



NEW HOPE
GROUP

20. Cumulative Impacts



Contents

20	Cumulative Impacts	20-1
20.1	Introduction	20-1
20.1.1	Localised cumulative impacts	20-1
20.1.2	Regional cumulative impacts	20-2
20.1.3	Indirect cumulative impacts	20-7
20.2	Land Resources	20-7
20.3	Surface Water Resources	20-8
20.4	Groundwater Resources	20-8
20.5	Terrestrial Ecology	20-9
20.6	Aquatic Ecology	20-10
20.7	Air Quality	20-10
20.8	Greenhouse Gas Emissions	20-12
20.9	Noise and Vibration	20-12
20.10	Traffic and Transport	20-13
20.11	Social	20-13
20.12	Economic	20-14
20.13	Conclusions	20-15

20 Cumulative Impacts

20.1 Introduction

This Chapter describes the impacts of the revised Project that are cumulative. There are three areas with potential for cumulative impacts: localised cumulative impacts; cumulative impacts from regional projects; and indirect cumulative impacts.

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development.

20.1.1 Localised cumulative impacts

Localised cumulative impacts result from mining operations in the immediate vicinity of the revised Project site. These impacts have been discussed throughout the EIS and are consolidated in this Chapter. The areas of impacts include land resources, surface water, groundwater, air quality, noise and vibration and transport. The potential for cumulative impacts from current operations at the Mine are presented in **Table 20-1**.

Table 20-1 Potential for cumulative impacts from existing operations on the revised Project

Area of Impact	Potential for cumulative impacts associated with existing operations at the Mine and the revised Project
Land resources	Low – following successful rehabilitation at the Mine agricultural production will remain possible post mining in the form of grazing.
Groundwater	Low – impact of existing operations determined in the groundwater model.
Surface water	Low – impact of existing operations determined in the surface water modelling.
Terrestrial ecology	Low – no clearing of endangered vegetation for Stage 2. Substantial clearing of vegetation has occurred previously for agriculture. The incremental clearing associated with the Project is minor in comparison with historical clearing. The minor clearing that has occurred for the Mine to-date has been offset by the establishment and management of conservation zones along Lagoon Creek and over Bottle Tree Hill.
Air quality	Low – existing operations will not be contemporaneous with the revised Project.
Noise and vibration	Low – existing operations will not be contemporaneous with the revised Project.
Transport	Low – existing operation will not be contemporaneous with the revised Project.
Social	Low – the revised Project will require an additional 135 direct job employees (above current workforce of 300 employees). Most employees will be based either locally or in Toowoomba region.

20.1.2 Regional cumulative impacts

Regional cumulative impacts occur when two or more projects are close enough that their combined impacts may be significant. For example, an individual coal mine may not represent a substantial impact. However, the cumulative effect on issues such as habitat loss, water quality degradation, and socio-economic impacts may be sufficient enough to warrant consideration.

There are no significant projects occurring or proposed near the revised Project site. The revised Project site has experienced significant agricultural development over an extended period of time which has been included in the description of existing environment and the impact assessments conducted throughout the EIS.

The potential cumulative impacts from other projects have been identified by reviewing current and proposed resource projects in the region. **Figure 20-1** depicts resource developments including coal, coal seam gas and petroleum near the revised Project.

Details on current and future mining operations are presented in **Table 20-2** including the proximity to the revised Project, potential for cumulative environmental impacts, requirements for transport infrastructure and community services.

All other mining operations are more than 60 km from the revised Project and therefore are unlikely to contribute to cumulative environmental impacts to surface water, groundwater, air quality and noise. There is the potential for cumulative impacts from some of the proposed resources projects on transport and community infrastructure. These impacts are discussed further in **Section 20.10** and **Section 20.11**.

