5 PROJECT CONSTRUCTION

5.1 INTRODUCTION

The EIS separates the description of the Project into two chapters – Chapter 5 Project Construction and Chapter 6 Project Operations.

This chapter outlines the various activities, potential impacts and mitigation measures related to the Project during the early works and construction phases, including site clearance, civil works, structure and plant erection and installation, commissioning and testing, and site demobilisation.

The indicative mine layout and mining schedule is provided in Figure 6-1-V1.3, and a map of the indicative operational mine facilities is provided in Figure 6-26-V1.3. Note that figures with numbering ending in V1.3 refer to figures contained in Volume 1, Book 3 of the EIS.

As the commencement date for construction is dependent upon the timing of the Project approvals process, the EIS will not quote specific years for early works, construction and operation. The phasing of the Project is discussed in terms of early works commencing in Year -3, with the first year of construction being Year -2, second year of construction Year -1, followed by first year of operation as Year 1, then following operational years to Year 30. A description and indicative Project timing is provided in Table 5-1.

Table 5-1: Indicative project timing

Year	Explanation	Indicative dates
Year -3	Early works	Aug-Dec 2009
Year -2	1st Year of construction	2010
Year -1	2nd Year of construction	2011
Year 1	Commencement of operations	2012

This chapter will focus primarily on early works, site preparation and construction activities for mine infrastructure within and immediately adjacent to the Mining Lease Application (MLA) areas, including Wandoan township, including activities associated with the gas supply pipeline from the lateral Peat-Scotia gas pipeline (if that pipeline was to proceed).

Project descriptions of the proposed southern coal seam methane (CSM) water supply pipeline, proposed CSM western pipeline and the proposed Glebe Weir Raising, are provided in Chapter 6 of Volumes 2 and 3, and Chapter 4 of Volume 4, respectively.

5.2 CONSTRUCTION PROGRAM

Construction of Project infrastructure is expected to take approximately two years. However, a period of early works (including possible off-site construction) may commence approximately four months in advance of proposed site construction, where the WJV considers it prudent and feasible to do so, and subject to obtaining relevant approvals. Early works may include, for example, detailed design and commencement of procurement for infrastructure components with long lead times. Early works will not include any construction on the MLA areas.

The main components of the construction program will therefore include:

- early works:
  - design
  - tenders/procurement
  - off-site works (subject to obtaining approvals).
- site preparation:
  - site security
  - site clearance
  - civil works.
- construction:
  - structure and plant erection and installation
  - commissioning and testing
  - site demobilisation and clearance of construction equipment and materials.

As the option and a site for the proposed airstrip are still under investigation, no detailed assessment has been included on construction of that facility within this Chapter. The airstrip will be the subject of further assessment and approval once a decision is made on transport mode and, if air transport, an appropriate site is chosen (either Wandoan or Taroom).

Chapter 11 Water Supply and Management, provides further details on the water supply and management of infrastructure installed and used during the construction phases.

Reference to Volumes 2, 3 and 4, and other chapters within this volume will be given to further describe the Project's lands, infrastructure and activities as appropriate for early works, site preparation and construction.

5.2.1 EARLY WORKS

Subject to obtaining necessary approvals, early works are anticipated to commence approximately four months prior to site construction. Early works activities may include, but not be limited to:

- detailed design, tenders and early procurement of infrastructure components with long lead items (for example, power distribution equipment)
- finalisation of design and commencement of procurement process for the Project accommodation facilities

- commencement of construction for off-site infrastructure, including, for example, upgrade of the potable water treatment and wastewater facilities in Wandoan Township, in conjunction with Dalby Regional Council, and order pipeline for potable and construction water supply and wastewater discharge

As noted above, the extent and timing of early works will be determined by the WJV.

