



NEW HOPE
GROUP

22. Conclusions and Recommendations



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22 Conclusions and Recommendations

The EIS presents an assessment of the environmental, social and economic impacts that potentially arise from the revised Project, and the proposed mitigation measures to minimise these impacts. The outcomes are summarised in the following sections.

New Acland Coal Pty Ltd (NAC) propose to mitigate impacts through the implementation of management plans provided in **Appendix J**. All commitments made by NAC for the revised Project are presented in **Appendix L**.

22.1 Land Resources

The revised Project site has a history of grazing and small lot cropping. Allotment and paddock sizes are relatively small and access is generally restricted by a mosaic of boundary and paddock fencing. Within the Study area the former Rosalie Shire Council identified two proposed Key Resources Areas (KRAs), which are very close to the KRA that covers the current mining operations on ML 50216 and ML 50170. Of the existing ML's within the Study area, ML 50170 was granted in 2001, while ML 50216 was granted in 2006. Nearby land uses include pig farming, dairying, grain storage and various rural homestead properties. Predominant land use patterns of the revised Project site have remained cash and forage cropping in addition to grazing of improved pastures. Much of the revised Project site has long been cleared of its original vegetation due to agricultural production, although localised areas of original remnant vegetation remain alongside Lagoon Creek, relic alluvial plains and upland low hills. The revised Project site has been subject to long periods of continued dry years and unreliable rainfall since the early 1990's.

The land parcels contained within the revised Project site are predominantly freehold and leasehold tenures held by APC and currently there are no registered Native Title Claimants over these areas.

The revised Project site is located within the Lagoon Creek catchment. The majority of the terrain within the catchment is undulating and land use is predominantly grazing. Lagoon Creek is grazed and cultivated up to and within the creek channel. In the upper reaches of the catchment, the terrain becomes steeper and possesses tracts of remnant vegetation. Higher, localised peaks in the Lagoon Creek catchment are also vegetated with trees.

A range of soil types exist on the gently undulating topography of the Study area in which climate, topographical position and old sedimentary periods with more recent volcanic activity have played an important role in the formation of the soil mass. Most prominent soil types are the deep, heavy clay alluvia, lighter clay 'scrub soils' and well-structured texture contrast soils which occur on undulating plains. Areas of sandy non cracking clays and sandy duplex soils also occur.

The soil survey identified a total of 12 soil types within the Study area which include two variants. The variants in this survey are for the high quality agricultural soil B1 and cover situations of reduced soil depth (shallow variant) or areas of increasing slope (upland variant). These variants are of minor occurrence but are noted as they have slightly reduced agricultural suitability.

All soils are considered to be suitable for grazing on improved pastures with the exception of some on the upper slopes where steeper soil types exist.

The Study area supports grazing industries for beef and dairy production. Grazing is predominately based on native pastures and also occurs on mixed farming enterprises combining grain and fodder production. A number of other minor industries including piggeries, horticulture and animal studs are present within the Study area due to the diversity of soils, proximity to markets and a favorable climate. Cropping for grain production is one of the largest agricultural land uses and industries within the Study area with cultivation for cropping and/or sown pasture carried out to some extent.

Pasture lands occur throughout the Study area and mainly occur in soil types A3, A4, A5, B3 and B4. Most of these areas carry native or sown grasses supporting grazing livestock. These pasture lands are (or were) the basis for a number of beef enterprises and to a lesser extent, dairy enterprises of the Study area.

Based on a conservative assessment, it is anticipated that there will be a significant net reduction in the land suitability rating as a result of the revised Project. The suitability of post-mine features for cropping and grazing purposes is constrained by the slope angle, the nature of soil cover and altered moisture profile and waste material quality. These constraints would increase the risk of erosion significantly if cropping or grazing were undertaken on these areas. A return to grazing is entirely feasible for much of the revised Project site post-mining.

The TRC Scheme shows that the revised Project site overlies GQAL. Approximately 54% of the revised Project site lies within Class A, 34% within Class B and 12% within Class C. 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.

As the revised Project site is located within the SCL Southern Protection Area and may result in a permanent impact on SCL, an SCL Protection decision is required as part of the approvals process and for the issuing of an EA for MLA 50232. NAC may undertake further survey of soils within MLA 50232 in areas which have been mapped as Potential SCL and are to be disturbed by the revised Project to confirm the extent of SCL and mitigation requirements. 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.

A search of the CLR and the EMR has been conducted. No land parcels were recorded on the CLR. The search revealed that five sites are listed on the EMR. One of those sites is the former Acland Tip. It has been estimated that the Tip contains approximately 61,500 m³ of soil and waste material. Chemical analysis has been undertaken of samples of soil and waste material collected from the Tip. Based on the results of the chemical analysis, it has been concluded that the majority of the waste material can be classified as general waste and as such does not require any specialised management. The preferred strategy to manage the waste is to relocate the material to an engineered containment cell within one of the revised Project's mine pits.

The spoil associated with the revised Project consists of weathered and fresh overburden having slightly higher clay content than the interburden and floor material. This material is generally geochemically benign, with negligible acid generation potential. During the initial phases of operation, and continuing throughout life of mine, it is proposed to carry out analysis of overburden and tailings material to confirm its geochemical characteristics, and if necessary, implement a series of mitigation measures as outlined above. Overall, the material tested is likely to be suitable for revegetation. Topsoil will also be used as a surface treatment prior to revegetation to minimise any effects from sodic spoil.

Overall, the mine waste material is likely to be suitable for revegetation. Topsoil will also be used as a surface treatment prior to revegetation to minimise any effects from sodic spoil. Additionally and as required, consideration may be given to incorporating calcium into the surface horizon of the final spoil dump to reduce issues related to high sodicity. Taking this action may assist in maintaining the structure of the soil and help to prevent erosion of the underlying sodic material.

