

26 CUMULATIVE IMPACTS

26.1 INTRODUCTION

The incremental effects of multiple sources of impact (past, present and future) are referred to as cumulative impacts (Contant & Wiggins 1991). Cumulative impact assessment requires an analysis of the incremental effects on an area from one or more activities as they accumulate over time.

The purpose of this chapter is to provide clear and concise information on the overall impacts of the Wandoan Coal Project, discussing the interrelationship of these impacts. This chapter undertakes a review of the major interactions which contribute to the cumulative impacts of the Project:

- in the MLA areas and immediate surrounds, including the gas supply pipeline for components of the Project, that is, the interactions between Volume 1 activities
- associated between the various components of the Project, being the MLA areas and surrounds, gas supply pipeline, and each of the raw water supply options, as described in Volumes 1, 2, 3 and 4
- associated with other projects that are separate but interrelated to the Wandoan Coal Project, being the Surat Basin Rail (SBR) project, Wiggins Island Coal Terminal, and Port Alma
- associated with other projects or publically known potential future projects surrounding the Wandoan Coal Project area, that are not directly interrelated to the Wandoan Coal Project.

The potential cumulative impacts of the raw water supply options for Volumes 2 and 3 are addressed in this chapter, and not separately presented in Volumes 2 and 3. The potential cumulative impacts of the Glebe Option are addressed separately in Chapter 20 of Volume 4.

26.2 METHODOLOGY

The methodology used to identify and assess the potential direct and indirect impacts of the Wandoan Coal Project on each of the identified environmental elements is set out in each chapter of the EIS and in the corresponding technical reports.

This chapter examines the potential key cumulative impacts associated with the Wandoan Coal Project based on the identified residual impacts for each environmental element.

The methodology adopted for this cumulative impact assessment has been based on consideration of the scale, intensity, duration and/or frequency of impacts, by identifying:

- potential key direct and indirect impacts associated with the Wandoan Coal Project, as given in each of the chapters
- appropriate spatial boundaries for analysis of cumulative impacts
- appropriate temporal boundaries for analysis of cumulative impacts, considering immediate, short term and long term impacts

- the key interaction of impacts of environmental elements:
 - in Volume 1, as activities on and surrounding the MLA areas and gas supply pipeline
 - associated with various raw water supply options for the Wandoan Coal Project from Volumes 2, 3 and 4
 - associated with interrelated projects
 - associated with projects surrounding the Wandoan Coal Project.
- the potential significance of cumulative impacts, including the potential benefits and adverse impacts
- suitable mitigation strategies and measures for the key cumulative impacts.

The requirements of relevant State Planning Policies, Environmental Protection Policies, National Environmental Protection Measures and water resource planning have been addressed in the relevant chapters, and are therefore considered as part of the cumulative impact assessment.

Key cumulative impacts identified are based on information available at the time of assessment, with the assessment providing a review of the major interactions of residual impacts identified in the chapters. Some inherent uncertainty exists in cumulative impact assessment given the scale, temporal, spatial, additive and synergistic impacts that may potentially be experienced over the life of the Wandoan Coal Project.

Table 26-1 outlines the spatial boundaries considered in the cumulative impact assessment, while Table 26-2 outlines temporal boundaries in the cumulative impact assessment.

Table 26-1: Spatial boundaries

Spatial boundary	Definition
Local	Within 5 km of the Project area
Regional	Dalby, Banana, Roma Regional Councils
State	Queensland

Table 26-2: Temporal boundaries

Temporal boundary	Definition
Immediate	Occurring only during the undertaking of an activity
Short term	Occurring within approximately 24 hours of the activity and continuing for up to three years after the cessation of the activity
Long term	Occurring for longer than three years after the activity has ceased

Table 26-3 outlines the potential consequences of a cumulative impact. Cumulative impacts range from a major beneficial impact to a major adverse impact.

Table 26-3: Consequence of cumulative impact

Consequence		Definition
Beneficial	Major	Long term, beneficial (+ve) impact for Queensland
	Moderate	Long to short term, beneficial (+ve) impact for Regional and Local areas
	Minor	Short term, beneficial (+ve) impact for the Local area
	Insignificant	Immediate, beneficial (+ve) impact for the Local area
Adverse	Major	Long term, adverse (-ve) impact for Queensland
	Moderate	Long to short term, adverse (-ve) impact for Regional and Local areas
	Minor	Short term, adverse (-ve) impact for the Local area
	Insignificant	Immediate, adverse (-ve) impact for the Local area

26.3 KEY INTERACTIONS

All environmental, social and economic elements are interrelated to some extent, and can be highly complex.

As noted above, key interaction of impacts of environmental elements as examined:

- in Volume 1, as activities on and surrounding the MLA areas and gas supply pipeline
- associated with various components of the Wandoan Coal Project from Volumes 2, 3 and 4
- associated with interrelated projects
- associated with projects or publically known potential future projects surrounding the Wandoan Coal Project area, for projects that are not interrelated to the Wandoan Coal Project.

26.3.1 INTERACTIONS OF ENVIRONMENTAL ELEMENTS IN VOLUME 1

Key cumulative impacts within each environmental element are summarised in Table 26-4.