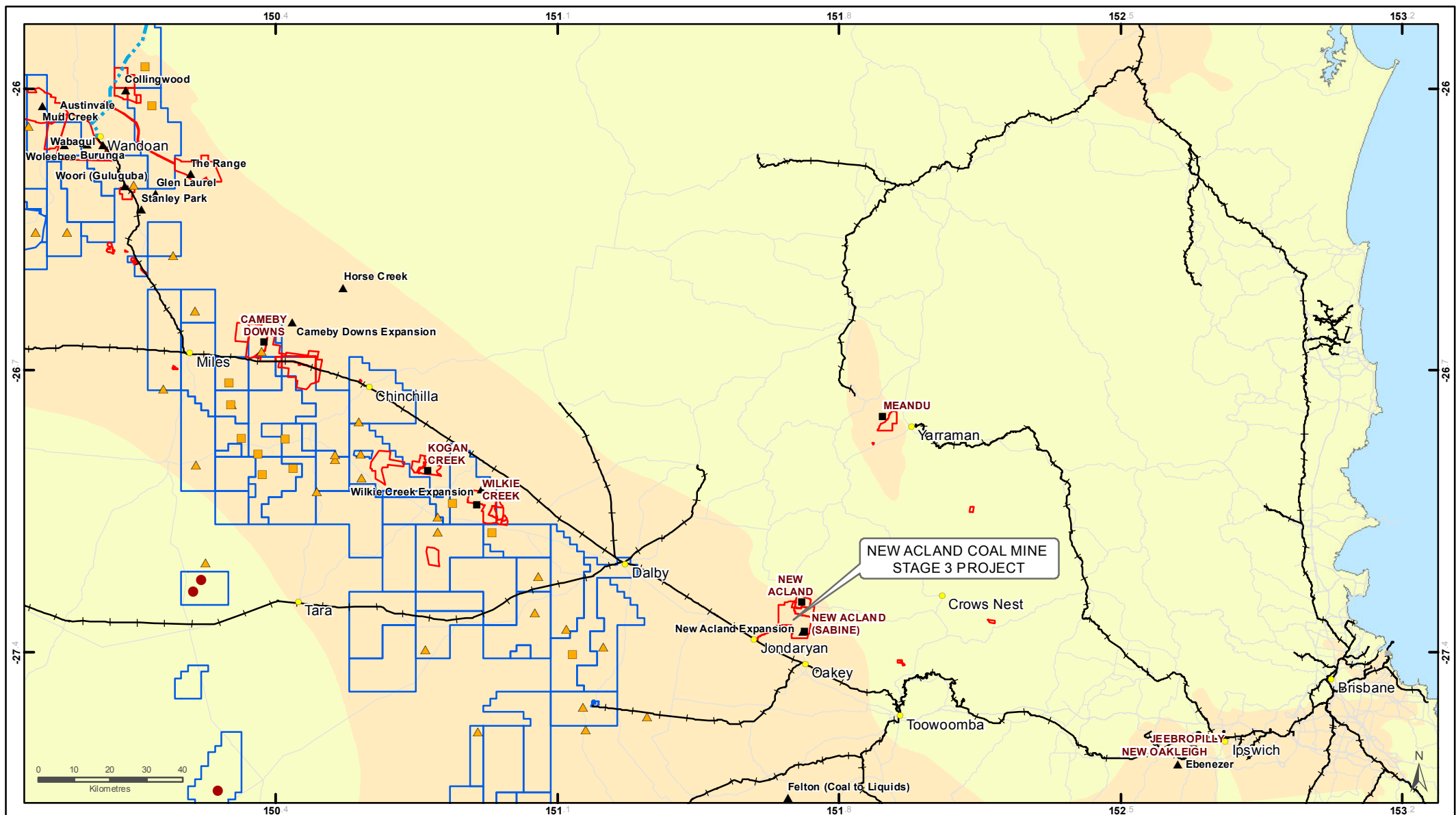
Table 20-2 Potential Regional Cumulative Impacts

Project	Proximity to revised Project	Coal Basin	Comments
Mining Operations			
Meandu Coal Mine and Tarong Power Station	Approximately 60 km north east	Tarong Basin	The Meandu Coal mine provides coal to the Tarong Power station. No coal is transported on the QR network. The closest town is Kingaroy. No increased demand for community infrastructure and accommodation in Toowoomba is anticipated. The operations will not generate cumulative environmental impacts for water, air and noise.
Wilkie Creek Coal Mine	Approximately 80 km northwest	Surat Basin	Transports coal via the QR network to the Port of Brisbane. There is a potential cumulative impact based on increased demand for rail capacity on the QR network. The closest town is Dalby. No increased demand for community infrastructure and accommodation in Toowoomba is anticipated. The operations will not generate cumulative environmental impacts for water, air and noise.