The overriding principle for the rehabilitation program at the revised Project is to ensure the disturbed land is returned to a post-mine condition that is stable, self-sustaining and requires minimal maintenance. The main post-mine land use at the revised Project will be grazing based on a self-sustaining vegetation community using appropriate pasture grasses and scattered plantings of native tree and shrub species. A conservation zone will be established along the riparian zone of Lagoon Creek and will also cover bottle tree hill.

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.

A progressive rehabilitation program will be implemented throughout the mine life and reported in each Plan of Operations and will commence when areas become available within the operational land.

Rehabilitated land will be monitored on an annual basis until monitoring data confirms successful achievement of the agreed rehabilitation performance criteria. The experience at the Mine has shown that pasture establishment on elevated landforms is successful. Grazing trials will continue to confirm productivity and inform a long term management strategy for the rehabilitated land. Rehabilitated areas that have not reached a sufficient growth density of vegetation will be reseeded. Supplementary sowing of seed may be used to increase species diversity.

A Mine Closure Plan will be submitted to the DEHP at least five years prior to the surrender of the EA. The decommissioning and final rehabilitation of the revised Project will occur on a staged basis over several years.

22.2 Surface Water Resources

The revised Project site is located within the Lagoon Creek catchment of the greater Condamine River catchment. Lagoon Creek is an ephemeral creek, with a shallow, narrow poorly defined channel and wide floodplains. The creek has been moderately disturbed through past agricultural practices including a number of in-stream dams. NAC is not proposing to divert or alter the Lagoon Creek channel and has offset the revised Project's resource areas from the creek bank by approximately 150 m. Importantly, the 150 m operational offset includes a commitment by NAC to a 50 m 'no mining' buffer to promote the re-establishment of the creek's riparian zone. The buffer distance either side of Lagoon Creek within the revised Project area will be incorporated into the Mine's current conservation zone,

NAC will expand the existing Lagoon Creek monitoring program as part of the WRMP for the revised Project. The WRMP is located in **Appendix J.4**.

The revised Project is not expected to have a significant impact on the existing flood regime. Furthermore, the analysis indicates that there would not be additional flooding impacts at Jondaryan as a result of the revised Project.

Flood protection for the revised Project's resource areas will be provided through two flood levees designed to provide protection from a PMF flood event, which is well in excess of the current legislative requirements. In addition, NAC has committed to ensuring the revised Project's final landform is outside the existing PMF flood extent, and as a result, there are no flooding impacts on the key aspects of the proposed final landform (i.e. the depressed and elevated landforms).

Surface water licences are all located a significant distance downstream with the closest located 19 km downstream of the revised Project site. All but one of the licences are located downstream of the confluence with Oakey Creek and Lagoon Creek. However, it is considered that there will be negligible impacts to water licence holders and stock and domestic users downstream of the revised Project site.

NAC is not seeking any new water allocations. The majority of the revised Project water demands are provided from the WWRF through a pipeline constructed in 2009. This beneficial use of a waste water product ensures the revised Project possesses a sufficient and reliable water supply.

As part of NAC's water management system, runoff from disturbed areas will be captured and treated with an amount available for reuse by the revised Project's mining activities. In line with current industry guidelines, NAC's water management system will include a controlled release system to manage rainfall events and minimise adverse impacts to the downstream receiving environment. The ephemeral nature of Lagoon Creek means that controlled releases will occur on a minimal basis over the life of the revised Project, and as a result, are not expected to have a significant impact on water quality, aquatic ecology and downstream water users.

22.3 Groundwater Resources

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.

The Quaternary Alluvial aquifer is limited in spatial extent and within the revised Project site may only exist within the westernmost part in association with Lagoon Creek, although investigations have shown that Lagoon Creek is very likely disconnected from the regional groundwater system. The alluvial aquifer is known to form a significant groundwater resource outside of the revised Project site, especially in association with Oakey Creek south of the revised Project site and Myall Creek northwest of the revised Project site.

A review of surface geological mapping and bore logs from drilling undertaken as part of the revised Project baseline assessment demonstrates that there is only minor outcrop of the Tertiary Basalt aquifer in the northwestern and extreme southwestern sections of the revised Project site. The basalt is known to form a major aquifer immediately west of the revised Project site.

The Walloon Coal Measures aquifer outcrops over much of the revised Project site, and forms the main groundwater aquifer intersected by the revised Project. On a regional scale the Walloon Coal Measures is considered a confining unit of the GAB however on a local scale it is known to support significant groundwater extraction for stock and domestic use. Groundwater is dominantly held and transmitted within the coal seams, although testing has shown the interburden strata may also hold and transmit significant quantities of water.

The Marburg Sandstone and Helidon Sandstone aquifers are major aquifers of the Great Artesian Basin and are the deepest semi-confined to confined aquifers underlying the revised Project site. These aquifers lie at significant depth below the revised Project's mine pits. The Marburg Sandstone aquifer is separated from the Project's mine pits by at least 75 m of low permeability Walloon Coal Measures/Eurombah Formation aquitard-forming strata, and the Helidon Sandstone aquifer is separated from the Marburg Sandstone aquifer by around 200 m of Evergreen Formation, which is a recognised aquitard. Only very small impacts from the revised Project are expected on the Marburg Sandstone aquifer and no impacts will occur to the Helidon Sandstone aquifer.

