PROJECT CHINA STONE

Cumulative Impacts 23

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23 CUMULATIVE IMPACTS

23.1 INTRODUCTION

This section provides a summary of the cumulative impact assessments undertaken for Project China Stone (the project). Further details of the assessments are discussed in each of the relevant technical sections of the Environmental Impact Statement (EIS). For example, cumulative impacts on air quality are addressed in detail in Section 15 – Air Quality and the *Air Quality Report* (Appendix L).

23.2 CUMULATIVE IMPACT SETTING

The project site is remotely located, with the closest townships being Clermont, which is approximately 260 km by road to the south-east and Charters Towers, which is approximately 285 km by road to the north. The region surrounding the project site is sparsely populated, with only a few isolated rural homesteads. Only four sensitive receptors are located within 20 km of the project site (Figure 23-1).

The terrain within the project site is generally flat at around 200 - 300 m Australian Height Datum (AHD), with the exception of Darkies Range on the western boundary of the project site which reaches a height of approximately 500 m AHD. The site is located at the head of the Tomahawk and North Creek catchments and site drainage is therefore highly ephemeral. There are no watercourses traversing the site. The project site drains in a generally west to east direction from Darkies Range to the Belyando River via Tomahawk and North Creeks and a number of other minor ephemeral drainage lines. The entire project site contains remnant vegetation comprising Eucalyptus and Acacia open woodlands.

The Carmichael Coal Mine and Rail Project (CCM&RP) is a proposed open cut and underground coal mine located to the immediate south-east of the project site (Figure 23-1). The CCM&RP is proposed to produce up to 60 Million tonnes per annum of coal over a mine life of 90 years. The CCM&RP is currently in the approval phase. As the CCM&RP is proposed to be operating at the same time as the project, the assessment of cumulative impacts focuses on impacts arising from these two projects.

The Moray Power Project (MPP) involves the construction and operation of a thermal and diesel power station with a generating capacity of 150 Mega Watts. The MPP site is located immediately east of the proposed Carmichael Coal Mine site (Figure 23-1), approximately 23 km south east of the project site. The MPP project is also currently in the approval phase. Potential significant cumulative impacts with the MPP have also been considered in relevant studies within the EIS.

No other significant industrial developments exist or are proposed in the vicinity of the project site.

23.3 ASSESSMENT METHODOLOGY

Cumulative impact assessments have been completed as a component of each of the relevant environmental studies within the EIS. The cumulative impact assessments have considered the impacts from the CCM&RP and the MPP, where relevant, with those predicted for the project. The methodology for cumulative impact assessment necessarily varies, depending on the nature of the environmental aspect being considered.

The following sections describe the cumulative impact assessment approach adopted for each of the relevant environmental aspects addressed in the EIS. An overview of the results of the cumulative impact assessments and the mitigation and management measures relevant to potential cumulative impacts is also provided.

More detailed information on the cumulative impact assessments and any proposed mitigation measures is provided within the relevant sections of the EIS. Relevant sections of the EIS are referenced in the following discussion.

23.4 LAND USE AND SUITABILITY

This section provides a summary of the land uses within and surrounding the project site and describes the potential for cumulative impacts. Proposed mitigation measures are also discussed. Further detail is provided in Section 5 – Land Use and Section 18 – Socio-Economic Impact Assessment.

23.4.1 Existing Setting

As discussed in Section 5 – Land Use, the primary land uses within the project site are currently cattle grazing and coal mining exploration. A stock route also traverses the southern section of the project site (Figure 23-1). These land uses are also present in the surrounding region.

There are no priority agricultural areas, strategic cropping areas, strategic environmental areas or Agricultural Land Classification Class A or B within the project site. There are a number of recreational areas in the region, including Lake Buchanan and Wilandspey Conservation Park (Figure 23-1). However, these are located more than 20 km from the project site and are not predicted to be impacted by the project. As such, no impacts to these areas are predicted.

23.4.2 Cumulative Impacts and Mitigation Measures

As discussed in Section 5 – Land Use and Section 18 – Socio-Economic Impact Assessment, the project will change the rural character of the region by introducing large scale coal mining. There will be cumulative impacts due to similar changes in land use from the development of the CCM&RP and MPP. The proponent will develop an ongoing program of landholder liaison and a grievance and dispute resolution procedure to ensure identification and management of any issues arising as a result of the introduction of mining to the area and the change in rural character.