5.2.2 SITE PREPARATION

The initial phase of construction will include site preparation, which is anticipated to occur for approximately three months from the beginning of Year -2. These activities will include:

- removal, relocation or demolition of existing infrastructure and buildings on the MLAs that affect the first year of construction
- site clearance of areas involved in the first year of construction, including vegetation clearance, topsoil removal and storage and temporary drainage works
- commencement of site bulk earthworks (MIA, CHPP and accommodation village)
- for the crossing of Frank Creek, completion of a drainage structure to accommodate low flows, with a concrete causeway extending through the lowest section of the crossing
- completion of the access road to the MIA
- erection of site security and training facilities
- water and sewerage supply to accommodation facilities
- construction of Project workforce accommodation facilities
- construction of a laydown area containing demountable offices and carpark to be used during construction
- installation of initial security fencing where required.

5.2.3 CONSTRUCTION

The construction phase of the Project will commence at the beginning of Year -2, with site access subject to timing of works associated with site preparation. Construction phase activities can be broadly described as:

- civil works including temporary and permanent drainage works
- structure and plant erection and installation
- commissioning and testing of plant and equipment
- construction site demobilisation.

Infrastructure to be constructed during the two years of construction (noting that some construction works will continue into the operational years of the Project) includes:

- CHPP
- overland conveyor and first dump station
- product coal handling and train load out
- rail spur
- construction accommodation facilities as construction workforce increases
- permanent accommodation facility

- residential subdivision and housing in Wandoan
- haul roads
- light and heavy vehicle internal roads
- main gate and security building
- mine infrastructure area
- draglines and dragline erection facility
- telecommunications, including new mobile phone tower
- power supply and generation
- water supply and management facilities, including raw water supply and storage, initial tailings dam
- explosives storage and preparation facilities.

The access road intersection with the Leichhardt Highway will be developed as part of works associated with the Project's 200,000 tonne bulk sample pit, as shown in Figure 6-2-V1.3. The bulk sample pit and access road intersection upgrade works will be conducted under separate approvals through an amended Minerals development licence 221 and amended Environmental Authority 4489 currently held by the WJV, and do not form part of this EIS.

Electricity requirements for construction will be supplied via 11 kV diesel generators for construction power requirements and to provide lighting to the site when required. Diesel will also be used for all major mobile plant, equipment and vehicles during the construction period. It is intended that diesel will be stored in a 150,000 L self-bunded tank on a bunded slab, prior to completion of the 2 million litre permanent diesel storage within the MIA. Other options for diesel fuel storage during construction may be considered by the WJV, in consultation with the relevant government authorities. Chapter 3 Approvals, outlines the relevant environmental licence requirements associated with the temporary and permanent fuel storages.

Chapter 6 Project Operations, further describes the infrastructure of the Project. Chapter 11 Water Supply and Management, and Volumes 2, 3 and 4, further describe water supply and management activities associated with the Project.

Telecommunications during early works will use the existing Telstra fibre optic cable and mobile phone tower.

5.3 DESCRIPTION OF ACTIVITIES

The following provides a general description of the activities for the early works, site preparation and construction phases.

5.3.1 EARLY WORKS

Detailed design, procurement

The WJV will identify infrastructure components with long lead times that may require detailed design and commencement of the procurement process in order to meet Project deadlines before a decision is made on the granting of the mining leases.

Accommodation facilities

The WJV will obtain all necessary approvals and commence detailed design and procurement for the Project accommodation facilities, to ensure that they may be available for the construction workforce as early as is practicable in Year -2, and to minimise the impact on the local accommodation/rental market.

Upgrade of potable water treatment facilities

Early works may include commissioning of detailed design to undertake upgrade of the Wandoan water treatment facilities, required to meet the construction and operational needs of the Project, as well as increased population within Wandoan. Pipeline may also be ordered at this time. The WJV will work with the Dalby Regional Council to establish the best delivery method and the timing of this upgrade.

Upgrade of wastewater treatment facilities

Early works may include commissioning of detailed design to undertake upgrade of the Wandoan sewerage treatment facilities, required to meet the construction and operational needs of the Project, as well as increased population within Wandoan. Pipeline may also be ordered at this time. The WJV will work with the Dalby Regional Council to establish the best delivery method and the timing of this upgrade.

5.3.2 SITE PREPARATION

Removal, relocation or demolition of existing structures

Removal, relocation or demolition will include the total removal of existing standing structures, including farm complexes, houses, and fences. The WJV will develop an appropriate schedule for removal of these structures that best meets the requirements of the Project, in consultation with former property owners, as required.