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. The current Mine uses groundwater from bores accessing the Tertiary Basalt aquifer as the main potable water supply, groundwater inflows to the mining pits from the Walloon Coal Measures aquifer for industrial purposes (dust suppression), and maintains access to the Marburg Sandstone and Helidon Sandstone aquifers as an emergency water supply for industrial purposes. In general, reliance on groundwater for industrial purposes has decreased significantly since the WWRF Pipeline was brought online in 2010. No groundwater Dependant Ecosystems have been identified within or adjacent to the revised Project site.

As part of the groundwater impact assessment process, a numerical groundwater model was used to predict the effect of groundwater drawdown from mine pit dewatering. The modelling was used to assess the potential effect of groundwater drawdown resulting from mine pit inflows on existing groundwater users. Mine pit inflows are predicted to range from 0.8 to 4.0 ML/day during mining, with predicted drawdown of 1 to 5 m in the Walloon Coal Measures and Tertiary Basalt aquifers extending approximately 7 km west from the revised Project's boundary. Drawdown in the Walloon Coal Measures aquifer to the south and east of the Project site is not predicted to exceed much more than 5 m outside the Project's boundaries. Drawdown within the Marburg Sandstone aquifer is predicted to be less than 3 m throughout the revised Project's duration, with impacts greater than 2 m limited to the revised Project site. Off-site impacts are limited to drawdown of less than 2 m, with the predicted 1 m drawdown contour extending up to 5km from the revised Project boundary.

After cessation of mining in 2030, groundwater levels are predicted to gradually recover so that for the most part there is less than 5 m residual drawdown outside the revised Project's boundaries.

Recovery to pre-mining conditions throughout the revised Project site is limited by evapotranspirative losses from the depressed landforms (rehabilitated final voids). Due to the high regional potential evapotranspiration rate, groundwater discharge to the depressed landforms (rehabilitated final voids) is predicted continue at a rate only slightly less (3.5 ML/day) to that in the last year of mine operation. Drawdown adjacent the last areas to be mined is predicted to remain relatively high (approximately 20 to 30 m) due to the ongoing evaporation-driven groundwater discharge into the depressed landforms (rehabilitated final voids). A pit lake is expected to form within the Manning Vale West depressed landform, but a lake may not form to any significant degree in the Willeroo depressed landform and is not expected to form at all in the Manning Vale East depressed landform. Groundwater level recovery within the depressed landforms (rehabilitated final voids) remains at to 30 to 40 m below the level of the pre-mining water table in the long term, due to the ongoing evapotranspirative groundwater discharge. As a result, the depressed landforms (rehabilitated final voids) form a depression of the potentiometric surface within the vicinity of the depressed landforms (rehabilitated final voids) and act as a groundwater sink that will not permit any pooled water within or adjacent to the depressed landforms (rehabilitated final voids) to flow outwards into the regional groundwater system.

The 1 m drawdown extent is predicted to remain at approximately 7 km from the revised Project boundary at its greatest (western) extent in the long term post-mining due to ongoing evapotranspiration-driven groundwater discharge to the depressed landforms (rehabilitated final voids). However, the groundwater system is expected to recover post-mining to a new steady state-equilibrium such that no additional groundwater impacts are expected other than those that exist at the end of mining in 2030.

The groundwater monitoring program currently being undertaken by the Mine will be extended to include additional locations within and outside the revised Project site, with new monitoring installations located in areas where drawdown impacts, and receptors sensitive to those impacts, are predicted to occur. Groundwater monitoring will be conducted on a regular basis and will provide information to detect any significant variations to the existing groundwater system over the life of the revised Project. The primary aim of undertaking groundwater monitoring on site is to ensure sufficient data is gathered for consideration of the following hydrogeological aspects:

- temporal and spatial variations in groundwater levels;
- temporal and spatial variation in groundwater quality; and
- groundwater level or quality effects including early detection of groundwater drawdown caused by dewatering of the mine pits.
- The results of the groundwater monitoring program will be used to further inform and refine the groundwater impact assessment for the revised Project, with model refinement occurring on a regular basis.

The revised Project is not expected to have a detrimental effect to the groundwater quality at revised Project site. Mitigation measures can be put into place should the effects of dewatering require alternative water supplies for affected users, such as installation of new pumps, deepening of existing bores or installation of a new bore at another location on the property. NAC will undertake a comprehensive bore characterisation program for third party groundwater users in the predicted impact area, to identify the exact requirements for 'Make Good' for those affected users.

NAC will manage the potential groundwater impacts from the revised Project using a dedicated GMIMP. The GMIMP is based on the groundwater impact assessment work completed for the revised Project's EIS. The GMIMP will be regularly reviewed over the life of the revised Project, and as required, will be updated based on monitoring results, new outputs from revisions to the groundwater modelling and any other applicable groundwater management matters that relate to operation of the revised Project. The GMIMP will form a supporting document to NAC's Plan of Operations for the revised Project.

NAC will discuss and agree with the administering authority, the need for on-going groundwater management, including monitoring during the decommissioning phase of the revised Project.

22.4 Terrestrial Ecology

The revised Project is located in area that has had a long history of agricultural use, which has resulted in the clearing of large areas of vegetation and habitat. Consequently, vegetation and habitat is fragmented and present in isolated patches across the Acland area.

Even though the majority of the revised Project's footprint is located on cleared agricultural land, the revised Project will result in the clearing 143 ha of remnant vegetation within the planned disturbance footprint. Nine regional ecosystems will be affected by vegetation clearance activities proposed for the revised Project. Under the VM Act, three regional ecosystems are listed as Endangered, five regional ecosystems are listed as Of Concern and one regional ecosystem as Least Concern.