Two stock routes also traverse the CCM&RP (Figure 23-1). Although these stock routes are different from the stock route that traverses the project site, cumulative impacts may arise in relation to any changes in the management and possible realignment of the stock routes. As discussed in Section 5 – Land Use, the proponent will liaise with the Department of Natural Resources and Mines, the Isaac Regional Council and affected landowners in relation to the management and possible realignment of the stock route on the project site, as necessary. This would include consideration of potential cumulative impacts arising from changes to the stock routes associated with the CCM&RP, as necessary.

23.5 ECOLOGY

This section provides a summary of the existing terrestrial and aquatic ecology setting within the project site. It also describes the project features designed to minimise flora and fauna impacts from the project, describes the cumulative flora and fauna impacts and proposed mitigation measures. This cumulative assessment included consideration of the CCM&RP as well as Kevin's Corner Project, Alpha Coal Project, Galilee Coal Project and South Galilee Project. The assessment considered potential cumulative impacts with these projects as well as proposed mitigation, management and compensation measures. The detailed results of the assessments are provided in Section 9 – Terrestrial Ecology, Section 10 – Aquatic Ecology, Section 11 – Matters of National Environmental Significance, and in detail in the *Terrestrial Ecology Report* (Appendix F), the *Aquatic Ecology and Stygofauna Report* (Appendix G), and the *Biodiversity Offset Strategy* (Appendix H).

23.5.1 Existing Setting

Terrestrial Ecology

The project site comprises approximately 20,000 ha of well vegetated land. The entire project site contains remnant vegetation comprising Eucalyptus and Acacia open woodland. The project site is currently predominantly used for cattle grazing. Terrestrial ecology is discussed in detail in Section 9 – Terrestrial Ecology.

Aquatic Ecology

The project site is predominantly located in the headwaters of North and Tomahawk Creeks and drains eastwards from Darkies Range. Drainage lines within the project site are highly ephemeral. These drainage lines contain a number of remnant pools that form after rainfall, but then dry out during the dry season. The site does not contain any watercourses as defined under the Queensland *Water Act 2000.*

The project site itself is relatively dry and surface water sources are ephemeral and limited to two seasonal wetlands and two artificial farm dams. There is no permanent water on the project site. The seasonal wetlands and farm dams provide refuge for flora and fauna during the wet season, and into the dry season whilst they retain water. The northern seasonal wetland is classed as a wetland of high ecological significance located within Great Barrier Reef catchments (termed High Ecological Significance wetlands).

23.5.2 Cumulative Impacts

Terrestrial Ecology

As discussed in Section 9 – Terrestrial Ecology and Section 11 – Matters of National Environmental Significance, potential significant impacts to both Commonwealth and State listed flora and fauna from the project include:

- Clearing of approximately 11,000 ha of remnant vegetation, including 24 ha of one of concern Regional Ecosystem (RE) (RE 10.10.3).
- Clearing of habitat for the following species which were confirmed to be present in the project site during field surveys:
  - Squatter Pigeon (southern subspecies) (*Geophaps scripta scripta*) (listed as vulnerable under the EPBC Act and NC Act);
  - Black-throated Finch (white-rumped subspecies) (*Poephila cincta cincta*) (listed as endangered under the EPBC Act and NC Act);
  - Koala (*Phascolarctos cinereus*) (listed as vulnerable under the EPBC Act and special least concern under the NC Act); and
  - Short-beaked Echidna (*Tachyglossus aculeatus*) (listed as special least concern under the NC Act).
- Clearing of habitat for the Australian Painted Snipe (*Rostratula australis*) (listed as endangered under the EPBC Act and vulnerable under the NC Act), which was considered to have a moderate potential of occurring within the project site.

The impacts of clearing of habitat on the project site will be mitigated through the provision of biodiversity offsets (Section 23.5.3). An additional potential cumulative impact of the project on flora and fauna is habitat fragmentation. As the clearing of vegetation is only in the southern portion of the project site, full east to west connectivity will remain in the northern portion of the project site. In addition, areas beyond the clearing footprint are proposed to be managed to retain and enhance biodiversity values. The open cut mining/infrastructure footprints between the project and the CCM&RP are approximately 10 km apart, leaving a large corridor of remnant vegetation between the cleared areas. This will allow for continued movement and dispersal opportunities, and as such significant cumulative impacts on connectivity are not predicted to occur. In addition,

the Department of Environment and Heritage Protection (EHP) Landscape Fragmentation and Connectivity tool confirmed the project would not result in a significant, residual impact on local or regional connectivity.