Table 26-4: Key cumulative impacts

Environmental element	Residual impact	Spatial boundary	Temporal boundary	Consequence
Land use	Negotiated purchase of private lands associated with MLA areas	Local	Long term	(-ve) moderate
	Relocation of public infrastructure and lands	Local	Long term	(+ve & -ve) moderate
	Investigation and clean-up of existing land contamination	Local	Long term	(+ve) moderate
Geology and soils	Decrease in land suitability classes for cropping and cattle grazing	Local	Long term	(-ve) moderate

Environmental element	Residual impact	Spatial boundary	Temporal boundary	Consequence
	Disturbance of sodic and dispersible soils	Local	Long term	(-ve) moderate
	Creation of voids	Local	Long term	(-ve) moderate
Groundwater	Drawdown on surrounding bores	Local	Long term	(-ve) moderate
	Disturbance or loss of alluvial aquifers	Local	Long term	(-ve) moderate
Water supply and management	Management of sediment dams	Local	Long term	(-ve) moderate
	Management of environmental dams	Local	Long term	(-ve) moderate
	Management of tailings dams	Local	Long term	(-ve) moderate
	Drawdown of Great Artesian Basin (GAB) due to construction raw water supply.	Regional	Long term	(-ve) moderate
	Downstream surface water entitlements	Regional	Long term	(-ve) moderate
	Flood levels	Local	Long term	(-ve) moderate
	Upgraded potable water supply facilities and wastewater treatment facilities for Wandoan township.	Local	Long term	(+ve) moderate
Transportation	Increased risk of traffic incidents during construction due to increases in vehicle movements	Regional	Short term	(-ve) moderate
	Driver fatigue during construction	State	Short term	(-ve) moderate
	Driver fatigue during operations	Regional	Long term	(-ve) moderate
Air quality	Increased dust during construction	Local	Immediate	(-ve) insignificant
	Increase dust during operations	Local	Long term	(-ve) moderate
Climate change	Increased greenhouse gas emissions	State	Long term	(-ve) major
Noise	Increased noise during construction	Local	Immediate	(-ve) insignificant
	Increase noise during operations	Local	Long term	(-ve) moderate
Vibration	Increased vibration during construction	Local	Immediate	(-ve) insignificant
	Increase vibration during operations	Local	Long term	(-ve) moderate
Terrestrial ecology	Clearance of remnant and non-remnant regional ecosystems and associated habitat.	Local	Long term	(-ve) moderate

Environmental element	Residual impact	Spatial boundary	Temporal boundary	Consequence
	Introduction of weed species	Local	Short term	(-ve) minor
Aquatic ecology	Barrier effect on aquatic fauna movement	Local	Long term	(-ve) moderate
Waste Management	Construction of a new municipal landfill	Local	Long term	(+ve & -ve) moderate
	Creation of new contaminated lands from on-site tyre disposal	Local	Long term	(-ve) moderate
Visual amenity	Change in landform	Local	Long term	(-ve) moderate
	Loss of vegetative cover	Local	Short term	(-ve) minor
Indigenous cultural heritage	Loss of local indigenous cultural heritage items and context	Local	Long term	(-ve) moderate
Non-Indigenous cultural heritage	Loss of local non-indigenous cultural heritage items and context	Local	Long term	(-ve) moderate
	Renovation of Booral Homestead	Local	Long term	(+ve) moderate
Social	Impacts on sensitive receptors due to air quality, noise, vibration, and visual impacts (see Table 26-6)	Local	Long term	(-ve) moderate
	Increased employment creation during construction	State	Short term	(+ve) moderate to major
	Increased operational employment creation	State	Long term	(+ve) major
	Increased pressure on housing demand, availability and affordability during construction	Regional	Short term	(-ve) moderate
	Increased pressure on housing demand, availability and affordability during operations	Regional	Long term	(-ve) moderate
Economic	Contribution to Queensland economy through royalties and other charges	State	Long term	(+ve) major
	Increased economic activity	Regional	Long term	(+ve) major

The interaction of residual impacts for the environmental elements for activities in and surrounding the MLA areas and gas supply pipeline, produce cumulative impacts that are summarised in Table 26-5.

Table 26-5: Summary of key interactions of residual impacts

	Land use	Geology	Groundwater	Water	Transportation	Air quality	GHG	Noise	Vibration	Terrestrial ecology	Aquatic ecology	Waste management	Visual amenity	Indigenous CH	Non-indigenous CH	Social	Economics	Hazard and risk	Health and safety	
Land use		✓	✓	✓						✓	✓	✓		✓	✓	✓	✓	✓		
Geology	✓		✓	✓		✓				✓	✓			✓	✓					
Groundwater	✓	✓		✓								✓				✓				
Water	✓	✓	✓							✓	✓	✓				✓				
Transportation																✓		✓	✓	
Air quality		✓					✓									✓				
GHG						✓										✓				
Noise																✓				
Vibration																✓				
Terrestrial ecology	✓	✓		✓							✓	✓	✓							
Aquatic ecology	✓	✓		✓						✓		✓	✓							
Waste management	✓		✓	✓						✓	✓					✓				
Visual amenity										✓	✓					✓				
Indigenous CH	✓	✓														✓				
Non-indigenous CH	✓	✓														✓				
Social	✓		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓			✓
Economics	✓															✓				
Hazard and risk	✓				✓															
Health and safety					✓											✓				

Based on the interactions in Table 26-5, the key cumulative impacts are clustered to address each key issue generating a cumulative impact, being:

- land use
- land clearing
- groundwater and surface water management
- impact on individual private properties and sensitive receptors
- impact on wider community and service providers.