There are two threatened ecological communities, under the EPBC Act, to be impacted by the revised Project, covering an area of 64.7 ha – a *Dichanthium sericeum* dominant grassland community (40.1 ha) and an *Acacia harpophylla* dominant and co-dominant community (24.6 ha).

Two Queensland and three Commonwealth listed plant species are known to occur within the disturbance footprint of the revised Project area - *Digitaria porrecta* (Qld and Cth), *Homopholis belsonii* (Qld and Cth) and *Bothriochloa biloba* (Cth), respectively. A further three species of listed plants possess a low probability of being affected by the revised Project.

The Koala has been identified in the vicinity of the revised Project area and some of the Koala habitat within the revised Project area will be cleared. The Grey-headed flying fox has been observed in the revised Project area.

Overall, the habitat in the study area for the fauna species targeted in this report, and other native species generally, is of poor quality. The site has previously undergone significant clearing for cultivation and grazing and is heavily disturbed and mostly comprised of cleared land and access tracks. The small patches of remnant vegetation that remain are generally associated with Lagoon Creek and farm houses. As a result, these small patches are highly fragmented, isolated and subject to edge effects. Consistent with a landscape in this condition, the area is heavily invaded by introduced pest species such as the Feral Cat (*Felis catus*) and Wild Dog (*Canis familiaris*), Indian Mynas (*Acridotheres tristis*), Red Fox (*Vulpes vulpes*) and European Rabbits (*Oryctolagus cuniculus*), and weeds including Velvet Tree Pear (*Opuntia tomentosa*) and Rhodes Grass (*Chloris gayana*). While there will be clearing of vegetation and habitat for the revised Project, there will be areas left unaffected by the revised Project footprint. These areas will continue to be used by wildlife and be able to provide resources for species found in the revised Project area.

Those impacts that are not able to be avoided are to be managed with the implementation of an offset strategy and a number of specific management plans, to address matters such as species translocation, offset management and management of the Lagoon Creek corridor.

22.5 Aquatic Ecology

The Lagoon Creek catchment has a long history of disturbance from activities including grazing and mining and as a result, riparian and aquatic vegetation, as well as channel diversity and bank stability have been highly impacted and exotic weeds are now prevalent (SKM, 2011). The ecological and physical status of Lagoon Creek as part of the lower Oakey Creek sub-catchment was classed as 'poor' to 'very poor' in all the key parameters surveyed in the SoR Report for the Upper Condamine River catchment (Phillips and Moller 1995).

During dry periods, flows cease in Lagoon Creek and surface water contracts into temporal pools. These conditions predominate in the ephemeral watercourses of the Condamine catchment and are interspersed with periods of flow when substantial rainfall and run-off events occur in the catchment. The aquatic habitats that persist during dry periods are limited to temporal pools formed from in-stream earthen impoundments. During the wet season the channels provide shallow but varied habitat and connectivity within the watercourse.

Water quality was found to be generally poor; low dissolved oxygen concentrations and high nutrient concentrations occurred during the wet season survey in 2013, with high pH and electrical conductivity occurring during the dry season. Values frequently exceeded the guidelines for the protection of moderately disturbed aquatic ecosystems.

At the dry season survey sites riparian trees have been cleared, often to the watercourse edge. Some of the upper locations of Lagoon Creek exhibit sections of intact riparian vegetation including trees and shrubs, and this was observed at the two sites visited during the wet season survey. In the lower

section, where the proposed rail crossing is located, the riparian vegetation has been cleared and vegetation is limited to ground cover dominated by grasses.

Macrophyte diversity in Lagoon Creek is low, with fringing sedges and rushes the most dominant forms. Macrophytes are likely to be restricted to the permanent waterbodies and were not observed in the channel habitats during the flow period.

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 (SKM, 2011).

Fourteen fish species are known to occur in the surrounds of the aquatic ecology study area. Of these, the EVNT species Murray Cod (*Maccullochella peelii*) or its potential habitat was identified within a 25 km radius. However, within the Lagoon Creek itself, only three species of fish have been recorded: spangled perch (*Leiopotherapon unicolor*), gudgeon (*Hypseleotris* spp.), and the introduced Mosquitofish (*Gambusia holbrooki*). These three species are widely distributed and tolerant of disturbed environments. Furthermore, the degraded aquatic habitat and connectivity, and land use impacts in Lagoon Creek are likely to restrict the presence of fish species to those with high tolerance of degraded habitats and water quality. The distribution of fish species that are strongly associated with high quality habitats and abundant woody debris (e.g. Murray Cod) (Schiller and Harris 2001) are highly unlikely to extend upstream into such disturbed environments as Lagoon Creek.

The single turtle species observed during the survey was the Eastern snake-necked turtle which inhabits slow moving water bodies from farm dams to major rivers and lakes. Due to their ability to move over land to find water, they are able to inhabit shallow lakes and ephemeral waterbodies. The Murray turtle is highly unlikely to be found in the aquatic ecology study area due to its habitat preference for large river and permanent lakes both of which are not present in the aquatic ecology study area.

During and following substantial rainfall and catchment run-off events, the flows in the channels of Lagoon Creek provide connectivity within the watercourse and to floodplains and off-stream aquatic environments. These periods of flow provide opportunities for dispersal and movement of aquatic flora and fauna, which are often accompanied by reproductive strategies and increased availability of nutrients and food resources. Whilst the aquatic environment of Lagoon Creek has been substantially impacted, the wet seasons flows are important for maintaining the aquatic values present in this system.

The application of the mitigation strategies for management of water quality, altered flows, aquatic habitat, watercourse crossings and the introduction and spread of weeds associated with the revised Project have been developed with respect to the existing environment of the aquatic ecology study area. The proposed mitigation strategies provide a suite of management actions to avoid or minimise the potential impacts of the revised Project and to maintain the aquatic values of Lagoon Creek.