Aquatic Ecology

As discussed in Section 10 – Aquatic Ecology, potential significant impacts to aquatic ecology from the project include:

- Removal of the southern seasonal wetland and farm dam; and
- Subsidence impacts on the northern seasonal wetland and farm dam.

The proponent has committed to providing additional water sources in areas that do not currently contain water in the dry season within the project site. These water sources will include cattle troughs, and areas of aquatic habitat created by excavating pools to provide deeper regions of water. These watering points will mitigate for the loss of water sources on the project site.

Impacts on these aspects are localised and, as such, there is no potential for significant adverse cumulative impacts on aquatic ecology with the CCM&RP.

23.5.3 Mitigation Measures

Biodiversity offsets will be required to offset significant, residual impacts to flora and fauna species and identified Matters of State Environmental Significance and Matters of National Environmental Significance, under both the Commonwealth EPBC Act *Environmental Offsets Policy* and the *Queensland Environmental Offsets Policy*. The proponent's *Biodiversity Offsets Strategy (*Appendix H) will compensate for the project's significant, residual impacts on biodiversity. Offsets are specifically designed to offset unavoidable residual impacts through protecting and managing vegetation areas that are ecologically equivalent to the area that is to be impacted. The use of offsets therefore provides effective mitigation for any residual impacts and potential contribution to any significant cumulative impacts.

In addition to the proponent's offset strategy, the following monitoring and management plans will also be implemented for the project to minimise impacts on both terrestrial and aquatic ecology:

- Pre-clearing surveys;
- Vegetation conservation management , including provision of fauna water points;
- Permit to Disturb process;
- A Species Management Program;
- An Erosion and Sediment Control Plan;
- Subsidence Crack Rehabilitation Program, including minor remedial drainage earthworks;
- A Feral Animal and Weed Management Plan;
- A Subsidence Management Plan; and
- Biodiversity Management Plan.

These monitoring and management plans are discussed in Section 9 – Terrestrial Ecology, Section 10 – Aquatic Ecology and Section 11 – Matters of National Environmental Significance.

23.6 GROUNDWATER

This section provides a description of the groundwater regime in the vicinity of the project site. It also presents an assessment of the cumulative groundwater impacts and describes the proposed management and monitoring measures. The detailed results of the groundwater assessment are provided in Section 12 – Groundwater and in the *Groundwater Report* (Appendix I).

23.6.1 Groundwater Regime

The local topography is dominated by an elevated ridgeline located at the western periphery of the project site (Figure 23-1). This ridgeline (known as Darkies Range) comprises outcropping, highly weathered Triassic formations. East and west of this ridgeline, the lower-lying topography is overlain by later Tertiary and Quaternary sediments. This ridgeline forms a zone of groundwater recharge. Groundwater is located at significant depth in this area, due to the prominence of the ridgeline. Groundwater flow generally follows topography to the east and west of this recharge zone. A water table forms within the shallow sediments east and west of the ridgeline, while deeper groundwater becomes increasingly confined by low permeability formations.

The hydrogeological units of the project site are broadly:

- A veneer of highly weathered Tertiary sediments and localised fluvial Quaternary sediments that are generally thin or absent on the elevated ridge of Darkies Range. The Tertiary sediments generally thicken in the lower lying areas beyond Darkies Range. A water table forms within the Tertiary sediments in the south-east of the project site and extends east towards the Belyando River;
- Triassic sediments of the Clematis Sandstone that form a permeable and regionally significant aquifer where saturated;
- Low permeability Triassic sediments of the Moolayember and Rewan Formations that act as confining units above and below the Clematis Sandstone aquifer, respectively;
- Permian Betts Creek Beds that comprise coal seams between low permeability sediments; and
- Underlying Carboniferous sediments of the Joe Joe Group.

Groundwater storage and movement occurs within the massive sandstones of the Clematis Sandstone, the cleats that intersect the coal seams in the Betts Creek Beds, and the shallow Tertiary sediments. Other sediments in stratigraphic sequence exhibit low permeability and form discrete confining units between these water-bearing formations.

23.6.2 Cumulative Impacts

The method of superimposition has been used to assess the potential cumulative groundwater impacts of the project with the CCM&RP. Depressurisation predictions for each stratum due to each project were overlaid on a single map to identify any areas of overlap of impacts. Potential cumulative impacts could occur within any overlapping zones. By comparing the maximum predicted extents of depressurisation for each mine, this approach provides a conservative assessment of the potential worst-case cumulative impacts in terms of changes to groundwater levels. Predictions relating to the CCM&RP were sourced from the CCM&RP EIS Hydrogeology Report (GHD, 2012) and Supplementary EIS Mine Hydrogeology Report Addendum (GHD, 2013).