Land use

Changes in land use have both beneficial and adverse cumulative impacts. Within the operational life of the mine, the negotiated purchase of land for mine development, temporary relocation of public roads and stock routes, relocation of public infrastructure including local power lines, and changes in land suitability and good agricultural land classifications from mining activities, have a moderate adverse and some beneficial cumulative impact on land use, as the duration of these activities lasts longer than three years.

Realignment of some local roads will result in improvements to the road formation and running surface, compared to existing road conditions, and will provide a long term beneficial moderate cumulative impact. However, travel times may slightly increase for some local road users of road diversions, with travel times provided in Chapter 6 Project Operations, Section 6.7.2, providing an adverse moderate cumulative impact.

Although land rehabilitation and revegetation will be undertaken, moderate direct impacts will remain beyond the life of the mine, as final landforms will include voids, levees, and creek diversions. Other cumulative impacts associated with land use will reduce to toward minor impacts, as agricultural activities recommence, and infrastructure, roads and stock routes reinstated where feasible.

The investigation and clean-up of potentially contaminated lands prior to commencement of construction and/or mining operations in areas of existing contamination provides a moderate beneficial cumulative impact. However, management of waste tyres during mine construction and operations will result in tyres being disposed on-site, with the disposal area registered on the contaminated land register, resulting in an adverse moderate cumulative impact.

Land clearing

Even with the application of best practice mitigation measures, clearing of land for mine construction and operations will typically result in moderate adverse cumulative impacts associated with disturbance of sodic and dispersible soils leading to increased soil erosion and potential water quality degradation; increased dust generation; reduction of terrestrial ecological values including remnant and non-remnant regional ecosystems, species distribution and individuals; introduction and spread of weed species; reduction of aquatic ecological values including species distribution and individuals; loss of visual amenity through reduction of vegetative cover; and loss of indigenous and non-indigenous cultural heritage items in-situ and their landscape context.

Progressive rehabilitation and revegetation of disturbed lands and the proposed biodiversity off-set strategy, with a proposed ratio of offsetting vegetation loss by 3:1, will reduce the cumulative impact of land clearing towards minor, as landforms stabilise and vegetation sustainably regenerates. However the time horizon of this will be at a minimum of 15 years, allowing for sustainable vegetation regeneration towards the development of self-sustaining terrestrial and aquatic ecological communities.

Groundwater and surface water management

Groundwater and surface water management strategies result in moderate adverse cumulative impacts, as the long term landforms of pit voids, creek diversions and levees will influence groundwater and surface waters in the local area beyond the life of the mine.

Disturbance or loss of alluvial and coal seam aquifers from pit excavations will lead to moderate adverse cumulative impacts. While assessed as unlikely to occur, impacts on users may occur through loss or disruption of supply of groundwater drawn from these aquifer types due to the effects of drawdown. If groundwater users are impacted by drawdown effects, the WJV will make good the allocated supply of groundwater.

Groundwater will be drawn down from the Great Artesian Basin to supply construction raw water. Recovery of the drawdown will be within the life of the mine, but longer than three years. The drawdown is within the existing allocation under the Resource Operations Plan (ROP) for the Wandoan town water supply, as the current use of water in Wandoan is lower than the allocation.

Downstream of the MLA areas at the Horse Creek/Juandah Creek confluence, the nearest surface water entitlement (water harvesting entitlement) is held. A cumulative impact on the entitlement is a predicted decrease of 2.2% of mean annual flow by Year 30 of the Wandoan Coal Project. This equates to an adverse moderate impact, as the impact is over 5km downstream of the MLA areas and extends beyond a three year period.

A preliminary assessment of the Woleebee Creek diversion conceptual design, indicates that flood levels downstream of the MLA areas could be increased by up to 300 mm downstream of the MLA areas. This will have a small impact on the frequency of flooding of the Booral Road bridge, and will slightly reduce the flood immunity of the Windamere homestead. This equates to an adverse moderate cumulative impact, as the impact is local, however extends beyond a three year period.

The application of leading industry practice mitigation strategies and measures will establish a groundwater and surface water monitoring network associated with the MLA areas, which will consider the long term groundwater and surface water cumulative impacts and guide ongoing mitigation measures.

Decommissioning, rehabilitation and revegetation of groundwater and surface water management systems including sediment, environmental and tailings dams will reduce some cumulative impacts, as many surface water catchments and sub-catchments will approach pre-mining runoff characteristics. Once final voids and land forms profiles are established, modelling of the interaction between groundwater and surface waters will be undertaken to establish the most appropriate sustainable long term management of land forms, groundwater, surface waters and vegetative systems.

Construction of upgrades to the potable water treatment and wastewater treatment facilities in Wandoan township will provide a long term beneficial cumulative impact for the town.

Impact on individual landowners and sensitive receptors

Impacts on individual private landowners associated with the MLA areas are associated with negotiated purchase of lands and impacts on adjacent landowners.

The WJV is consulting with the owners of the thirty-seven properties in the MLA areas with a view to negotiating the purchase of properties, so that a mining lease can be established. For people leaving properties within the MLA areas, a moderate adverse cumulative impact results, as the outcomes are long term for the individuals involved and their associated social networks within the local area.