Project	Proximity to revised Project	Coal Basin	Comments
Kogan Creek Power Station and Mine	Approximately 100 km north west	Surat Basin	The Kogan Creek Coal Mine provides coal for the Kogan Creek Power Station. No coal is transported on the QR network. No increased demand for community infrastructure and accommodation in Toowoomba is anticipated. The operations will not generate cumulative environmental impacts for water, air and noise.
Cameby Downs Coal Mine	Approximately 150 km north west	Surat Basin	Transports coal via the QR network to the Port of Brisbane. There is a potential cumulative impact based on increased demand for rail capacity on the QR network. The closest town is Miles. No increased demand for community infrastructure and accommodation in Toowoomba is anticipated. The operations will not generate cumulative environmental impacts for water, air and noise.
Millmerran Power Station and Commodore Coal Mine	Approximately 85 km south west	Clarence-Moreton Basin	The Commodore Coal Mine provides coal for the Millmerran Power Station. The operations do not transport coal by rail. No increased demand for community infrastructure and accommodation in Toowoomba is anticipated. The operations will not generate cumulative environmental impacts for water, air and noise.
Jeebropilly Coal Mine	Approximately 100 km south east	Clarence-Moreton Basin	Transports coal via the QR network to the Port of Brisbane. Due to the small scale of the mine and its proximity to Brisbane no significant cumulative impacts on the QR network are anticipated. The closest major centre is Ipswich. The operations will not generate cumulative environmental impacts for water, air and noise.
Approved projects			
Wandoan Coal Project	Approximately 220 km north west	Surat Basin	The proposed mine is likely to rail its product to the Port of Gladstone. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine. The development will not generate cumulative environmental impacts for water, air and noise.
The Range Project	Approximately 220 km northwest	Surat Basin	The proposed mine is likely to rail its product to the Port of Gladstone. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine. The development will not generate cumulative environmental impacts for water, air and noise.

Project	Proximity to revised Project	Coal Basin	Comments
Australia Pacific LNG Project	More than 80 km to west and northwest	Surat Basin	Development including coal seam gas fields in the Surat Basin with up to 10,000 CSG wells, proposed gas transmission pipeline to LNG and export facility on Curtis Island. There is potential for cumulative impacts associated with community infrastructure. The development will not generate cumulative environmental impacts for water, air and noise.
Gladstone Liquefied Natural Gas Project	More than 200 km to west and northwest	Surat Basin	Development of coal seam gas fields with approximately 2,650 CSG wells in Surat Basin, proposed gas transmission pipeline to LNG and export facility on Curtis Island. No cumulative impacts associated with community infrastructure due to the distance from the development. The development will not generate cumulative environmental impacts for water, air and noise.
Queensland Curtis Liquefied Natural Gas Project	More than 50 km to west and northwest	Surat Basin	CSG development of coal seam gas fields with approximately 6,000 CSG wells in Surat Basin, proposed gas transmission pipeline to LNG and export facility on Curtis Island. There is potential for cumulative impacts associated with community infrastructure. The development will not generate cumulative environmental impacts for water, air and noise.
Seeking environmental approvals			
Cameby Downs Expansion Project	Approximately 150 km north west	Surat Basin	The proposed mine expansion is likely to rail its product to the Port of Gladstone and to the Port of Brisbane. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine. The proposed operations will not generate cumulative environmental impacts for water, air and noise.
Elimatta Coal Project	Approximately 240 km north west	Surat Basin	The proposed mine is likely to rail its product to the Port of Gladstone. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine.
Collingwood Coal Project	Approximately 240 km north west	Surat Basin	The proposed mine is likely to rail its product to the Port of Gladstone. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine.

Project	Proximity to revised Project	Coal Basin	Comments
Taroom Coal Project	Approximately 240 km north west	Surat Basin	The proposed mine is likely to rail its product to the Port of Gladstone. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine.
Norwood Coal Project	Approximately 240 km north west	Surat Basin	The proposed mine is likely to rail its product to the Wiggins Island Export Coal Terminal. No cumulative impacts associated with community infrastructure and accommodation demand are expected in Toowoomba due to the distance from the proposed mine.
Ironbark Project	Approximately 240 km north west	Surat Basin	Proposed development of coal seam gas fields in Surat Basin with up to 600 wells, associated facilities and gas pipeline to connect to the existing Darling Downs Pipeline. No cumulative impacts associated with community infrastructure due to the distance from the development. The development will not generate cumulative environmental impacts for water, air and noise.
Santos GLNG Gas Field Development Project	Approximately 220 km north west	Surat Basin	Development of coal seam gas fields with approximately 6,100 wells in Surat Basin. No cumulative impacts associated with community infrastructure due to the distance from the development. The development will not generate cumulative environmental impacts for water, air and noise.
Surat Gas Project	Approximately 50 km west	Surat Basin	Development of coal seam gas fields with approximately 7,500 wells in Surat Basin. There is potential for cumulative impacts associated with community infrastructure. The development will not generate cumulative environmental impacts for water, air and noise.