The potential presence of Murray cod in Lagoon Creek in the reach associated with the Study area is considered to be very unlikely due the abundance of instream barriers downstream, the limited and moderately disturbed aquatic environment, limited instream habitat and the degraded water quality. The potential impacts of the revised Project on water quality, alteration of hydrology, instream barriers,

aquatic habitat and downstream environmental values are considered to be minimal with the implementation of the mitigation measures and are extremely unlikely to have a detrimental effect on the distribution of Murray cod in the Oakey Creek subcatchment. A comprehensive assessment of water quality is presented in **Chapter 5, Section 5.6**.

It is considered that that potential impacts associated with the revised Project will not extend to the Regional ecosystem identified approximately 24 km downstream of the Study area. Given this distance downstream, the likely ephemeral nature and offstream location of the possible wetland, and the proposed mitigation strategies and management actions for the revised Project, the risks of potential impacts on water quality are very low.

22.6 Air Quality

This Chapter has assessed the air quality impacts of the revised Project at nearby surrounding sensitive receptors.

Air quality in the study area for the revised Project is influenced by current operations of the Mine and other localised sources including wind-blown dust and bushfires. NAC continues to undertake a range of air quality monitoring around the Mine (i.e. from 2001 to present). All recorded PM₁₀ concentrations since commencement of monitoring are below the air quality goals in the EPP (Air).

Dust emissions for three operating scenarios of the revised Project were estimated using published emissions factors. Dust emissions estimates incorporated dust control factors in line with mining industry benchmarks for dust management.

CALPUFF was used to predict PM₁₀ and TSP concentrations and dust deposition rates at sensitive receptors for three operating scenarios for the revised Project. The dispersion modelling indicates that without mitigating measures there is potential for air quality impacts at:

- sensitive receptor 1 due to mining operations in Manning Vale East pit; and
- sensitive receptors 35, 36, 37, 38, 39 and 45 due to mining operations in Manning Vale West pit.

NAC has proposed a comprehensive air quality management strategy to manage potential air quality impacts from the revised Project including the implementation of:

- mitigation measures to minimise dust emissions;
- blast fume management procedures;
- a dust forecasting system;
- a range of air quality monitoring techniques (real time and contemporary);
- adaptive air quality management;
- communication and concern management; and
- an acquisition/relocation/treatment strategy.

The implementation of adaptive air quality management measures will include the suspension or modification of operations in response to potential dust risk predictions from the dust forecasting system, real time air quality monitoring data and visual monitoring.

This assessment considered the potential residual air quality risk through dispersion modelling incorporating the adoption of adaptive air quality management. This assessment assumes mining is restricted to daytime hours (6 am – 6 pm) in the Manning Vale East Pit and suspension of overburden activities (including loading, dumping and hauling) in the Manning Vale West Pit for periods where there is potential for dust risk. The implementation of adaptive air quality management predicted no exceedances of the EPP (Air) objective. Successful implementation of adaptive air quality management will significantly reduce potential for air quality impacts from the revised Project.

The revised Project is expected to comply with the ambient air quality objectives in the EPP (Air) provided NAC successfully implement a comprehensive air quality management strategy including a dust forecasting system, real time air quality monitoring and adaptive air quality management through the suspension or modification of mining activities to reduce dust emissions.

22.7 Greenhouse Gas and Climate Change

Greenhouse gas emissions were estimated based on published emissions factors. 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 per cent of Australia's annual greenhouse gas emissions.

The project is considered to have a low vulnerability to climate change.

22.8 Noise and Vibration

The noise and vibration impact of the revised Project has been assessed. A computer noise model was developed using SoundPLAN version 7.2 to predict the noise levels during different stages of the mining operations.

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 $L_{Aeq,adj,1\text{ hr}}$ criteria of 42 dB(A) in daytime and evening hours, and 37 dB(A) in night time hours at all noise sensitive receivers over the life of the revised Project.

The maximum operational noise level from the mining operation is predicted to meet the Planning for Noise Control's sleep disturbance criterion of L_{Amax} 52 dB(A) during the worst case temperature inversion condition at all noise sensitive receptors over the life of the revised Project.

The cumulative noise impact from both the revised Project and the existing Mine during the early stage of the revised Project's life has been predicted and assessed in the year 2019 scenario and is found to comply with the EPP Noise criteria.

The un-weighted noise levels from the revised Project's mining operation are predicted to comply with the low frequency noise criteria.

The airblast overpressure and vibration impacts from blasting can be managed to achieve acceptable levels at the sensitive receivers surrounding the revised Project.

Road and rail traffic noise impacts have been assessed and are found to comply with the TMR and QR criteria, respectively.

Recommendations are provided to minimise the revised Project's potential noise and vibration impacts and to ensure nuisance levels at nearby sensitive receptors are kept to a practical minimum.

22.9 Cultural Heritage

The historical heritage aspects of the Study area relate to the farming and grazing activities of the Acland region as well as the coal mining industry and its link to the development of the region as a whole.

The non-indigenous cultural heritage assessment identified 12 'cultural places' within the Study area. Although the revised Project does not directly impact on the listed items, an assessment has been conducted and is presented in **Section 12.2.7**. The revised Project will not directly impact on the 12 'cultural places'. The Acland Management Strategy outlining the property types and structures in Acland currently owned by the NHG is provided in **Chapter 3, Section 3.12**.