Cumulative impacts on the nearest sensitive receptors, being private landowners adjacent to the MLA areas, may include air quality, noise, vibration and visual amenity impacts during the Wandoan Coal Project operations. Table 26-6 and Figure 26-1-V1.3 outline the adjacent private properties impacted. Note that figures with numbering ending in V1.3 refer to figures contained in Volume 1, Book 3 of the EIS.

The cumulative impacts will vary throughout the life of the mine as operations change over the course of the mine life and mitigation measures are implemented to achieve the ultimate residual impacts, but generally moderate adverse cumulative impacts will result.

Table 26-6: Potential cumulative impacts on adjacent landowners as sensitive receptors during operations

Sensitive receptor	Lot	Plan	Potential cumulative impacts
MLA-300	15	FT161	Air quality Visual amenity
MLA-355	38	CP899702	Vibration Visual amenity
MLA-361	38	CP899702	Vibration Visual amenity
MLA-374	111	FT487	Vibration Visual amenity
MLA-378	1	RP144130	Noise monitoring Visual amenity
MLA-404	15	SP180948	Air quality Visual amenity
MLA-459	28	FT467	Noise monitoring Air quality
MLA-484	1	RP110817	Air quality Visual amenity
MLA-505	6	FT788	Noise Air quality Visual amenity
MLA-520	36	FT981	Noise monitoring Air quality
MLA-552	16	FT1012	Noise monitoring Air quality Vibration Visual amenity

Sensitive receptor	Lot	Plan	Potential cumulative impacts
MLA-557	3	FT695	Air quality Visual amenity
MLA-595	38	AB188	Noise Air quality Vibration Visual amenity
MLA-687	28	FT563	Air quality Visual amenity
MLA-693	41	CP857459	Air quality Visual amenity
MLA-712	39	FT503	Noise monitoring Visual amenity
MLA-720	72	FT590	Noise monitoring Visual amenity
MLA-740, MLA741 Abattoir	—	—	Noise Vibration

Mitigation measures, as described in the relevant chapters, that will also reduce cumulative impacts include:

- consultation with property owners with a view to agreeing to appropriate mitigation measures
- meteorological monitoring to form the basis of a weather forecasting system. Coupled with the dust, noise and vibration monitoring programs, meteorological conditions will inform the implementation of proactive and reactive management strategies
- installation of continuous real time air quality, noise and meteorological monitoring stations at representative sites prior to the commencement of operations, and review the required management actions at and during mining of relevant pits
- installation of vibration monitoring and recording stations, and coupled with meteorological monitoring, review the required management actions at and during mining of relevant pits
- appointment of a local Community Liaison Manager to promptly address concerns of the community and enable proactive actions
- the provision of a Social Involvement Plan (SIP) of community needs and responses to the Wandoan Coal Project with an internal annual review and five-yearly external technical review. This will be based on surveys, consultation with the local communities and local service providers
- undertake proactive implementation of viewer location treatments to minimise visual impacts, including specific sensitive view location treatments, and screening treatments for various zones. Landscaping in association with the Biodiversity Management Plan will consider terrestrial ecological requirements

- undertake rehabilitation and revegetation of disturbed areas as soon as areas become available, as part of the Wandoan Coal Project's Biodiversity Management Plan, to reduce visual, noise, and dust impacts.

Properties impacted during the construction of the gas supply pipeline will incur local and immediate impacts, resulting in insignificant adverse cumulative impacts. Further cumulative impacts associated with the gas supply pipeline, Surat Basin Rail Project and the Glebe Option for raw water supply are discussed in Section 26.3.3.

Impact on the wider community and service providers

Cumulative impacts on the wider community and service providers will be both beneficial and adverse.

Community infrastructure potentially impacted during the construction and operational phases will include:

- potable water treatment facilities
- wastewater treatment facilities
- existing landfill in Wandoan township
- Wandoan Cemetery
- the existing Telstra Tower
- schools and education facilities
- medical and health services.

Contributions by the WJV for upgrading of the potable water treatment facilities and wastewater treatment facilities in Wandoan Township, and the proposed new Wandoan landfill facilities, in conjunction with Dalby Regional Council, will provide a moderate beneficial benefit to the community, by improving existing services.

Vibration, noise, air quality and visual amenity impacts on the Wandoan Cemetery during construction and particularly operations will be mitigated through direct liaison between the local Community Liaison Manager and Dalby Regional Council's Cemetery Manager for Wandoan. Mitigation measures will include condition surveys of existing plots prior to construction commencing, planting and other appropriate viewer screening of the mine operations, vibration and noise monitoring, and consideration of feedback from the local community and Community Reference Group.

The existing Telstra tower may be subject to vibration and fly-rock impacts. The WJV is currently in discussion with Telstra regarding potential impacts on the existing tower, so that users of the telecommunications services are not impacted by mining operations.

Consideration of the new Sustainable Resource Communities Policy will aid in management of educational facilities, and medical and health services, in co-operation with relevant government departments, potentially through the development of a Social Impact Plan. The Sustainable Resource Communities Policy focuses on resource communities (such as Wandoan) where rapid development brought about by the resources boom may have significant impacts on community infrastructure and services, and the social structure of local and regional communities that support the new or expanding communities that will support the increased resource development. The moderate beneficial cumulative impact for the local area and region would result with effective implementation of Sustainable Resource Communities Policy objectives, which include:

- strengthening the Government’s coordination role (including assisting in Social Impact Plan negotiation and implementation)
- improving linkages between social impact assessment and regional planning
- fostering partnerships between local government, industry and community
- an enhanced regulatory environment for social impact assessment.