LEGEND

- Towns and Localities
- Operation Coal Mine
- ▲ Coal Development
- CSG Operation
- ▲ CSG Development
- Petroleum Operations
- Major Road
- Rail Line
- Proposed Surat Railway
- Mining Leases
- Petroleum Leases
- Coal Measures

NEW HOPE GROUP

SINCLAIR KNIGHT MERZ
SKM

NEW ACLAND COAL MINE STAGE 3 PROJECT

**Figure 20-1 - Resource developments
(coal, CSG and petroleum)
near the revised Project**

Scale 1:1,430,000 on A4
Projection: Australian Geodetic Datum – Zone 56 (AGD84)

20.1.3 Indirect cumulative impacts

Indirect cumulative impacts are impact that are not a direct result of the construction and operation of the revised Project, but may occur as a result of a complex pathway. The major potential for indirect impacts with the revised Project is associated with transport of coal. There will also be indirect socio-economic impacts occurring as a result of the revised Project.

The sections below discuss impacts of the revised Project on environmental and socio-economic aspects at the localised, regional and indirect cumulative impact levels.

20.2 Land Resources

A comprehensive land resources impact assessment is presented in **Chapter 4**.

Predominant land use patterns of the revised Project site in addition to grazing of modified pastures have remained cash and forage cropping. Much of the revised Project site has long been cleared of its original vegetation due to agricultural production. Localised areas of original remnant vegetation remain alongside Lagoon Creek, within relic alluvial plains and on upland low hills.

The TRC Scheme shows that the revised Project site overlies Class A and Class B GQAL. The revised Project will disturb 1,108 ha of Class A GQAL with existing cropping use, while 343 ha of Class B GQAL will be impacted upon. However, Class B GQAL is considered to be marginal at best for cropping and more suited to grazing use. An assessment of areas to be disturbed by the revised Project against the provisions of the SCL Act will be made following the completion of the further soil survey.

The spoil material is generally geochemically benign, with negligible acid generation potential, and is therefore not expected to contribute to local or regional impacts to land or water.

This joint land management approach by NAC and APC allows continued agricultural production pre and post mining, which contributes to a more sustainable outcome and ensures that there is an economic imperative as well as environmental and social imperatives driving the revised Project's rehabilitation success. APC also assists NAC with specific rehabilitation management activities, such as grazing trials, offset establishment trials, offset management and weed and pest management.

The revised Project's general rehabilitation areas comprise the greater part of the active mining areas, the out-of-pit dumps, the final voids and mine infrastructure. The general rehabilitation areas equate to approximately 2,030 ha and have been designated to be returned to a final land use of 'grazing with scattered areas of native tree species for shade, ecological and aesthetic purposes'. The rehabilitation strategy will allow a majority of the former revised Project site to be re-incorporated into APC's agricultural activities. The return of the revised Project land to grazing is consistent with the current land uses practised within the region and is considered a long term sustainable outcome for the revised Project.

In general, there will be a loss of land capability as a result of mining across the revised Project site. However, following successful rehabilitation, agricultural production will remain possible post mining in the form of grazing. This beneficial outcome has been demonstrated at the Mine and other NHG mine

sites. The return of the revised Project land to grazing is consistent with the current land uses practised within the region and is considered a long term sustainable outcome for the revised Project.

20.3 Surface Water Resources

A comprehensive surface water impact assessment is presented in **Chapter 5**.

The revised Project is not expected to have a significant impact on the existing flood regime. The change in surface water flows from existing operations was included in surface water modelling of the existing environment. Impacts to flooding as a result of the proposed flood protection levee and railway crossing are largely located on land owned by the APC. Furthermore, the analysis indicates that there would not be additional flooding impacts at Jondaryan as a result of the revised Project. NAC is not proposing to divert or alter the Lagoon Creek channel. The revised Project has offset its resource areas from the creek bank by approximately 150 m and will maintain a 50 m conservation zone along the reaches of the creek that fall within the MLs.

No licenced surface water users were identified on Lagoon Creek with the closest downstream user located after the Oakey Creek confluence 19 km downstream of the revised Project site. Therefore, the impacts of the revised Project to downstream users and the environment are expected to be negligible.