To satisfy its obligations as an owner of a Queensland Heritage listed site, the NHG has developed the ACCMP for the Acland No.2 Colliery, and is provided in **Appendix J.12**. The purpose of the ACCMP is to set out an agreed framework for the management, preservation and maintenance of the listed structures within the former Acland No.2 Colliery site. A total of twenty-one management commitments have been included in the ACCMP to ensure the former Acland No.2 Colliery receives a high standard of management and is protected for future generations.

The only statutory Aboriginal party for MLA 50232, comprises those people who together were the registered native title claimant for the former Western Wakka Wakka People native title claim.

NAC possesses a signed 'Co-operation Agreement' with the Western Wakka Wakka People dated 15 October 2003. In addition, NAC possesses a signed CHMP with the Western Wakka Wakka People dated 14 July 2006. This CHMP applies to the land within MDL 244. All documents between NAC and the Western Wakka Wakka People are confidential and will only be discussed in general terms for the purpose of the EIS.

22.10 Traffic and Transport

The traffic assessment examined potential traffic impacts from the revised Project, in terms of its construction and operational phases, which include:

- increased vehicle movements on the existing road network associated with the revised Project workforce;

- materials supply during the construction and operational phases; and
- altered traffic patterns and journey times resulting from permanent road relocations.

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, with the LoS for each phase estimated to remain unchanged for each road section in comparison to the background traffic volumes. During detailed construction planning, Traffic Control Plans will be prepared to safely manage road works and minimise disruption to traffic during construction.

Detailed intersection assessment should be undertaken during the preliminary design phase of the revised Project when the traffic demand and other infrastructures are confirmed through the EIS process. NAC will ensure that all road intersections required for the revised Project are adequate to safely cater for the construction and operational traffic volumes. However, given that intersection as currently planned would operate outside DMR's standard DoS thresholds in 2027 irrespective of the additional development traffic, TMR and TRC should take an active role in consultation with NAC in determining the appropriate intersection design. One school bus routes (S24) will be affected by the revised Project. The revised access to Acland township and appropriate rerouting will be considered in consultation with all key stakeholders. Due to the small increase in traffic movements regenerated by the revised Project during the construction and operation phase, no significant impacts are anticipated to the operation and safety of school bus services within close proximity to the revised Project.

The ALCAM Report outlines the key findings of the level crossing assessment undertaken on the key level crossings located within close proximity to the revised Project site. NAC will ensure that appropriate discussions are undertaken with the relevant road and rail authorities to ensure an appropriate mitigation measures are implemented based on the proposed design considerations outlined within the ALCAM Report.

Recommended mitigation measures include scheduling tasks outside peak traffic periods, conducting materials haulage on established truck and arterial routes, staging of construction works to minimise congestion, notification and consultation as appropriate, implementation of local traffic control measures, provision of adequate parking and utilisation of the private (internal) haul road.

22.11 Waste Management

During the revised Project construction, operation and decommissioning phases, waste will be managed to avoid adverse impacts on the life, health and wellbeing of people and the diversity of ecological processes and associated ecosystems surrounding the revised Project site. Operational waste streams in particular will remain in line with those currently generated at NAC.

NAC will continue to maintain segregation of different types of waste during generation, storage and transportation. The appropriate management and storage of wastes will prevent on-site and off-site pollution and enhance opportunities for reuse and/or recycling. Waste that is not regulated or able to be re used or recycled will be sent for disposal to the Oakey landfill or the closest practical landfill. All waste streams will be assessed for potential reuse, prior to transport to an approved waste disposal facility.

The revised Project will not generate many wastes that have a market demand. There are likely to be opportunities to reuse and recycle aluminium cans, some containers such as glass bottles, paper and scrap steel. Some other general wastes will be recycled or reused on-site, such as pallets, or disposed of by licensed waste management contractors.

The waste management strategies proposed for the revised Project will consider waste management from the concept and planning stages through design, construction, operation and decommissioning. Waste planning allows for considerable flexibility in the management of all wastes. Waste segregation will apply to the management of all waste streams onsite at the point of generation and will cover the handling and removal of a variety of wastes in order to comply with current regulations. The Waste Management Plan (WMP) for the revised Project is provided in **Appendix J.13**.

22.12 Visual Amenity

The undulating nature of the Study area generally provides for extensive views of a predominately rural landscape with a medium degree of visual amenity. Apart from the Mine, the revised Project site is dominated by interspersed vegetated landscapes with unobtrusive residential developments.

The Mine is a visually prominent feature within the existing landscape. However, through the implementation of the mitigation measures listed in **Table 15-5**, views of mining operations for the revised Project from sensitive receptors would be limited.

In its initial stages, the revised Project would be a visually prominent feature within the landscape and, to an extent, will conflict with the existing nature of the visual environment. The nature of the works will initially alter the existing visual environment through excavation of a predominately rural landscape and the removal of vegetation.

As is common with the broader region, residential dwellings surrounding the revised Project site are sparsely located and it is considered that approximately eight of the 44 sensitive receptors would have an expansive view of the various works being undertaken for the revised Project, as presented in **Figure 15-2 to Figure 15-5**. Primarily, traffic on Oakey-Cooyar would have the highest level of visibility over the revised Project site. However, as the traffic is considered as a temporary receptor, impacts are considered to be minor. Sensitive receptors within Acland would also have views of the revised Project site due to its proximity, but suitable mitigation measures such as vegetation screening will minimise visual impacts.

The establishment of visual buffers around the revised Project site, particularly along Oakey-Cooyar and Jondaryan-Muldu Roads and at appropriate locations within Acland, will limit views of the revised Project and ensure that the region retains its predominately rural outlook.

