmental Protection Act 1994 (EP Act)*. The objective of the *EP Act* is to:

… protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).

The consideration of ESD principles in the planning and approval stages of the SGCP is described below.

2.3.1. Integration of Economic, Environmental, Social and Equitable Considerations

Decision-making and Project planning undertaken for the SGCP has addressed the principles of ESD by integrating the following:

- the findings of risk assessments
- economic and financial modelling

- environmental assessment of the outcomes of consultation with key stakeholders.

Section 7—Land to **Section 20—Matters of National Environmental Significance** consider the short and long-term impacts of the SGCP on land resources, nature conservation, water resources, air quality, greenhouse gas emissions, noise and vibration, waste, transport, cultural heritage, socio-economic environment, hazards and risk and Matters of National Environmental Significance.

The assessment of risk, project feasibility and the development of the mitigation measures proposed in this EIS demonstrate that the SGCP can be operated in accordance with the principles of ESD.

2.3.2. Precautionary Principle

Assessments of the predicted impacts of the SGCP on the natural, social and economic environment are provided in **Section 7—Land** to **Section 20—Matters of National Environmental Significance**. These assessments have adopted a conservative approach.

The Proponent has conducted a risk assessment (refer to **Section 19—Hazard and Risk**) to identify the hazards and risks associated with the SGCP and propose appropriate controls and mitigation measures where required.

Where the risk assessment identified extreme or high risks, additional controls and mitigation measures were identified and the hazardous incident reassessed with these controls in place. These controls reduce the risk to an acceptable level.

Mitigation measures to minimise the risk of serious or irreversible environmental harm as a result of the SGCP are proposed in **Section 7—Land** to **Section 20—Matters of National Environmental Significance**.

2.3.3. Inter-generational and Intra-generational Equity

The principle of inter-generational equity requires the present generation to ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations. Intra-generational equity refers to equity across communities within one generation.

The potential social and economic benefits and impacts of the SGCP, along with mitigation measures, have been identified and quantified in **Section 17—Social**, **Section 18—Economic Environment**, **Appendix Q—Social Impact Assessment**, **Appendix R—Social Impact Management Plan** and **Appendix S—Economic Technical Report**.

The SGCP is expected to provide significant socio-economic benefits, as described in **Section 2.1.1** and **Section 2.1.2**.

As described above, the Proponent proposes to implement mitigation measures to minimise the risk of environmental impacts (refer to **Section 7—Land** to **Section 20—Matters of National Environmental Significance**).

2.3.4. Biodiversity Conservation

The conservation of biodiversity has been a fundamental consideration in decision making for the SGCP. The existing nature conservation values have been identified, and the potential impacts described and quantified in **Section 8—Nature Conservation**.

The Proponent has committed to a stand-off from Threatened Ecological Communities within the open pit and underground mining areas to minimise direct surface disturbance. In order to develop an alignment for the infrastructure corridor, the Proponent adopted an iterative planning process which considered the findings of baseline environmental studies as constraints on the design (e.g. terrestrial and aquatic ecology).

Mitigation and management measures for biodiversity conservation have been proposed in **Section 8—Nature Conservation**. These include rehabilitation for biodiversity conservation purposes using native vegetation species typical of the Regional Ecosystem to be disturbed (refer to **Section 5—Rehabilitation and Decommissioning**), pest animal and weed management, implementation of leading practice controls for erosion and sedimentation and consideration of native vegetation corridors as part of post-mining rehabilitation works.

2.3.5. Valuation Mechanisms

ESD requires that project decision-making considers and internalises environmental costs, many of which currently fall outside the current market system.

The economic assessment undertaken for the SGCP (refer to **Section 18—Economic Environment** and **Appendix S—Economic Technical Report**) quantifies the economic value of the remnant vegetation proposed to be cleared by the SGCP.

The Proponent intends to internalise the costs of environmental impacts through the implementation of mitigation measures proposed in this EIS.