Potential water quality impacts (increased sediment load and salinity) on Lagoon Creek will be mitigated through measures outlined in **Chapter 5**, including a mine water management system, sediment dams, restrictions to site water discharges, progressive rehabilitation, spill controls, and water quality monitoring. The regional cumulative impact on surface water quality is considered small.

20.4 Groundwater Resources

A comprehensive groundwater impact assessment is presented in **Chapter 6**.

Cumulative groundwater impacts may result mining or coal seam gas operations in the area. Five aquifers exist within the revised Project site; the Quaternary alluvial aquifer, the Tertiary basalt aquifer, the Walloon Coal Measures aquifer, and the deeper Marburg Sandstone and Helidon Sandstone aquifers.

Groundwater use in and adjacent the revised Project site is limited to landholders who draw on groundwater through bores for water supply purposes. Aquifers accessed by identified groundwater users include the Quaternary alluvium, Tertiary Basalt, Walloon Coal Measures and Marburg Sandstone.

Groundwater level monitoring has been undertaken in accordance with the Mine's current EA on a monthly basis since 2003. No monitoring bore shows drawdown impacts of more than around 20 m over the duration of monitoring, and all drawdowns appear to stabilise over a period of around two years (i.e. continuing drawdown at a rapid rate does not occur in any bore).

There are five bores currently used for monitoring Marburg Sandstone. Water levels in the Marburg Sandstone have been recovering from the start of 2009 associated with a reduction in Mine

groundwater use due to the WWRF Pipeline coming online, and further recovery is expected to continue into the future.

Groundwater drawdown from existing operations is included in the numerical groundwater modelling of the existing environment. The long term predicted effect of the groundwater drawdown from mine pit dewatering by the revised Project is limited to a drawdown of less than 2 m off-site, with the predicted 1 m drawdown contour extending up to 5 km from the revised Project boundary.

The revised Project lies within the eastern most part of the Surat Cumulative Management Area (CMA). The findings of the Underground Water Impact Report (UWIR) (OGIA, 2012) are based on the outputs of a regional groundwater model developed for the UWIR, which is aimed at predicting cumulative impacts from coal seam gas and conventional petroleum / gas extraction. The UWIR model simulates groundwater extraction associated with all current and proposed CSG projects within the Surat CMA. The groundwater impacts relate to projects located at least 32 km west of the revised Project and do not extend to the revised Project area or overlap with impacts presented in **Chapter 6**. Impacts arising from the revised Project are considered minor and localised.

The management of groundwater drawdown impacts is outlined in **Chapter 6**.

20.5 Terrestrial Ecology

A comprehensive terrestrial ecology impact assessment is presented in **Chapter 7**.

The revised Project will result in the clearing of 143 ha of remnant vegetation. There will be eleven regional ecosystems cleared for the revised Project. There will be areas of vegetation and habitat unaffected by the revised Project, which will continue to be viable areas for fauna to use for feeding, resting and roosting.

Approximately 40.1 ha of remnant bluegrass grassland will be removed as part of the revised Project. Approximately 28.7 ha of brigalow woodland will be removed as part of the revised Project. The Biodiversity Offset Strategy describes the approach to be taken to offset unavoidable impacts to both Commonwealth and State vegetation and species. The CZMP is a specific management plan for the progressive re-establishment of the riparian zone of Lagoon Creek including revegetation and management goals/objectives, planned revegetation techniques, rehabilitation acceptance criteria, a monitoring and reporting regime, a maintenance regime for weeds and poor establishment, and a comprehensive long term management regime.

Three threatened flora species (under EPBC Act) occur within the disturbance area of the revised Project site: *Homopholis belsonii* (Vulnerable), *Bothriochloa biloba* (Vulnerable) and *Digitaria porrecta* (Endangered). A TSRMP has been developed for the transplanting and relocation of threatened species. This plan includes the transplantation and management goals/objectives, site details, a propagation strategy, transplantation techniques, transplantation success criteria, a monitoring and reporting regime, a maintenance regime and a comprehensive long term management regime.

One Vulnerable fauna species (Grey-headed Flying-fox), recognised under the EPBC Act, and two Rare fauna species (Painted Honeyeater and Little Pied Bat), recognised under the NC Act, were

recorded within the revised Project site. The long-term rehabilitation of Lagoon Creek will ultimately increase the area and quality of habitat available to these species, which for conservation purposes will benefit these species at local and regional scales. The retention of areas of habitat suitable to local species will also contribute to the ongoing presence of these species in the Acland area.