Post-operation of the revised Project, the elevated and depressed land forms will be re-vegetated and returned to a relatively natural form to allow for grazing land uses. In the long-term, it is expected that impacts from the revised Project on the visual landscape will be negligible as the peaks and dips associated with the elevated and depressed land forms will be similar to the undulating topography that is common throughout the broader, regional landscape.

22.13 Social Impact

The revised Project will provide several key social benefits for local and regional communities. Benefits will include:

- creation of employment for local and regional communities;
- opportunities for local business and industry to supply goods and services to the revised Project;
- increased spending power of employees and the associated boost to the local economy;
- training and apprenticeship opportunities at the Mine or with APC wherever possible; and
- support for local organisations and community groups through donations and population growth.

These benefits will be enhanced through the continued application of local procurement and recruitment policies, as well as through NAC's direct involvement in local communities.

The additional workers and their families to the SIA Study area may result in some negative impacts due to increased demand for residential accommodation and decreased housing affordability. The state of the local and regional property markets will also have an important influence over the degree of impact. However, the property market was generally considered fit to absorb the small population increase associated with the revised Project, as housing and accommodation will be required over time. Population growth was welcomed by businesses and community services in the local area and was seen to contribute to the sustainability and vitality of the local area.

Commuter traffic and road damage is an existing problem between Toowoomba City and Dalby and as a result, may deteriorate if the population of the TRC area is significantly increased. Future government policy direction and spending levels in these service and infrastructure areas will also be critical factors.

The following management measures will be implemented by NAC to enhance benefits and minimise impacts:

- where practical and possible, NAC will continue to undertake recruitment that promotes the employment of local people;
- NAC will continue to consult with local government and community service providers to discuss the requirements of the revised Project and possible business opportunities;
- NAC will provide ongoing feedback to the TRC, government agencies and community groups with regard to the progress of the revised Project so that the necessary preparations can be made in a timely manner;
- NAC will assist in maintaining agricultural land uses and opportunities in Oakey through APC; and
- NAC will continue its community support program for local individuals, clubs and schools.

The application of the recommended mitigation measures will help reduce the potential impact on employees and nearby communities.

22.14 Economics Impact

The economic impact assessment considers impacts (both quantitatively and qualitatively) at a local, regional, state and national level.

Economic benefits for the local study area from the revised Project's construction and operation include:

- Ongoing contribution to local employment during operation– the New Acland 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. During operation of the revised Project, it is anticipated that this employment will continue to be sourced from the local study area. Where possible, the proponent will also endeavour to fulfil additional labour requirements for increased production 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 provide ongoing household income benefits for the local study area, estimated at approximately 35 per cent of total salaries outlay.
- NAC will seek to utilise local suppliers where possible and commercially viable during the construction and operation stage, which will enhance economic benefits for the local study area. However, it is unlikely that significant benefits for the local study area will be realised from construction expenditure, since the majority of expenditure is likely to be outlaid outside of the local study area. However, some impacts for economic output, value added, employment and household income would be expected through induced impacts associated with construction workers spending money in the local economy. In addition, NAC estimates that some (approximately 20%) of the construction workforce would be sourced locally. Availability of local labour will be reviewed at the revised Project's commencement.

Economic risks for the local study area from the revised Project's construction and operation include:

- A reduction in agricultural output valued at \$2.1 million per year or \$34.3 million over the life of the revised Project. This represents a direct employment impact of approximately 5 FTEs per year. It is expected that rehabilitation during de-commissioning would return the majority of impacted land to a state suitable for agricultural production and therefore impacts are not estimated beyond this period.
- Significant migration to the local area causing upward pressure on property values - significant impacts on are not expected since the majority of the labour force during operation is expected to be sourced locally. Construction workers which are sourced from outside the local study area are not expected to relocate to the region.

Across all regions, the revised Project will directly support approximately \$6.6 billion in economic output from construction / capital and operational expenditure. Direct employment for the revised Project is estimated at 109 FTEs on average during construction and 412 on average during operation. Total employment impacts per year (including direct, indirect and induced impacts are estimated at 468 FTEs per year on average from construction / capital expenditure and 3,082 FTEs

per year on average during operation. As previously outlined, IO modelling provides an estimate of contributed or supported economic output, value added, employment and household income and does not necessarily constitute a generated benefit.

The total economic impact across all regions and including indirect and induced impacts is summarised in **Table 22-1**. Impacts are estimated for output, value added, employment and household income, and show that the revised Project will potentially contribute to the on-going economic growth in the Darling Downs (which has historically been lower than the Queensland average). Household income benefits may contribute to increasing the median household income in the study area which is also below the Queensland average.

■ **Table 22-1 Overall economic impact (IO modelling)**

Economic impact	Regional Study Area	Total Queensland	Total Australia
Total output impact (millions)	\$3,876	\$16,740	\$18,711
Total value added impact (millions)	\$2,584	\$6,646	\$8,868
Total employment impact (Average FTE per year)	1,431	2,953	3,550
Total household income impact (millions)	\$1,247	\$4,288	\$4,877

Source: SKM Calculations

Estimated economic benefits for the local and regional study areas can be maximised through strategies to increase local worker and business participation, including from local indigenous communities, and through NHG's commitment to the Queensland Resources and Energy Sector Code of Practice for Local Content and the company's internal purchasing policy that makes provision for local purchasing.

NAC also currently holds two headline internal (confidential) policies which address employment opportunities for recognised traditional owners of impacted land. These will be renegotiated for the revised Project.

More generally, strategies for increasing local participation and contributing to development of a skilled workforce in the study area include:

- Providing information for regional businesses to allow them to tender, bid or apply for projects and/or work.
- Providing or facilitating the provision of pre-tender training and information to ensure interested parties are tender ready.
- Consider programs to encourage the use of apprentices during the construction stage to enhance the local skills base. Also, NAC could work with regional training organisations to provide skills upgrade programs for any areas that there is a perceived gap in skills.