It is proposed that the history of the region and the individuals and communities that have contributed to its culture and heritage will be acknowledged by way of documentation or other recognition of landowners by the WJV. Acknowledging these contributions to local history will have a moderate beneficial impact for the local and regional areas.

26.3.2 CUMULATIVE IMPACTS OF THE PROJECT COMPONENTS

The cumulative impacts resulting from the impact assessments provided in Volumes 1, 2, 3 and 4 can only be viewed in the following combinations:

- Volume 1 MLA areas and surrounds, and Volume 2 Southern CSM Water Supply Pipeline
- Volume 1 MLA areas and surrounds, and Volume 3 Western CSM Water Supply Pipeline
- Volume 1 MLA areas and surrounds, and Volume 4 Glebe Option involving the weir raising and water supply pipeline.

No more than one water supply pipeline will be developed for the Wandoan Coal Project, therefore cumulative impacts between Volumes 2, 3 and 4 are not considered.

Land clearing

Clearance of terrestrial remnant and non-remnant regional ecosystems and aquatic communities and habitats will be an adverse moderate cumulative impact when examining any of the proposed pipeline options combined with the MLA areas and surrounds. The total cumulative impacts associated with vegetation clearing are provided in Table 26-7.

Table 26-7: Cumulative impacts of clearance of regional ecosystems

Project component	Remnant (ha)	Non-remnant (ha)
Volume 1	673.0	501.7
Volume 2	55.8	30.0
Total	728.8	531.7
Volume 1	673.0	501.7
Volume 3	2.8	7.0
Total	675.8	508.7
Volume 1	673.0	501.7
Volume 4	644.2	60.5
Total	1317.2	562.2

Cumulative impacts on visual amenity will also result from land clearance. The greatest cumulative visual amenity impacts will result during the construction phase of the selected proposed pipeline and infrastructure of the MLA areas and surrounds. This cumulative impact is considered as a moderate adverse impact, given that the duration before

revegetation substantially re-establishes along the proposed pipeline will be at least three years, and will not reach maturity for at least 15 years.

Water supply

The supply of raw water from the water supply options may result in potential cumulative impacts associated with use of coal seam methane (CSM) by-product water, and the spread of noxious or exotic aquatic species.

The beneficial reuse of CSM by-product water for the operational raw water supply would result in a moderate beneficial impact for the region, as CSM by-product would otherwise be either treated and discharged, or stored in evaporation ponds.

The noxious fish species carp (*Cyprinus carpio*) is present in the Condamine Catchment associated with the Southern CSM Water Supply Pipeline, however as CSM by-product water is not surface water and will not be in contact with watercourses, the likelihood of carp transfer to the Dawson River Catchment which currently does not contain carp is low. However, if carp were to transfer into the Dawson River Catchment, the cumulative impact would be a major adverse impact.

No noxious or exotic fish species have been recorded within the MLA areas, but have been recorded along the gas supply pipeline study area. *Gambusia holbrooki* (mosquitofish) and *Carassius auratus* (common goldfish) have been captured in the Dawson River, and have the potential for transfer via the raw water supply from the Glebe Option. If appropriate mitigation measures are applied, the likelihood for this cumulative impact to occur is low. However, if noxious or exotic species are transferred onto the MLA areas, the cumulative impact would be a moderate adverse impact.

26.3.3 INTERRELATED PROJECTS

Projects that are separate but interrelated to the Wandoan Coal Project are the SBR project, Wiggins Island Coal Terminal, Port Alma expansion. The relationship of the Project to the SBR project, Wiggins Island Coal Terminal and the Port Alma expansion is discussed further in Chapter 2.

Both the Wiggins Island Coal Terminal and Port Alma developments would service not only the Wandoan Coal Project, but are proposed to be used by multiple coal mining companies or coal mines. There are significant cumulative beneficial impacts associated with these developments and the Wandoan Coal Project, such as the major beneficial cumulative impact for Queensland government revenue through the export of coal, and rail and port charges, thereby generating royalties of approximately \$3.7 billion over the life of the Wandoan Coal Project, and rail and port charges of approximately \$500 million per annum.

The interrelated project within the regional and local areas, as defined in Table 26-1, is the SBR project. The SBR project is a new coal and freight rail line linking the Western and Moura Railway Systems between Wandoan and Banana. The corridor defined by SBR project has provided opportunities for co-location of infrastructure associated with the Wandoan Coal Project, being the gas supply pipeline (Volume 1) and the Glebe Option Water Supply Pipeline (Volume 4). The gas supply pipeline adjoins the eastern boundary of the SBR project before running parallel to a local road to the gas supply plant. The Glebe Option Water Supply Pipeline runs along the Nathan Road reserve which sits immediately west of the SBR easement corridor.

Cumulative impacts associated with the MLA areas, gas supply pipeline, Glebe Option pipeline and SBR project are discussed below and include:

- impacts on landowners for land access during construction and land use during operations
- road traffic impacts during construction
- demand for accommodation during construction
- impacts on short and long term housing affordability and availability
- demand for community services provided by various service providers
- noise impacts during construction and operations
- air quality impacts during construction and operations
- supply of sands, gravels, cement, rock, with extraction of materials from the local and regional areas for construction
- supply of raw water for construction.

The southern and western raw water supply pipeline options will not interact with the SBR given the different locations and their spatial relationship.