Site clearance

Site clearance will include clearance of vegetation, topsoil removal and storage, bulk earthworks, and temporary drainage works. The initial site clearance works will be focused on the mine access road, accommodation village and MIA (including construction laydown area). Site clearance will be staged throughout the construction phases on an as-needed basis to coincide with structure installation and erection.

Water and sewerage to accommodation facilities

If not commenced during early works, with the cooperation of the Dalby Regional Council, upgrade of the water and sewage facilities, including reticulation systems, will be fast-tracked at the beginning of Year -2 to ensure that sufficient potable water and sewerage systems are operating from the commissioning of the on site accommodation facilities.

Installation of initial security fencing where required

Security fencing will be constructed as a means to secure the construction site. It is likely that fencing will be developed adjacent to the main access road security gate, and other strategic areas across the construction site, including the MIA and accommodation facilities.

5.3.3 CONSTRUCTION

Civil works

Civil works include, but may not be limited to:

- civil earthworks, including piling and foundation construction of structures
- installation of permanent and temporary drainage
- trenching and laying of reticulated services and any other underground pipelines and services including the gas supply pipeline
- road formation construction, surfacing and finishing
- rail spur formation construction, track laying and finishing.

Civil earthworks, including any piling and construction of structure foundations, laydown areas and hardstands will be undertaken mostly in Year -2. The timeframe for completion will depend on ground conditions, topography and geology encountered, and the priorities as determined by the WJV.

In the event that piled foundations are required, piling rigs will be needed. Until detailed geotechnical investigations are completed, it is not known whether cast-in-situ piles or driven piles will be used, with the final decision on choice of pile, dependant on ground conditions.

Installation of permanent drainage will be undertaken where possible to accommodate both the construction and operational phase drainage. Where permanent drainage for the operational phase cannot be installed, temporary drainage will be used to the appropriate standards.

Installation of reticulated and other underground services will occur as required.

Installation of the gas supply pipeline (if required to meet the power requirements of the Project) from the Santos Gas Plant located on the Peat Scotia Gas Pipeline will be underground. Clearing to approximately 20 m width for the construction access, the pipeline will be installed using trench excavation, and backfill and compaction. Trenching width will be approximately 1 m wide to accommodate up to a 600 mm diameter pipe, with a buried depth of cover of approximately 500 mm to 1,200 mm depending upon the land use and the assessed risk in any location. Chapter 6 Project Operations, Section 6.7.9, further discusses the potential construction of the gas pipeline.

Roads associated with the MLA areas include initial coal haul roads, site access roads, light and heavy vehicle internal roads, and public roads. Construction of coal haul, site access, and light and heavy vehicle internal roads will continue to be phased over the life of the construction and operations of the mine. Temporary closures and relocation of public roads and stockroutes will occur during the operation of the mine, as discussed in Chapter 6, Chapter 8 Land Use and Chapter 12 Transportation. Construction features of each road are given in Chapter 6. Sealing of road surfaces, laydown areas and hardstands with asphalt may require an asphalt plant during the construction phase. Chapter 3 Project Approvals, discusses licensing requirements for such plant.

The rail spur will be constructed during Years -2 and -1 and all construction works will be co-ordinated with the construction of the Surat Basin Rail main line.

Structure and plant erection and installation

Construction of buildings and structures will occur after the civil works. Concrete batching to ensure suitable quantities and qualities of concrete will be undertaken during construction, with Chapter 3 Project Approvals, discussing licensing requirements for a concrete batching plant. Materials required for concrete batching will be delivered to site by third parties with materials to conform to particular specifications. No suitable borrowing or quarrying materials are available from within or on lands adjacent to the MLA areas.

Installation of plant and related building components will follow superstructure erection, including the installation of pipe works, cables and instrumentation. Where possible, main plant components will be pre-fabricated and delivered complete to site to minimise the requirement for on-site assembly work.

Accommodation facilities

During the site preparation and construction phases, temporary accommodation for the initial workforce will be provided until the Project's permanent accommodation facilities are completed. Options for temporary accommodation include use of local caravan parks, hotels and motels; or the provision by the WJV of temporary accommodation units on site. However, once completed, all construction workers will be housed in the Project accommodation facilities, with the exception of those individuals wish to source their own accommodation in Wandoan, Miles or Taroom.