Other economic risks for which mitigation strategies have been provided include:

- Displacement of employment following construction and commissioning phase

- Transfer of employment from other industries or businesses leading to reduced business viability and increasing labour costs

Negative impacts on future development are not expected, except where significant competition for labour and materials exists. This can be mitigated through sourcing labour and materials externally. However, this approach should only be pursued where absolutely necessary, since it would reduce the overall contribution of the revised Project to the local economy.

Overall, if suggested strategies for local participation are pursued, the revised Project is expected to contribute to economic development in the local and regional study areas through supported output (and value added), employment and household income.

22.15 Health Safety and Risk

The information contained in **Table 18-6** to **Table 18-8** shows that the health and safety risk profile for the revised Project is generally 'Low' or 'Moderate' with the exception of noise generation, dust, groundwater management, runoff, hydrocarbon leaks, weed & pest management, safety risks from slumping, fire, run off from tailings, dam failure, and clearing of rare and endangered ecosystem have been assessed as having a 'High' risk. These risks are common to all open cut mining operations and are subject to the controls contained in the *Coal Mining Safety and Health Regulations 2001*.

The information contained in **Table 18-6** to **Table 18-8** shows that the environmental risk profile for the revised Project is generally 'Low' to 'Moderate'.

Noise has been identified as a high risk for the revised Project due to its proximity to sensitive receptors. **Chapter 11** identifies these receptors along with appropriate mitigation measures and proactive monitoring to ensure the revised Project meets all regulatory requirements.

The majority of revised Project risk is likely to occur during the construction period. All site personnel will undergo comprehensive site inductions, regular 'tool box talks'. The risks identified in this Chapter will be communicated, audited and regularly reviewed to ensure applicability.

All identified risks to the community and surrounding environment will be assessed and mitigated as far as reasonably practicable. Mitigation measures will be developed in consultation with the relevant stakeholders. The Mine is located in a rural setting with no other industrial or mining activities in the vicinity. A cumulative assessment for the revised Project is presented in **Chapter 20**.

NAC has developed emergency and evacuation planning and response procedures in consultation with state and regional emergency service providers. NAC will continue to liaise with Queensland Fire and Rescue Service (QFRS), Queensland Ambulance Service (QAS), local State Emergency Services, local ambulance, local hospital services and local Police throughout all stages of the revised Project. NAC will continue to conduct periodic emergency simulation drills with its regional emergency service providers over the life of the revised Project. In addition, NAC will liaise with Queensland Health at the appropriate time regarding emergency management procedures for the revised Project. The Emergency Management Plan for the revised Project is located in **Appendix J.15**.

22.16 Community Consultation

During the consultation period, more than 627 contacts were made with the Project team via the revised Project contact points, community information sessions, CRG meetings, individual meetings and discussions during visits to the New Hope Community Information Centre since the announcement of the revised Project in November 2012.

The program was based on open and transparent public consultation, allowing multiple opportunities for community and stakeholder input and the provision of easily accessible communication channels from which stakeholders could seek information and provide input into the revised Project and the statutory approvals process. NAC actively engaged with a range of stakeholders as identified in the Stakeholder Engagement plan with the main topics raised through these activities recorded to include:

- queries about engagement activities for the revised Project, which are addressed in **Appendix K.2**. On-going community engagement will continue to focus on proactive discussions with community and stakeholders to better inform them about these processes;
- employment enquiries, which are addressed in **Chapter 16**;
- sponsorship and donation requests and opportunities, which are addressed in **Section 19.5.14**;
- discussions surrounding community partnerships, which are also addressed in **Section 19.5.14**;
- clarification and comments regarding the approvals process. On-going community engagement will continue to focus on proactive discussions with community and stakeholders to better inform them about these processes;
- concerns about potential dust levels, which are addressed in **Chapter 9**;
- discussion around potential impact on groundwater which are addressed in **Chapter 6**;
- information on education and training opportunities which are considered in **Chapter 16**;
- social impacts as a result of the revised Project, which are addressed in **Chapter 16**;
- business opportunities as a result of the revised Project, which are addressed in **Chapter 17**; and
- heritage opportunities and loss of community associated with Acland, which are addressed in **Chapter 11**.

Contacts with the community and stakeholders have been generally supportive with 64% of stakeholder interactions recorded as positive since announcement of the revised project in November 2012. There has been a general recognition of project benefits and opportunities through the provision of additional employment, training, sponsorship, community investment and business opportunities for Oakey and the surrounding communities.

Concern about coal dust was the sixth most raised topic. However, many stakeholders indicated that they were pleased NAC planned to relocate the JRLF onto the revised Project site and introduce profiling and veneering of coal wagons.

The tenth and twelfth most frequently raised discussion point was regarding potential social and historical and heritage impacts. Many stakeholders were concerned about the loss of rural and agricultural history and community cohesion as a result of the purchase of properties in Acland and surrounding rural areas but in turn recognised the important role the mine played in the community.

Stakeholders were also pleased that Acland would be left in place and raised interest in potential opportunities to restore items of historical significance. **Chapter 11** and **Appendix J.12** provide an overview of the proposed conservation management plan for the Acland No.2 Colliery.

NAC will continue to consult with relevant stakeholders using a variety of communication mechanisms to ensure that the local community is continually engaged about the revised Project. NAC will also continue to ensure its neighbours are properly consulted in relation to revised Project.

22.17 Cumulative Impacts

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 27 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.