There are no other resource developments within 50 km of the revised Project with potential to create regional cumulative impacts to terrestrial ecology values. Assessment of the cumulative impacts of the revised Project at a national and State level are taken into account in the assessment of endangered vegetation communities and threatened flora and fauna species under Commonwealth and State legislation.

20.6 Aquatic Ecology

A comprehensive aquatic ecology impact assessment is presented in **Chapter 8**.

Lagoon Creek is an ephemeral creek and only flows during periods of high rainfall. The existing aquatic habitat is considered to be in poor condition and has been moderately disturbed. The revised Project has the potential to impact on aquatic values of Lagoon Creek through development of haul road crossing, minor alteration in flow regimes as results of mine surface water management system (including two flood levees) and construction of a new 8 km rail spur line and balloon loop, which passes through the flood plain of Lagoon Creek. The proposed mitigation measures including the construction of flood levees, maintaining and enhancing the riparian buffer and implementation of appropriate erosion and sediment management controls will adequately manage the potential impacts at a local level.

There are no other resource developments within 60 km of the revised Project with potential to create regional cumulative impacts to the aquatic ecology values. It is considered that that potential impacts of the revised Project will not extend to the wetland system identified approximately 24 km downstream. The revised Project is not expected to have any regional or indirect cumulative impacts on aquatic ecology.

20.7 Air Quality

Cumulative air quality impacts may result from increased dust generation from the mining operations in the localised area, and also dust generated from the increased rail movements in the region. The revised Project has the potential to result in air quality impacts at a number of sensitive receptors near mining operations. NAC has proposed a comprehensive air quality management plan to manage potential air quality impacts from the revised Project including the implementation of mitigation measures to minimise dust emissions, a dust forecasting system, air quality monitoring and adaptive air quality management.

No other significant mining or industrial developments are currently planned within the local Acland, Oakey or Jondaryan areas or have been proposed as future projects. Air quality monitoring for existing operations at the Mine is presented in **Chapter 9**. The air quality data for TSP, PM₁₀ and PM_{2.5} from existing operations are below the air quality objectives in the EPP (Air). Mining operations for the existing operations will not be contemporaneous with mining operations for the revised Project.

The risk of cumulative impacts from other projects or current operations from the Mine adversely affecting the local or regional airshed is low.

There have been some complaints from residents of Brisbane suburbs along the Metropolitan rail line to the Port of Brisbane concerning dust nuisance from the transport of coal (DSITIA, 2013).

In response to these complaints air quality monitoring was undertaken during September 2012 (<http://www.ehp.qld.gov.au/air/pdf/tennyson-dust-report.pdf>). More comprehensive monitoring was undertaken during March and April 2013 and then again during May 2013 at six locations along the rail coal line of the South West System (SWS) (Oakey, Willowburn (Toowoomba), Dinmore, Tennyson, Fairfield and Coorparoo) and one background location on a section of the Metropolitan rail system not used by coal trains (Chelmer). The two-stage monitoring during 2013 was to assess air quality without and then with veneering of coal in rail wagons from the JRLF.

In all cases, ambient PM_{10} and $PM_{2.5}$ concentrations did not exceed the EPP (Air) 24-hour average air quality objectives of $50 \mu g/m^3$ and $25 \mu g/m^3$ respectively on any day. The PM_{10} and $PM_{2.5}$ concentrations measured at the monitoring sites located on the SWS differed little from those measured at DSITIA's ambient monitoring network sites in Brisbane. Furthermore, coal dust represented no more than 20% dust deposited. The effect of veneering was not clear, masked by wet weather. Thorough coal washing appears to have limited coal dust emissions. The most recent report concluded a low risk of health impacts from coal dust, either within or outside the rail corridor, although there may be a potential for short term nuisance impacts from dust deposition (DSITIA 2013).

The monitoring report is consistent with findings from a 2008 Queensland Rail study in Central Queensland (Connell Hatch, 2008).

The South West System Coal Dust Management Plan (CDMP) has been prepared to assist in mitigation and management of coal dust on the SWS rail corridor (SWS User Group 2013). This CDMP outlines the activities that are currently being undertaken by all members of the SWS User Group to minimise and manage coal dust emissions:

- **Moisture content management:** Washing or blending coal to achieve an optimum moisture level which reduces dust and achieves market qualities.
- **Improved loading practices:** Improved loading practices can reduce coal deposits on coal wagon ledges and wheel surfaces that are prone to spillage during transport. It also supports the ability to create a consistent surface of coal in each wagon.
- **Load profiling of coal surface:** The profile of the loaded coal wagon refers to the shape of the exposed surface of coal on the top of in the wagon. A flat surface with gradually sloping sides (referred to as a 'garden bed' type coal profiles) is has been demonstrated to reduce dust emissions.
- **Veneering:** Veneering is the application of a biodegradable polymer onto the surface of the loaded coal. The veneer forms a crust over the coal load reducing in coal dust lift-off from wagons.

