



Adani Mining Pty Ltd

NORTH GALILEE BASIN RAIL PROJECT

Environmental Impact Statement

Chapter 22 Conclusion and recommendations

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22. Conclusion and recommendations

22.1 Purpose of this chapter

The purpose of this chapter is to present conclusions and recommendations with respect to the North Galilee Basin Rail Project (NGBR Project), based on the studies and impact assessment presented and proposed mitigation and management measures.

The environmental impact assessment has identified a number of predominantly localised, potential adverse impacts to the environment as a result of the NGBR Project. Impacts that were unavoidable will in most instances be effectively managed through the implementation of management and mitigation measures developed for the NGBR Project, which are presented in Volume 2 Appendix P Environmental management plan framework.

This chapter provides a summary of residual impacts identified which cannot be avoided or fully mitigated, and commitments made by Adani to offset any residual impacts.

The following studies identified potential residual impacts:

- Volume 1 Chapter 3 Land use and tenure
- Volume 1 Chapter 5 Topography, geology, soil and land contamination
- Volume 1 Chapter 6 Nature conservation
- Volume 1 Chapter 7 Matters of National Environmental Significance
- Volume 1 Chapter 11 Greenhouse gas
- Volume 1 Chapter 15 Cultural heritage
- Volume 1 Chapter 16 Social and economic impacts
- Volume 1 Chapter 17 Climate and natural hazards
- Volume 1 Chapter 18 Hazard, risk, health and safety.

22.2 Rationale for NGBR Project

The NGBR Project is a standard gauge rail project which is proposed to connect the Carmichael Coal Mine and Rail Project (Carmichael Project) rail infrastructure to the Port of Abbot Point. The NGBR Project will service the Carmichael Project (Mine) and third-parties allowing coal to be transported to the Port of Abbot Point for international export.

The Galilee Basin spans over 247,000 km² of land which is considered to be one of the last undeveloped coal reserves within Queensland and is expected to become the largest coal producing region in the State. In June 2012, the Queensland government announced its support for the development of the coal industry in the Galilee Basin and recognised the need for infrastructure, particularly rail links from mine to port, to support such development.

The NGBR Project is proposed to provide a more direct and operationally more cost effective transport solution direct to the Port of Abbot Point in accordance with the Queensland Government's preference for a single north-south multi-user common access rail corridor servicing the Galilee Basin, as outlined in the Galilee Basin Coal Infrastructure Framework. This would aid in the reduction of current rail congestion and cumulative impacts experienced on the Goonyella and Newlands systems via Moranbah.

The NGBR Project aligns with a number of key State and Federal government policies that guide and inform the development of Queensland's abundant coal resources including:

- Galilee Basin Coal Infrastructure Framework (DSDIP 2013b)
- Galilee Basin Development Strategy (DSDIP 2013g)
- Coal Plan 2030 (DSDIP 2010)
- Queensland Government's Queensland Infrastructure Plan (DLGP 2011a)
- Queensland Governments Draft Moving Freight strategy (DTMR 2013)
- Queensland Regionalisation Strategy (DLGP 2011b).

The NGBR Project will be strategically significant in a local, regional and state context. The Queensland Regionalisation Strategy (DLGP 2011b) considers critical infrastructure associated with the expansion of mining in the Galilee Basin, for example the NGBR Project, to be a great opportunity for the Mackay, Isaac and Whitsunday region. The NGBR Project is consistent with the Queensland Regionalisation Strategy as it will provide significant employment opportunities in these regions during both construction and operation.

22.3 Economic justification

Economic assessments estimate that at a regional level, the NGBR Project is expected to generate a significant and positive economic impact in the Mackay, Isaac and Whitsunday (MIW) region and Queensland. The NGBR Project will involve a capital investment of approximately \$2.2 billion which includes capital expenditure on earthworks, drainage, bridges, road works, rail track and signalling, communications and construction management costs.

Economic modelling estimates that the NGBR Project will generate approximately 6,150 jobs (1,700 direct and 4,452 indirect) in the MIW region and just under 7,000 jobs (2,017 direct and 4,981 indirect) in total across Queensland during the peak construction year of 2015. In 2015, modelling estimates that the NGBR Project will contribute \$791 million to Gross Regional Product in the MIW region and \$909 million to Queensland's Gross State Product.

Once fully operational, modelling estimates that the NGBR Project will contribute \$209 million to Gross Regional Product in the MIW region per annum and \$369 million per annum to Queensland's Gross State Product. Operation of the NGBR Project is also estimated to generate 1,097 (277 direct and 820 indirect) full time equivalent positions each year in the MIW region and 1,940 (369 direct and 1,571 indirect) full time equivalent positions each year across Queensland over the life of the NGBR Project.