As discussed in Section 12 – Groundwater, the zone of potential cumulative depressurisation is concentrated largely in the area where the two projects adjoin. Depressurisation associated with the CCM&RP does not extend to the Northern Underground Mine area and there is, therefore, no potential for cumulative impacts in this area.

Cumulative depressurisation is most extensive in the coal seams that are targeted by both mining operations, with cumulative drawdown in the A, C and D seams predicted to occur by the end of mining.

The CCM&RP does not propose to directly mine the Clematis Sandstone within the open cut mining areas, or fracture this unit above the underground mines. The CCM&RP groundwater model therefore predicts no significant depressurisation of the Clematis Sandstone during or post mining. There is therefore no potential for cumulative impacts on the Clematis Sandstone.

During mining there is no cumulative drawdown on the water table within the Tertiary sediments. Post mining, the project may increase the drawdown predicted for CCM&RP by up to 20 m. Cumulative impacts on the Quaternary sediments are not predicted due to the different surface water catchment settings of these projects and the absence of these deposits in the vicinity of the project site.

Groundwater use is very limited in the area of predicted cumulative depressurisation. Only three bores (RN103875, RN132938 and Allens Bore) are predicted to be potentially impacted by cumulative depressurisation. The area of potential cumulative groundwater depressurisation does not include any other features that would potentially be impacted by groundwater depressurisation.

23.6.3 Mitigation Measures

As discussed in Section 12 – Groundwater, cumulative impacts on groundwater supplies from affected bores will be addressed, as follows:

- RN103875 is located within the project site and will be effectively dealt with by the land access agreement for the mining lease application.
- RN132938 is located within the CCM&RP site and will be impacted by the CCM&RP. This bore is owned by the proponent for the CCM&RP.
- Allens Bore is also predicted to be impacted by the CCM&RP and is, therefore, likely to be subject to a make good agreement with the proponent for the CCM&RP.

In addition, the groundwater monitoring program established as part of the EIS groundwater investigations will be continued throughout the life of the project. The program includes recording of groundwater levels from existing monitoring bores and Vibrating Wire Piezometers and groundwater quality sampling. This monitoring will enable natural water level fluctuations (such as responses to rainfall) to be distinguished from potential water level impacts due to depressurisation resulting from mining activities. Groundwater quality sampling of existing monitoring bores will continue in order to provide longer term baseline groundwater quality, and to detect any changes in groundwater quality during and post mining. Further details of the groundwater monitoring program are provided in Section 12 – Groundwater.

23.7 SURFACE WATER

This section provides a summary of the surface water setting, proposed mine water management strategies and mine water management system and describes potential cumulative surface water impacts and proposed mitigation measures. The detailed results of the assessment are provided in Section 13 – Surface Water.

23.7.1 Existing Setting

The project site is located within the upper catchment of the Belyando Basin, 255 km upstream of the Burdekin Falls Dam. The Burdekin Falls Dam is the largest dam in Queensland and is located at the upstream end of a regulated water supply scheme involving a series of downstream weirs that are fed by controlled releases from the dam. The regional setting is characterised by high soil erosion rates which result in naturally elevated suspended sediment loads in watercourses. The Burdekin Falls Dam acts to attenuate natural sediment loads prior to any discharge into the lower Burdekin Basin and the coastal marine waters of Upstart Bay.

The local catchment setting is dominated by the elevated ridgeline of Darkies Range which is located at the western boundary of the project site. The majority of the project site drains east from Darkies Range forming the headwaters of Tomahawk Creek and North Creek. These creeks flow to the south-east to the Belyando River downstream of the project site.

The catchment of Lake Buchanan extends from Darkies Range to the west of the site. Only a very minor portion of the project site is within the Lake Buchanan catchment. Minor areas in the south-west of the project site also drain to the Carmichael River catchment via minor drainage lines.

The site is located at the head of the Tomahawk and North Creek catchments and site drainage is therefore highly ephemeral. There are no watercourses traversing the project site. Site drainage is characterised by a network of steep rocky gullies in the steeper topography associated with Darkies Range. These gullies transition to minor drainage lines with wide shallow flow paths on the flatter areas of the project site to the east of Darkes Range.