Land use, access and traffic impacts

The construction periods of the SBR project, Glebe Option pipeline and gas supply pipeline will exist over a similar time period of Years -2 and -1. Properties that are accessed via Nathan Road and other local roads to the east of Nathan Road will be impacted during the construction period with immediate and short term restrictions on property access, and increased commercial and heavy vehicle movements. Liaison between all construction parties, Dalby Regional Council, the Department of Main Roads, the Department of Primary Industries and Fisheries, and landowners will need to be undertaken so as to co-ordinate activities to minimise cumulative impacts on landowners, weed spread, the travelling public, and the construction workforces. The cumulative impact will be a minor adverse impact.

Land use by landowners in the vicinity of construction will be restricted during the construction phase of the SBR project, Glebe Option pipeline and gas supply pipeline, so as to minimise the potential for safety incidents occurring between landowner activities and construction activities. During construction limitations on land use will be a minor adverse cumulative impact.

During operations, land use over the gas supply pipeline and Glebe Option pipeline will be largely returned to the existing land use, therefore having negligible cumulative impact. However lands affected by the SBR project will experience a moderate adverse cumulative impact, given the establishment of long term above ground infrastructure.

Accommodation demand

During the early works and site preparation phases of the Wandoan Coal Project, construction commencement of the gas supply pipeline, and upgrading of the potable and wastewater treatment facilities in Wandoan will require accommodation for the workforces, as the construction accommodation facilities will not be completed at this time for the mine. Construction workforces for the SBR project and Glebe Option pipeline will also require accommodation within the local area. Potential exists that temporary

accommodation demand may outstrip supply within the local area within the first few months of construction commencing, however workforces may be accommodated in the wider region. This will potentially result in minor adverse impact. Liaison and co-ordination between the construction parties will be undertaken to allow scheduling of the construction activities to minimise the potential for outstripping of accommodation supply within the local and regional areas for the period before the Wandoan Coal Project accommodation facilities are established.

Demand for housing

In tandem with accommodation demand, during construction of the Wandoan Coal Project and the SBR project, rental housing availability will be impacted with demand putting pressure on existing properties, with potential for increases in rental prices with increasing demand. Existing tenants within the local and regional areas may experience moderate adverse cumulative impacts, but impacts will vary based on individual situations.

Long term housing affordability and availability will be influenced mostly by the Wandoan Coal Project within the Wandoan local area, but some operational workforce housing for the SBR project is anticipated within the town. WJV employees will be encouraged to settle within Wandoan and surrounding areas, with approximately 125-150 of the workforce expected to live locally. The WJV will provide the accommodation for the majority of the mine workforce and supply housing for 35 employees via 15 houses and ten duplexes. However, housing for the remaining employees of the WJV may potentially place short to long term pressure on the rental housing market and house construction capacity of the local and regional areas. Compared to existing rental prices, potential exists for moderate adverse cumulative impacts for existing tenants, with rental prices potentially increasing with increased demand.

The demand for house construction or purchase of existing properties ultimately depends on incentives provided by the WJV and SBR projects, availability of house construction contractors and new house sites, availability of existing housing, and speculative demand. Compared to existing house prices, a moderate adverse cumulative impact may be experienced.

Demand for services

During construction of the Wandoan Coal Project and SBR project, demands on medical and health services, potable water supply, wastewater treatment, and landfill facilities will all be impacted in the local area, prior to construction activities of the SBR project moving north along the rail corridor. Minor adverse cumulative impacts will be experienced in the initial months of construction while completion of upgrades and facilities are undertaken as part of the Wandoan Coal Project.

Retail and wholesale businesses of the local area and region will potentially experience impacts associated with supply demand, and employment competition and opportunities.

During construction and operations, with increased construction personnel in the area, the demand for goods and services will increase, particularly for goods and services not provided as part of accommodation facilities of the projects. This potentially results in a minor beneficial cumulative impact for businesses in the local area.

An adverse minor to moderate cumulative impact may be experienced by businesses that results from competition with the Wandoan Coal Project and the SBR project for employees, particularly during the operation of the mine, however this depends upon the existing skills of people within the local area and region and their interest in working in the mining industry.

The projects will bring employment opportunities to the area, which may help retain existing residents within the local area and region, given the Wandoan area has been experiencing a general population decline since the late 1980's, and may even act as a catalyst for people previously living in the area to return.

Noise impacts

During construction, cumulative noise impacts from construction within the MLA areas, and construction along the broader corridor for the gas supply pipeline, SBR Project and Glebe Option pipeline will provide insignificant to minor adverse cumulative impacts in the local area. With construction parties adhering to Environmental Protection Regulation 1998, EPP (Noise) requirements, Australian Standard AS 2438, and any Dalby Regional Council requirements, cumulative noise impacts should be limited.

Noise impacts during operations of the mine and rail line will provide moderate adverse impacts on the general noise environment of the local area for the life of the mine. Individual events where noise generated by mining activities and passing trains will result in a cumulative insignificant adverse impact, given the short duration of the event. However these cumulative noise events may be noticeable on adjacent properties, with the cumulative impact typically spatially limited to the eastern boundary of MLA 50230 in keeping the with the SBR Project alignment.

Air quality impacts

During construction, cumulative air quality impacts from construction within the MLA areas, and construction along the broader corridor for the gas supply pipeline, SBR project and Glebe Option pipeline will provide insignificant to minor adverse cumulative impacts in the local area. With construction parties adhering to Environmental Protection Regulation 1998, EPP (Air) requirements, and any Dalby Regional Council requirements, cumulative air quality impacts should be limited.