22.4 Project impacts

22.4.1 Land use and tenure

Impacts on land use and tenure are anticipated to occur as a result of developing the NGBR Project. After the implementation of the proposed management and mitigation measures, residual land use impacts resulting from the NGBR Project include permanent change to land use, sterilisation of good quality agricultural land (GQAL), intersection of restricted area 8 (Suttor dam site) and restricted area 126 (Protection of Magnetite Resources).

Operation of the NGBR Project will directly impact approximately 3,248 ha of land across 64 properties resulting in a permanent land use change. The land use change would be from predominantly cattle breeding and fattening activities to rail infrastructure.

Approximately 1,264 ha of GQAL will become sterilised due to the final rail corridor and permanent ancillary infrastructure and a further 405 ha will be sterilised due to temporary ancillary infrastructure. A total of 12.01 ha of strategic cropping land (SCL) passed the history of cropping test within the final rail corridor, and 5.09 ha of SCL passed the history of cropping test within the temporary ancillary infrastructure footprints. Ongoing consultation with the Department of Environment and Heritage Protection (DEHP) and the Department of Natural Resources and Mines (DNRM) will be undertaken to confirm the mitigation requirements relating to development and location of the final rail corridor within restricted areas.

22.4.2 Topography, geology, soils and land contamination

Impacts on topography, geology, soils, GQAL, SCL, acid sulfate soil (ASS) and contaminated land are anticipated to occur as a result of developing the NGBR Project. Four residual impacts are predicted to occur in the footprint of the final rail corridor and ancillary infrastructure. While residual impacts may be locally significant, they are unlikely to be regionally significant.

Residual impacts will affect the environmental value of topography. Design of the final rail corridor has incorporated the minimisation of disturbance to topography and landform through route selection to avoid key features. However, cut and fill activities will alter the existing topography, specifically where infrastructure is proposed to traverse steep low hills from chainage 71.3 km to 82.2 km in the vicinity of the Clarke Ranges.

Residual impacts will affect the environmental values of soil resources. Erosion and Sediment Control Plans (ESCPs) will be developed to provide underlying principles to limit erosion and contain sedimentation from entering waterways.

Residual impacts will affect the environmental values of GQAL and SCL. Adani will minimise impacts to areas of GQAL and SCL intersected by the final rail corridor through design and management strategies. A soil survey will be undertaken prior to commencement of construction to verify proposed management practices and provide detailed information for management plans. Topsoil will be stripped and stockpiled to maintain the quantity of fertile soil resources. Temporary disturbances will be returned to pre-development equivalent conditions. Areas impacted by the permanent disturbance created by the rail infrastructure are not expected to be returned to pre-development equivalent conditions. In this instance, compensation will be paid by Adani according to outcomes of consultation with landholders and relevant agencies.

22.4.3 Nature conservation

Impacts on nature conservation values are anticipated to occur as a result of developing the NGBR Project. Adani has minimised impacts to remnant vegetation and habitats intersected by the final rail corridor through design and management strategies. However, the following residual impacts have been identified:

- Clearance of three mapped threatened ecological communities (TECs) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act):
 - 100.3 ha of brigalow (*Acacia harpophylla*) dominant and co-dominant
 - 117.1 ha of natural grasslands of the Queensland central highlands and the northern Fitzroy Basin
 - 35.8 ha of semi-evergreen vine thickets of the Brigalow Belt (north and south) and Nandewar regions
- Clearance of potential habitat for five threatened species listed under the EPBC Act:
 - 64.6 ha of *Eucalyptus raveretiana* habitat

- 45.6 ha of Australian painted snipe habitat
- 2,143.4 ha of black-throated finch (southern) habitat
- 2,390.1 ha of koala habitat
- 246.6 ha of ornamental snake habitat
- 1,788.1 ha of squatter pigeon (southern) habitat
- Clearance of endangered regional ecosystems (REs) and of concern REs protected under the *Vegetation Management Act 1999* (VM Act)
- Clearance of threshold REs, protected under the VM Act
- Clearance of potential habitat for 16 threatened species protected under the *Nature Conservation Act 1992* (NC Act)
- Clearance of watercourse vegetation, wetland protection areas (including trigger areas) and wetland REs
- Clearance of marine habitat.

Where impacts are unavoidable through design or mitigation measures, offsets will compensate for the residual impacts of the NGBR Project on ecological values. The Offset strategy addresses the unavoidable loss of TEC areas, habitat for EPBC and NC Act listed threatened flora and fauna species, REs and threshold REs listed under the VM Act, watercourse vegetation and marine habitat resultant from the construction of the NGBR Project.