The land uses downstream of the project site are predominantly grazing on natural pastures. Riparian and aquatic habitat on the project site and in the downstream catchment is degraded due to the effects of clearing and cattle grazing and persistent water bodies are known to be turbid. Aquatic ecology values are considered slightly to moderately disturbed. Aquaculture, industrial and recreational uses are not known within the local catchment setting.

23.7.2 Project Features

A drainage strategy for the open cut mining area and mine infrastructure area has been developed as an integral component of project planning. The drainage strategy was designed to ensure suitable drainage arrangements and associated flood protection are provided for both the operations phase and post mine closure. The site drainage strategy involves diverting clean runoff from truncated catchment areas upstream of the open cut pit around the open cut mine and mine infrastructure area. This will be achieved by the construction of permanent drains along the final highwall of the open cut pit and the establishment of drainage corridors at the northern and southern ends of the open cut mine and infrastructure areas.

The highwall drains have been designed with sufficient capacity to convey the peak flows from the Probable Maximum Flood (PMF) from the critical storm event and will provide PMF flood immunity for the active open cut pits and final voids. Detailed modelling undertaken as part of the design process (refer to the *Open Cut Mine Drainage Report*, Appendix J) shows that average flow velocities, stream power and bed shear in the highwall drains are generally well within the applicable hydraulic design criteria. Based upon these design specifications, the drains will be stable in the long-term.

23.7.3 Cumulative Impacts

As discussed in Section 13 – Surface Water, the surface water setting of the project is of limited sensitivity due to the catchment setting and its disturbed and degraded characteristics, and also the absence of major drainage features in the vicinity of the project site.

The key potential for cumulative impacts relates to the potential for the project to affect downstream water quality and impact water users and the environmental values. As discussed in Section 13 – Surface Water, the project may generate waters that contain elevated levels of suspended sediment or other contaminants that, if unmitigated, could affect downstream water quality.

However, the project has been designed such that runoff from disturbed areas will be captured in collection drains and directed through sediment traps and sediment dams for control of suspended sediment prior to discharge from site. Sediment collected in sediment dams will be excavated at regular intervals and disposed of in the overburden emplacement areas. Diversion drains will be installed to divert overland flow from upstream areas around disturbed areas. An Erosion and Sediment Control Plan will be developed prior to commencement of construction to address erosion and the control of suspended sediment in drainage from these areas.

In addition, a mine water management system has been developed to contain and reuse potentially contaminated (i.e. mine-affected waters) generated by the project. The project mine water management system has been designed with sufficient storage capacity to allow containment of mine-affected water with a very low probability of uncontrolled discharge of mine-affected water based upon long-term historical climate data. The water management system has been designed to allow for the controlled release of excess stored pit water to the Belyando River catchment following extended wet periods. Any controlled releases would be conducted in accordance with the EHP Model Mining Conditions which include discharge water volume and quality limits that are specifically designed to protect downstream water quality and environmental values. These conditions also address potential cumulative impacts by taking into account the assimilative capacity of the receiving environment.

The EIS has also assessed the potential drainage impacts of the project. As discussed in Section 13 – Surface Water, the proposed drainage strategies and final landform will result in containment of catchment runoff, and changes to drainage patterns and flood behaviour. However, the predicted changes in catchment yield, flood behaviour and drainage flows will not impact on any structures or property, and in most cases will not be discernible when compared to existing conditions due to the wide shallow nature of the flow paths. The grazing land use on the downstream properties is also not sensitive to these minor and localised changes and no significant cumulative impacts are therefore predicted.

23.7.4 Mitigation Measures

Even though significant adverse cumulative surface water impacts are unlikely to occur, the following mitigation and management measures will be implemented for the project:

- Controlled discharge of any excess mine-affected water in accordance with the EHP Model Mining Conditions;
- Installation of minor remedial drainage earthworks to re-establish free drainage across the project site, where necessary;
- Site Water Management Plan including the monitoring of water transfers, consumption, dam storage volumes and the site water balance;
- An Erosion and Sediment Control Plan; and
- A Subsidence Management Plan including rehabilitation works to be conducted.

23.8 AIR QUALITY

This section describes the cumulative dust impacts and proposed mitigation measures. The methodology and results of the assessment are discussed in Section 15 – Air Quality and in the *Air Quality Report* (Appendix L).

23.8.1 Cumulative Impacts

As discussed in Section 15 – Air Quality, sensitive receptors for the project will potentially be exposed to cumulative air quality impacts from the CCM&RP and MPP which are proposed to be operating at the same time as the project. PM_{10} and NO_2 were identified as the air pollutants with the most potential for cumulative impacts with the project. Consequently, potential cumulative impacts from PM_{10} and NO_2 were assessed.