- **Ongoing dust monitoring:** Commitment to a program of ongoing dust monitoring for a further 12 months to validate the effectiveness of mitigation measures and to confirm that dust levels, particularly coal dust levels, continue to meet environmental standards.

NAC proposes to construct a TLF as part of the revised Project. The TLF will replace the JRLF, which during April 2013 was upgraded to include a veneering system. The TLF's design expects to reduce potential coal dust emissions further, for example, through the use of a hopper feed to create 'garden bed' type coal profiles within the rail wagons.

The revised Project will result in up to an additional 27 weekly rail movements along the SWS to QBH. Additional rail movements from the revised Project are unlikely to increase fugitive coal dust emissions along the rail corridor due to the implementation of the CDMP and the advanced TLF. The revised Project is not expected to result in exceedances of the ambient air quality objectives in the EPP (Air) Ongoing SWS rail coal dust monitoring is planned (DSITIA 2013) including the collection of deposited dust samples over a 12 month period at one rail corridor monitoring site within Brisbane as part of the second phase of the Western – Metropolitan Rail Systems Coal Dust Monitoring Program will monitor this..

Overall, the cumulative dust impacts associated with the operation of the revised Project and its associated coal transport are unlikely to significantly affect their local or regional airshed.

20.8 Greenhouse Gas Emissions

The assessment of greenhouse gas emissions is presented in **Chapter 10**.

The operation of the revised Project is estimated to result in approximately 0.18 Mt CO₂-e on an annual basis. These emissions represent an increase of 0.055 Mt CO₂-e in greenhouse gas emissions when compared to current operations of the Mine. The increase in greenhouse gas emissions above current operations of the Mine represents 0.01% of Australia's annual greenhouse gas emissions. The expected increase in greenhouse gas emissions from the revised Project represents a very minor contribution to global emissions and is considered to be insignificant.

20.9 Noise and Vibration

A comprehensive noise and vibration impact assessment is presented in **Chapter 11**.

No other significant mining or industrial developments are currently planned within the local Acland, Oakey or Jondaryan areas or have been proposed as future projects. Noise monitoring for existing operations at the Mine is presented in **Chapter 9**. Mining operations for the existing operations will not be contemporaneous with mining operations for the revised Project. The risk of cumulative impacts from other projects or current operations from the Mine is low.

By implementing noise management and mitigation measures including reduced night time operation and using attenuated equipment (noise attenuation of noisier equipment including excavators, track dozers, loaders and rear dump trucks), the predicted noise levels from the mining operation will meet the EPP (Noise) $L_{Aeq,adj,1\text{ hr}}$ objectives at all noise sensitive receptors over the life of the revised Project

except one noise sensitive receptor located at Muldu. NHG are currently in discussions with the owners of this property with a view to agreeing on appropriate mitigation measures.

The revised Project will result in up to an additional 22 weekly rail movements along the Western Rail Line to QBH. Rail noise impacts have been assessed and are found to comply with the QR criteria.

20.10 Traffic and Transport

A comprehensive traffic and transport impact assessment is presented in **Chapter 13**.

The traffic assessment adopted assumed high growth scenario to estimate traffic level in 2026. It is assumed that the growth rates adopted for the traffic assessment is sufficient to account for growth generated by committed development in the area; this is in line with advice received from Department of Transport and Main Roads (TMR). This is considered an appropriate approach as the compound growth rate applied in the assessment is based on forecast future growth, which will be largely driven by development in the mining industry and not based on past growth that does not reflect this change.

The traffic assessment found that both the construction and operational phases are not expected to have a significant impact on traffic operations on any of the key road links. During detailed construction planning, Traffic Control Plans will be prepared to safely manage road works and minimise disruption to traffic during construction.

20.11 Social

A comprehensive social impact assessment is presented in **Chapter 16**.