Individual events where dust generated by mining activities and coal dust from passing trains will result in a cumulative insignificant adverse impact, given the short duration of the event. However these cumulative air quality events may be noticeable on adjacent properties, with the cumulative impact typically spatially limited to the north-eastern boundary of MLA 50230 associated with the junction of the rail spur and SBR project alignment. The potential generation of air quality impacts from potential future freight train movements along the SBR line to the south of the rail spur junction will depend on the types of freight carried.

Extraction of materials

During the construction phase, supply of sands, gravels, cement, and rock, with potential extraction of materials from the local and regional areas for construction associated with the Wandoan Coal Project and the SBR project, will have a cumulative impact on local and regional material supplies and suppliers. All materials sources will need to be licensed as Environmentally Relevant Activities or other appropriate licenses and permits. For local and

regional materials suppliers minor beneficial cumulative benefits, as the supply of materials will mostly occur during the two years of construction.

Construction raw water supply

Raw water supply for the construction phase of the Wandoan Coal Project and the SBR project will come from multiple sources. The preferred option for the Wandoan Coal Project is from subartesian aquifers associated with the town water supply for Wandoan. Water supply options for construction of the SBR project are being investigated. Any potential cumulative impacts on surface waters and groundwater will be investigated during the detailed design phase of the projects. Cumulative impacts from raw water supply for both projects will vary depending on the ultimate selection and location of water supply.

Community consultation

Community consultation associated with the multiple interrelated and not interrelated projects may cumulatively impact on landowners' time and sense of certainty over use of their properties', having to potentially consult on purchase, access and/or development issues with multiple proponents. Where possible, for interrelated projects, ongoing consultation will endeavour to be co-ordinated, so as to minimise the moderate adverse cumulative impacts.

26.3.4 PROJECTS AND OTHER DEVELOPMENTS

Projects and other developments surrounding the Wandoan Coal Project include:

- other mines and gas fields
- potential coal fired power station
- selected development applications with Dalby Regional Council.

Other mines and gas fields

Figure 26-2-V1.3 indicates the existing operational thermal coal mines and potential thermal coal mining sites within the region, based on available Mining Lease (ML), Mining Development Lease (MDL) and Exploration Permits for Coal (EPC) information which include:

- ML 5908, MDL 174 and EPC 770 held by Peabody (Wilkie Creek) Pty Ltd, as Wilkie Creek
- ML 50074 and MDL 335 held by Aberdare Collieries Pty Ltd, as Kogan Creek
- MDLs 158 and 275 held by Anglo Coal (Taroom) Pty Ltd and Mitsui Moura Investment Pty Limited, as Taroom
- MDL 173 held by Peabody (Wilkie Creek) Pty Ltd, as Horse Creek
- MDL 187 held by Cockatoo Coal, as Guluguba
- MDL 216, and EPCs 1133 and 1024 held by Anglo Coal (Theodore South) Pty Ltd and Mitsui Moura Investment Pty Limited, and Christopher Ian Wallin, and QCoal Pty Ltd, as Theodore South
- MDLs 223 and 224 held by the Wandoan Joint Venture, as the Wandoan Deposits
- MDL 247 held by Chandail Pty Ltd, as Rywung
- MDL 247 held by Chandail Pty Ltd, as Sefton Park
- MDL 283 held by DJB Coal Pty Ltd and Racehorse Investments Inc, as Ownaview

- EPCs 468 and 585 held by Tarong Energy Corporation Ltd, as Haystack Road
- EPCs 468 and 700 held by Tarong Energy Corporation Ltd, as Glen Wilga
- EPC 640 held by DJB Coal Pty Ltd and Racehorse Investments Inc, as Collingwood
- EPC 650 held by Taroom Coal NL (owned by Northern Energy Corporation Ltd), as Elimatta
- EPC 732 held by Syntech Resources Pty Ltd, as Cameby Downs
- EPC 788 held by the Wandoan Joint Venture
- EPCs 796, 813 and 1041A held by Cockatoo Coal, as the Surat Project (DME 2008 a).

In terms of known coal projects in the region:

- Anglo Coal – Taroom and Collingwood Projects - in 2007 Anglo Coal acquired Collingwood deposit (MDL 346), located about 30 km north east of Wandoan and has held the Taroom coal deposit (10 km south of Taroom) on MDLs 158 and 275 for many years. These deposits are being assessed for development and no development plans are currently available.
- Northern Energy – Elimatta Project – The coal deposit is located approximately 20km west of the MLA areas. The coal seams are similar to those held by the WJV and exploration and early planning activities are being undertaken. Based on project EPBC Act referral 2008/3140, the project is proposed to comprise open cut mining and on-site processing to produce 4-5 Mt/a product coal for export. It is understood that the project is proposed to have a total area of disturbance of 2,500 ha for the mining and infrastructure footprint, with a total area of proposed MLAs of 4,054 ha. The project is anticipated to require water supply of 1,500 ML per annum, and the proponent is investigating CSM water. No IAS has been lodged at the time of drafting this EIS.
- Cockatoo Coal – Guluguba Project - Cockatoo Coal holds MDL 187, 20 km south of the Project which is reported to contain 105 Mt of coal seams similar to those held by the WJV. The Company has undertaken recent exploration and its 2008 Annual Report stated that it was involved in industry discussions on Wiggins Island and discussions with Queensland Rail on the upgrades required for the Moura-Gladstone rail line. No further development plans or timing are available.