The PM_{10} cumulative assessment considered predictions from the project, the CCM&RP, the MPP and background concentrations. This was considered a conservative assessment because it assumes worst-case operational years of the project and CCM&RP would occur at the same time. The predicted worst-case cumulative concentrations of PM_{10} are below the *Environmental Protection (Air) Policy 2008* (Air EPP) objective at all receptors except for Dooyne Outstation (which is not permanently occupied and only intermittently used) and the CCM&RP Accommodation Village. The contribution of the project to the cumulative impact is minor at both receptors i.e. at the Dooyne Outstation (11.4%) and the CCM&RP Accommodation Village (2.8%). At both of these receptors, the objective was predicted to be exceeded predominantly due to the CCM&RP. The proponent

will consult with the property owner and Adani, in relation to the management of any adverse cumulative impacts on these receptors.

The NO_2 cumulative assessment considered predictions from the project, the MPP and background concentrations. This was considered a conservative assessment because it assumes the maximum 1-hour concentrations would occur at same time. In reality, this is not likely to be the case due to the location of the power stations relative to the sensitive receptors and prevailing winds. The predicted worst-case cumulative maximum 1-hour average concentrations of NO_2 are well below the Air EPP objective at all receptors.

23.8.2 Mitigation Measures

The project is not predicted to make a significant contribution to cumulative dust impacts. However, the following dust impact mitigation measures will be implemented for the project, which will also assist to limit potential cumulative air quality impacts:

- Haul roads will be watered to minimise dust emissions;
- Progressive rehabilitation will be conducted on the open cut mine overburden emplacements;
- Inactive disturbed areas will be rehabilitated as soon as possible;
- Electrostatic precipitators will be installed on the power station to minimise emissions of particulate matter; and
- Compliance with the relevant requirements of the Aurizon Coal Dust Management Plan at the train loading facility including the use of coal wagon veneering systems.

A complaints handling procedure will be implemented for the project. The procedure will include the investigation of any complaints in relation to air quality impacts. These investigations would include air quality monitoring, if necessary.

23.9 NOISE AND VIBRATION

This section describes the cumulative noise and vibration impacts and proposed mitigation measures. The detailed results of the assessment are provided in Section 16 – Noise and Vibration and the *Noise Report* (Appendix M).

23.9.1 Cumulative Impacts

As discussed in Section 16 – Noise and Vibration, sensitive receptors for the project will potentially be exposed to cumulative noise impacts from the CCM&RP which is proposed to operate at the same time as the project. Noise predictions from the CCM&RP SEIS were combined with the project's noise results to predict cumulative noise levels for each sensitive receptor. This assessment demonstrated that cumulative noise levels would be within the relevant criteria at all receptors.

The potential for cumulative noise impacts was also considered for the construction phase. The assessment compared the sound power levels for the equipment fleets in the construction and operations phases of the project and predicted the construction phase would have a lower total sound power level than the operational phase. Consequently construction noise levels were predicted as being lower than operations for the project. Potential cumulative noise impacts from the construction phase were, therefore, assumed to be lower than those predicted during the operations phase and were not separately assessed.

Due to the distance between the MPP and the project site, there is no potential for cumulative noise impacts with the MPP.

23.9.2 Mitigation Measures

The proponent will implement a complaints handling procedure for the project. The procedure will involve the investigation of any noise complaints, including noise monitoring, where necessary.

23.10 VISUAL AMENITY

This section describes the cumulative visual impact assessment. The detailed visual assessment is provided in Section 17 – Visual Amenity.

23.10.1 Cumulative Impacts

As discussed in Section 17 – Visual Amenity, the visual effect of the project is limited due to the remote site and the limited number of sensitive visual receptors around the site. Views toward the visible elements of the mine will largely be obscured by topography and vegetation, and this, combined with the distance to visual receptors, will result in the project having a very low visual effect, and an overall low visual impact. The predicted low visual impact of the project limits the potential for cumulative visual impacts to occur.

The main potential for cumulative visual impacts to occur is along the Elgin-Moray Road and the Moray-Carmichael Road. These are both unsealed local government roads that provide the primary access from the Gregory Developmental Road to the project site. The CCM&RP and MPP also propose to use these roads for access. The roads are typically utilised by local rural residents and are not common routes for tourists and, as such, are assessed as having a low visual sensitivity. The visual impact from the project along these roads is predicted to be low as intervening vegetation and topography will provide screening, the viewing distances are long range (over 21 km) and views towards the project would generally be oblique to the direction of travel which limits the potential for impacts. As such, the project's contribution to any potential visual cumulative impacts with the CCM&RP or MPP would be minimal. Adverse cumulative visual impacts are, therefore, not anticipated.