22.4.4 Matters of national environmental significance

Following the implementation of the mitigation measures described for both the construction and operation of the NGBR Project, the following residual impacts to MNES are predicted:

- Presence of three mapped TECs protected under the EPBC Act. However, no significant impacts to the two TECs that were confirmed to be present (brigalow and semi-evergreen vine thicket), as neither the construction nor operation of the NGBR Project will result in a significant reduction in the extent of, increased fragmentation of, or degradation in the quality of any TEC.
- Clearance of potential habitat for six threatened species listed under the EPBC Act. Construction and operation of the NGBR Project will not lead to significant declines in or fragmentation of important populations of the species, or impact habitat critical to the survival of those species. As such no significant impacts to listed threatened species confirmed to be present or likely to occur are envisaged.
- Disturbance of migratory species listed under the EPBC Act. Three listed migratory (bird) species were confirmed present within the preliminary investigation corridor during field surveys, with a further 25 bird species and one reptile species being likely to occur within that corridor. No significant impacts to listed migratory species confirmed present or likely to occur are envisaged, as neither the construction nor operation of the NGBR Project will impact areas that constitute important habitat for migratory species or ecologically significant proportions of the populations of those species.

The Offset strategy addresses the unavoidable loss of TEC areas and habitat for EPBC Act listed threatened flora and fauna resultant from the construction of the NGBR Project.

22.4.5 Greenhouse gas

Greenhouse gas (GHG) emissions will be reduced as much as practicable however are an unavoidable consequence of the construction and operation of the NGBR Project. The estimated scope 1 and scope 2 GHG emissions (Carbon dioxide (CO₂), Nitrous oxide (N₂O) and Methane (CH₄) of the NGBR Project are as follows:

- 1,070 kt of scope 1 and scope 2 CO₂-e, over the two year construction period
- 782.82 kt of scope 1 and scope 2 CO₂-e, each year of operation
- 71,524 kt of scope 1 and scope 2 CO₂-e, over the 90 year life of the NGBR Project.

Sequestration through revegetation is excluded from this GHG assessment. The assessment is therefore considered to be conservative, as a progressive rehabilitation program is proposed during and following completion of construction activities. Further sequestration through securement or purchase of offsets will be considered in the future stages of the NGBR Project, with preference given to offsets certified under the Commonwealth Government National Carbon Offset Standard.

22.4.6 Cultural heritage

The development of Cultural Heritage Management Plans is the overarching measure that will assist in the identification of cultural heritage sites, determination of heritage significance, mitigation and management of impacts, and carrying out consultation with Native Title and Traditional Owner stakeholders. A residual impact with potential to occur is damage to cultural heritage that is unregistered or unexpected. Surveys will be conducted to attempt to identify these sites prior to construction; however, if damage occurs, appropriate measures will be implemented to avoid further damage. All other cultural heritage impacts can be alleviated through the implementation of proposed mitigation and management measures.

22.4.7 Social and economic impacts

It is anticipated that with the implementation of a Local Content Strategy, the NGBR Project will leverage a range of economic and social benefits for the regional study area through increased employment and business development opportunities. A risk assessment highlighted the following positive residual impacts with a high residual risk as a result of the NGBR Project:

- Opportunities for local and regional businesses in Bowen, Collinsville and Moranbah to supply goods and services to the NGBR Project
- Increased employment opportunities available for local and regional workforce
- Providing employment and training opportunities for Indigenous people
- Flow on benefits from the NGBR Project for regional, state and national areas.

Potential adverse impacts on landholders will be minimised through the implementation of a range of NGBR Project design elements, for example occupational crossings and design features to minimise impacts of land fragmentation, land access protocols, negotiation and compensation mechanisms. A risk assessment highlighted the following negative perceived residual impacts with a medium residual risk as a result of the NGBR Project:

- Challenges for local and regional business to attract and retain staff and compete with higher wages of the resources sector

- Potential mental health issues for workforce due to isolation and separation from families and friends
- Impacts on properties intersected by the NGBR Project - land fragmentation and access to and within the properties
- Changes to the natural environment from changes to overland flow paths with potential for increased ponding and flooding
- Potential risk of spread of weeds and seeds
- Impacts on productivity and economic impacts – increase in workload for landholders, decrease in property values, decrease in viability of agricultural business due to disruption in cattle operations and increased time and resources required to manage cattle
- Anxiety and stress associated with land access and acquisition discussions and negotiations
- Increased fire risk along the rail corridor
- Heightened safety risks to workers and the local community from increased traffic, rail road crossings, cattle and rail crossings.

It is anticipated that these impacts will be significantly reduced as the NGBR Project is to be built within the Galilee Basin Coal Infrastructure Framework single north-south rail corridor.