In terms of other known existing coal mines, the thermal coal mines at Wilkie Creek and Kogan Creek will have negligible interaction with the Wandoan Coal Project and SBR project given the existing scopes of the projects.

The future development of potential mine sites into operational mines depends on the commercial decisions of the parties involved. The Wandoan Coal Project, SBR project and Wiggins Island Coal Terminal may potentially act as catalysts of further coal resource development in the Surat Basin. Depending on the sites, infrastructure and services required by each mine site, the cumulative impacts will vary across the full range of potential consequences. The most significant cumulative impacts will likely be associated with land use, soils, air quality, noise, vibration, surface water, groundwater, visual amenity, terrestrial and aquatic ecology, and social impacts and opportunities.

Figure 26-3-V1.3 indicates the existing operational coal seam methane and conventional gas extraction fields and prospective fields within the region, based on available information which include:

- PL 4 held by Santos QNT Pty Ltd, as Pleasant Hills and Grafton Range
- PL 10 held by Santos QNT Pty Ltd, as Bony Creek and Tarrawonga
- PL 11 held by Santos QNT Pty Ltd, as Snake Creek East
- PL 13 held by Santos QNT Pty Ltd, as Westlands
- PLs 72, 73 held by Ian Grant Skyes (renewal lodged)
- PLs 90, 91, 92, 99, 100, 232, 233, 234 held by Santos Toga Pty Ltd, as Fairview
- PL 101 held by Origin Energy CSG Limited, as Peat
- PL 171 held by Roma Petroleum NL
- PL 176 held by Santos QNT Pty Ltd, as Scotia
- PL 180 held by Queensland Gas Company Pty Ltd
- PL 185 and 253 held by Australian CBM Pty Ltd
- PL 194 held by Australian CBM Pty Ltd, as Kogan North
- PLs 195, 200, 203, and 204 held by Origin Energy CSG Limited, as Spring Gully
- PL 198 held by Arrow Energy Limited, as Tipton West
- PL 209 held by Origin Energy CSG Limited
- PLs 211, 212, 247, 263 held by Queensland Gas Company Pty Ltd
- PLs 215, 216, 265, 267, 272 held by Origin Energy CSG Limited
- PL 220 held by Origin Energy CSG Limited
- PL 225 held by Origin Energy CSG Limited
- PL 226 held by Origin Energy CSG Limited, as Talinga
- PL 230 held by Arrow Energy Limited, as Daandine
- PLs 276, 277 and 278 held by Queensland Gas Company Pty Ltd (DME a 2008; DME b 2008)
- Queensland Curtis LNG (QCLNG) Project:
 - Authority To Prospect (ATP): ATP 651, ATP 574, ATP 632 (portion of), ATP 676, ATP 647, ATP 648, ATP 610, and ATP 621
 - Petroleum lease application (PLA): PLA 247, PLA 211, PLA 212, PLA 263, PLA 180, PL 179, PL 201, PL 228, PL 229, PLA 257, PLA 259, PLA 261, and PLA 262.

A number of existing and proposed coal seam methane and conventional gas operations may directly interact with the Wandoan Coal Project including the Scotia conventional gas field, and coal seam methane fields related to the supply of CSM water, as discussed in Volumes 2 and 3, and Sections 26.3.1 and 26.3.2 above.

The future development of CSM and conventional gas fields depends on the commercial decisions of the parties involved. Depending on the fields, infrastructure and services required by each field, the cumulative impacts will vary across the full range of potential consequences.

Coal-fired power station

The Wandoan Coal Project is proposed as an export mine. However domestic coal sales in the future are also possible.

In light of historical interest in a coal-fired power station at Wandoan, Xstrata Coal has received expressions of interest from potential proponents for a coal-fired power station in the vicinity of the mine to use product coal from the mine. Any such power station would potentially supply multiple users.

Any power station would be the subject of a separate environmental impact assessment and approval process, including cumulative impact assessment.

Development applications with Dalby Regional Council

Various development applications are currently before Dalby Regional Council for the Wandoan and Miles areas, including developments associated with:

- reconfiguring of a lot, including lot subdivisions for development
- material change of use for:
 - multiple dwelling developments
 - motel development
 - industrial storage.

The cumulative impacts associated with developments will vary across a range of consequences depending on the specific development, and their potential interaction with the Wandoan Coal Project.

Impacts may also be experienced by the Dalby Regional Council on their resourcing and staffing to undertake assessments of the various development applications submitted by the projects in the area, given the number and variety of submissions to be made in the future.

26.4 CONCLUSIONS

The Wandoan Coal Project, interrelated projects, and projects surrounding the Project area result in a range of beneficial and adverse cumulative impacts. Typically, cumulative impacts are moderate, in that the spatial and temporal boundaries are local and regional, and short to long term respectively.

The key cumulative impacts are associated with land use, land clearing, groundwater and surface water management, landowners and sensitive receptors, the wider community, service providers, road traffic, noise, air quality, visual amenity, demands for accommodation and housing, and materials supply. To mitigate key cumulative impacts, the WJV is committed to liaising with individuals, the community and other proponents of projects in the area, so as to minimise adverse and enhance beneficial cumulative impacts.

26.5 REFERENCES

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