23.10.2 Mitigation Measures

The proponent will implement the following mitigation measures to minimise the visual and lighting impacts of the project. These would also assist to limit the potential for any cumulative visual impacts:

- Progressive rehabilitation and revegetation of overburden emplacement areas to minimise the visual effect;
- Use of neutral tones in the cladding of infrastructure to blend with the surrounding environment; and
- Design of external lighting to minimise off site impacts.

23.11 TRAFFIC AND TRANSPORT

This section provides a summary of the cumulative traffic impacts and proposed mitigation measures. The detailed results of the assessment are provided in Section 19 – Traffic and Transport and the *Road Impact Assessment Report* (Appendix O).

23.11.1 Cumulative Impacts

As discussed in Section 19 – Traffic and Transport, the baseline traffic volume forecasts included the predicted traffic volumes associated with the CCM&RP as estimated in the CCM&RP EIS road impact assessment. The global traffic growth rate assumption of 3% per annum also effectively takes account of the relatively minor increase in traffic generated by the MPP. The baseline forecasts therefore represent a comprehensive cumulative assessment of traffic volumes on the road network.

Associated road network improvements required to be implemented by the CCM&RP proponent were also considered, where relevant, in Section 19 – Traffic and Transport and the *Road Impact Assessment Report* (Appendix O).

There is a potential for cumulative impacts with the CCM&RP on pavement rehabilitation and pavement maintenance along sections of the road network. The project's pavement rehabilitation impact and pavement maintenance impact will be recalculated prior to the commencement of construction based on confirmed pavement loadings and traffic estimates associated with the CCM&RP. This will enable the accurate quantification of any monetary contribution towards these activities in accordance with the Department of Transport and Main Roads (TMR) *Guidelines for Assessment of Road Impacts of Developments* (TMR guideline).

No cumulative impacts on public transport or other modes of transport are predicted due to the remote location of the project site.

23.11.2 Mitigation Measures

The cumulative road traffic impacts of the project with the CCM&RP and MPP have been taken into account in the road impact assessment for the project. The provision of any monetary contributions for pavement rehabilitation and pavement maintenance impacts in accordance with the TMR guideline will effectively mitigate any potential cumulative impacts relating to these road aspects. Section 23.12 and the *Socio-Economic Impact Assessment Report* (Appendix N) describe the mitigation measures that will be adopted to address any fatigue-related traffic impacts.

Project air traffic control will be coordinated with the CCM&RP airstrip to ensure there are no cumulative impacts on aviation safety.

23.12 SOCIO-ECONOMICS

This section provides a summary of the project features designed to minimise socio-economic impacts from the project and describes the cumulative socio-economic impacts and proposed mitigation measures. The detailed results of the assessment are provided in Section 18 – Socio-Economic Impact Assessment and the *Socio-Economic Impact Assessment Report* (Appendix N).

23.12.1 Project Features

Both the construction and accommodation workforce will be accommodated in the accommodation village located in the south-eastern section of the project site. The majority of the workforce is expected to be Fly-in Fly-Out, due to the remote location of the project site. The provision of the on-site accommodation village and private airstrip will reduce any project-related demand on housing in the region.

The accommodation village is expected to include medical services, firefighting, rescue and emergency services, and on-site security and policing services to ensure there are no cumulative impacts on public health values and services in the region.

23.12.2 Cumulative Impacts

Social and economic assessments, integrated with a comprehensive stakeholder consultation program, were undertaken for the project. This enabled the identification of community and other stakeholder issues associated with the project and the development of strategies to address these issues.

The socio-economic assessment considered the impacts associated with the project in conjunction with cumulative issues in relation to the CCM&RP and MPP, where relevant. The project will contribute to the following cumulative impacts:

- Non-resident worker population growth;

- Permanent resident population growth in home base locations;
- Labour draw;
- Change in rural character;
- Increased demand on emergency services;
- Health implications of employment conditions; and
- Increased traffic movements and reduced road safety.