22.4.8 Climate and natural hazards

Following the implementation of proposed mitigation measures, three hazards remain ranked with a medium residual risk given the measure of consequence including:

- Extreme heat significantly above stress free temperature, over a prolonged period, causing track buckling
- Extreme precipitation causing flooding
- Extreme precipitation causing inundation or damage to critical infrastructure.

The various management plans developed for the NGBR Project will serve to significantly reduce the likelihood of potential impacts occurring during natural hazard events. Management plans will be periodically updated and expanded as required throughout the life of the NGBR Project as design progresses and as risks and climate predictions are further refined.

22.4.9 Hazard, risk, health and safety

A risk management plan will be developed and implemented for the NGBR Project and include preventative and responsive mitigation measures to reduce the overall risk of potential hazards identified as high risk.

Following the implementation of proposed mitigation measures, two hazards remain ranked with a high residual risk given the measure of consequence, namely the risk of a traffic incident and risk of a vehicle being washed away by flood waters. Eleven hazard events were ranked with a residual risk rating of medium, with the remaining 18 hazard events regarded as having a low residual risk.

The implementation of a risk management plan will serve to significantly reduce the likelihood of such events occurring. The risk management plan will be periodically updated and expanded as

required throughout the life of the NGBR Project as design progresses and risks are further defined.

Many of the potential impacts to public health and safety would occur indirectly as a result of NGBR Project activities. For this reason, the overarching management plans and procedures that will be developed for the NGBR Project will inherently reduce the risk to public health and safety at the same time that risks to other receptors and environmental values are minimised.

The management plans will fit within a health and safety management system, taking into account the policies and procedures adhered to by Adani, its employees and subcontractors.

22.5 Cumulative impacts

It was considered that the mitigation and management measures incorporated into the NGBR Project will effectively address or otherwise manage potential cumulative impacts, such that residual consequences are low.

The unavoidable residual impacts with the greatest potential to result in cumulative impacts involved the disturbance of protected conservation values associated with terrestrial ecology. The NGBR Project will provide offsets to compensate for these residual impacts. Similarly each proponent of other projects considered in this assessment will be required to provide offsets in accordance with Commonwealth and State policies for unavoidable impacts on potential habitat for each of the ecological values. Over time these offsets should take account of the potential cumulative impacts that each project will realise with the aim of achieving a 'no net loss' of biodiversity values. Therefore cumulative impacts from disturbance of nature conservation values associated with the NGBR Project are considered low.

22.6 Environmental management and offset strategy

An Environmental Management Plan (EMP) and Offset strategy have been developed to outline mitigation measures and offsets commitments for the NGBR Project.

The EMP addresses the environmental management commitments for the design, construction and operational phases of the NGBR Project. The EMP also builds on the commitments to environmental performance made in the NGBR Project EIS and provides a framework to protect the environmental values potentially affected by the NGBR Project and sets out environmental management obligations for environmental authorities and permits to assist the authorities when developing project approvals.

An Offset strategy has been developed as part of the EIS to identify a range of environmental offsets to compensate the residual impacts that remain after avoidance and mitigation measures have been implemented. The strategy provides a framework for the identification of measures designed to provide regional biodiversity benefits, where onsite impacts cannot be avoided.

The Offset strategy demonstrates that it will be possible for the NGBR Project to achieve 'no net loss' of ecological values through a combination of direct and indirect offsets, in accordance with the ambitions of the various offset policies, the Terms of Reference for the NGBR Project and the EIS Guidelines.

22.7 Recommendations

The NGBR Project will provide significant capital investment of approximately \$2.2 billion and will generate approximately 6,150 jobs (1,700 direct and 4,452 indirect) in the region. The

NGBR project aligns with a number of key State and Federal government policies that guide and inform the development of Queensland's coal resources including:

- Galilee Basin Coal Infrastructure Framework (DSDIP 2013b)
- Galilee Basin Development Strategy (DSDIP 2013g)
- Coal Plan 2030 (DSDIP 2010)
- Queensland Government's Queensland Infrastructure Plan (DLGP 2011a)
- Queensland Governments Draft Moving Freight strategy (DTMR 2013)
- Queensland Regionalisation Strategy (DLGP 2011b).

In consideration of the EIS assessment outcomes with respect to the benefits and impacts of the NGBR Project, Adani is seeking approval of the NGBR Project, subject to:

- All necessary approvals and permits being obtained for the NGBR Project
- Developing, implementing and maintaining management and mitigation measures outlined in the EIS
- Developing and implementing detailed environmental management plans consistent with the principles, objectives and performance criteria outlined in Volume 2 Appendix P Environmental management plan framework for the construction and operation phase of the NGBR Project
- Developing and implementing the Offset strategy to offset residual impacts.