There are a five resource and energy projects planned, proposed or currently under construction in the TRC area, including the revised Project. Cumulatively, these projects would increase the non-resident and resident populations in the TRC area. The Surat Basin Workforce Development Plan (Skills Queensland, 2011) indicates that the construction and resource sector workforce in the Surat Basin will increase to 110,864 workers in 2016, from 85,791 workers in 2009. The revised Project represents approximately 0.4 % of these workers, including employees currently employed with NAC. It should be noted that most of this growth referred to in the The Surat Basin Workforce Development Plan will occur in the Surat Basin, west of the revised Project site.

The cumulative increase in resident and non-resident populations in the region is likely to result in increased demand for services and facilities. During both the construction and operational phases there may be indirect population growth associated with back-filling of local positions. This will occur where existing workers, for example farm hands or diesel mechanics, leave their existing employers to pursue employment opportunities in the resources industry. Their former employers will then need to back fill their positions, possibly with labour from outside the region.

Growth is seen to be positive for the Oakey community, and increased direct and indirect employment opportunities are likely to encourage growth in the local communities and encourage young people to remain in the region following school. The cumulative impacts in the region will also bring economic, employment and training opportunities to the TRC area.

Importantly, the revised Project is an extension of an existing mining operation and therefore impacts on housing or employment diversity are not expected to be significant.

20.12 Economic

The assessment of economic impacts is presented in **Chapter 17**.

The cumulative economic impacts of the revised Project include increased export income and employment, which generate wealth within Queensland and Australia that significantly benefits the wider community.

The revised Project is estimated to have significant economic benefits including:

- construction is expected to contribute \$2.7 billion to total Australian economic output, of which \$2.5 billion is estimated to remain in the Queensland economy. Operation is expected to contribute \$14 billion to economic output in Queensland and a total of \$16 billion in Australia.
- value added impact for the Australian economy (contribution to gross domestic product) from construction is estimated at \$1.1 billion, of which approximately \$1 billion comprises contribution to Queensland Gross State Product. The total value added impact from operation is \$5.7 billion in Queensland from a total of \$7.7 billion in Australia.
- construction is expected to support the equivalent of approximately 408 full-time equivalent jobs in Queensland and a total of 468 full-time equivalent jobs in Australia annually, including flow on impacts. Direct employment for the revised Project is estimated to peak at 260 workers.
- operation is expected directly employ 435 people at full production representing an additional 135 direct job opportunities. Including flow on impacts, operation is expected to support the equivalent of approximately 2,546 full-time equivalent jobs in Queensland, from a total of 3,082 full-time equivalent jobs in Australia annually.

At a regional level the revised Project is estimated to contribute:

- \$2.6 billion to value added (gross regional product) from construction and operation, of which \$228 million comprises impacts from household spending.
- 131 full-time equivalent jobs per year during construction and 1,300 per year during operation. During operation, the revised Project is expected to directly employ approximately 392 workers from the region per year (on average). Household income impacts are estimated at \$1.2 billion over the life of the revised Project.

At a local level, the revised Project will contribute to:

- ongoing contribution to local employment during operation – the Mine currently employs 300 full time workers, of which 105 reside within the local study area and would be displaced in the absence of the revised Project. Where possible, NAC will also endeavour to fulfil additional labour requirements for increased production locally. During construction, NAC estimates that some (approximately 20 %) of the construction workforce would be sourced locally.

- ongoing contribution to household income during operation - the local study area has historically had a lower median income compared to the regional study area and the Queensland average, and displaced employment in the absence of the revised Project would likely exacerbate this disadvantage. Conversely, the revised Project will directly provide ongoing household income benefits for the local study area, estimated at approximately 35 % of total salaries outlay.

20.13 Conclusions

There are no other resource developments within 50 km of the revised Project. The revised Project is considered to have minor potential for cumulative impacts at a localised level with respect to terrestrial ecology, aquatic ecology, surface water, groundwater, air quality and noise.

The revised Project will result in up to an additional 22 weekly rail movements along the Western Rail Line to QBH. There is the potential for the additional rail movements from the revised Project to increase fugitive coal dust emissions along the rail corridor. NAC propose to construct a TLF as part of the revised Project including a veneering system that seals the exposed coal at the top of each loaded wagon to reduce the potential for dust emissions during transport along the rail system. Rail movements along the Western Rail Line to QBH are expected to meet relevant air quality and noise objectives.

The expected increase in greenhouse gas emissions from the revised Project represents a very minor contribution to global emissions and is considered to be insignificant.

The cumulative social impacts include a potential increased demand for services and facilities.

The cumulative economic impacts of the revised Project include increased export income and employment, which generate wealth within Queensland and Australia that significantly benefits the wider community.