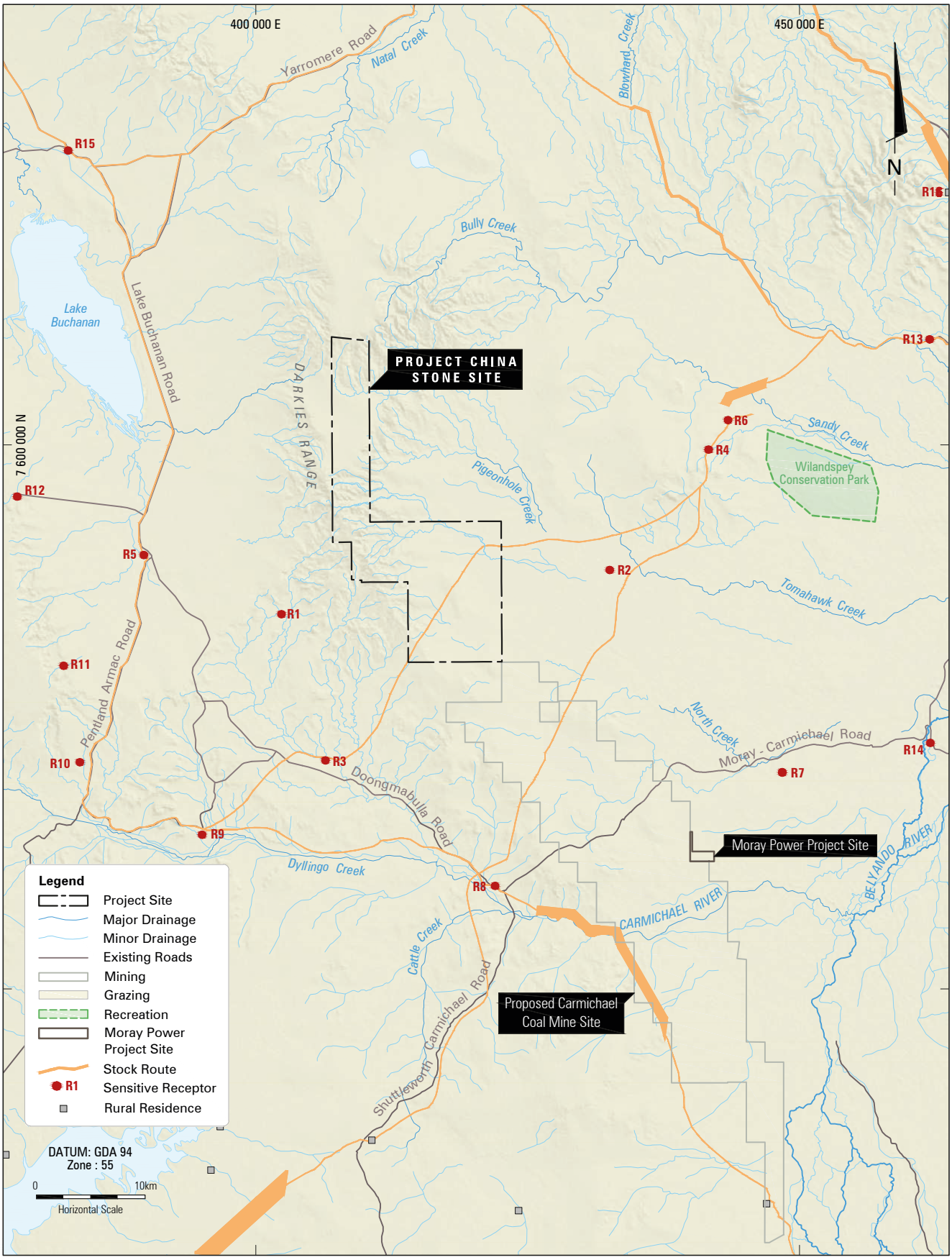
The project will also contribute to strengthening the local and regional economies due to cumulative mining development through:

- Employment growth;
- Indigenous employment growth;
- Skills enhancement;
- Increased supply chain opportunities;
- Increased economic activity;
- Increased real wage; and
- Improved infrastructure and services for the surrounding area.

23.12.3 Mitigation Measures

A series of strategies and management plans have been developed to enhance the social and economic benefits of the project and limit the potential adverse cumulative social impacts on the local community. These relate to project workforce recruitment and training; project workforce management; local and regional business development; community liveability and workforce health and wellbeing. The strategies and plans are discussed in the *Socio-Economic Impact Assessment Report* (Appendix N).

FIGURES



PROJECT CHINA STONE

MACMINES AUSTASIA | Hansen Bailey ENVIRONMENTAL CONSULTANTS

Local Setting

FIGURE 23-1