To accommodate the predicted construction workforce (whether male or female) all construction accommodation units will be single ensuited rooms, with either four or three units to a block. Blocks will either be leased or purchased transportable units, with the maximum anticipated accommodation requirements being up to 1,425 beds in Year -1 housing the construction workforce and some operational personnel involved in plant and equipment commissioning. The location of the construction accommodation facilities will be the same as that for the permanent accommodation facilities, shown in Figure 6-19-V1.3 of Chapter 6. It should be noted that while 1,425 beds will be available in the facilities, the peak workforce is estimated to be 1,375. The additional beds provide a float to accommodate additional construction workers and/or the initial operations employees likely to commence toward the end of Year -1.

During the construction phase and into the first four years of operation, permanent accommodation facilities of two rooms per block will be progressively constructed to replace the construction phase accommodation units, as described in Chapter 6. In Year 1, ongoing construction will require 150 beds, with further 140 beds during Year 2, fifteen beds in Year 3, and 220 beds during Year 4. Year 4 is anticipated to include the construction of the overland conveyor and second dump station associated with Mud Creek Pits. After Year 5, to accommodate personnel for minor construction works not undertaken by the mining workforce, visitors to the site, the regular CHPP maintenance shutdown workforce and the less frequent dragline shutdown workforce, 125 beds being 42 blocks of three ensuited rooms to a block, will be retained to satisfy continuing demand.

Accommodation requirements for the operations workforce and proposed sustainability measures are detailed in Chapter 6 Project Operations.

Construction management facilities

The main construction management facilities will be located in the north-east area of the MIA, and will be used only during the construction phase. Permanent administration facilities will replace the construction phase facilities, as described in Chapter 6 Project Operations.

The construction management facilities will include:

- demountable buildings including offices, meeting rooms, crib rooms/kitchen, toilets, first aid, communications and storage
- a separate unit to serve as a geotechnical laboratory and to include oven, sink, IT and geotechnical equipment for testing
- a 60 vehicle unsealed carpark
- a light vehicle wash down slab
- temporary power supply from diesel generators
- a temporary potable water supply, until permanent connections are installed
- temporary wastewater treatment, until permanent connections are installed.

The dragline store compound will be constructed to initially serve as the construction laydown area, including some demountable offices and personnel car parks. Towards the end of the construction phase, this area will be converted to the dragline store compound, as described in Chapter 6 Project Operations.

Draglines

Dragline erection will take approximately 80 weeks for each dragline, with the first dragline erected during Years -2 and -1, ready for operations in end of Year -1. It is proposed that dragline erection will be undertaken prior to Years 2, 3, 16 and 18 (the years when each additional dragline comes into actual operation).

Coal handling and preparation plant

Construction of the CHPP, conveyor and first dump station is anticipated to last approximately twenty months. Given the height and size of the CHPP modules, dump station dump bin and crushing facilities, use of cranes, lifts, and multistorey scaffolding is anticipated. All work will be in accordance with recognised Building Standards and Regulations.

Telecommunications

The existing Telstra fibre optic cable and mobile phone tower will provide telecommunications to the Project. However, the existing facilities are not equipped to provide the level of coverage required to the MIA and accommodation facilities, therefore additional telecommunication facilities will be required. Telecommunications infrastructure requiring upgrade or installation during the early works and construction phases of the Project include:

- a Telstra 48 core fibre access and upgrade to Next G and GSM mobile communications
- Project site-wide fibre optic installation
- Project site LAN cable installation
- server room fit-out, including cabling, AC, VESDA, power, servers racks, UPS
- hardware, including servers, data switches and racks

- wireless ISP and Austar at the accommodation facilities
- PABX, including handsets and installation for the telephone and facsimile service.

Commissioning and testing

Commissioning and testing of major components of plant and equipment will be undertaken mostly during Years -2, -1 and 1, and will include:

- potable water treatment upgrades and supply infrastructure, as discussed in Chapter 11 Water Supply and Management
- wastewater treatment upgrades and disposal infrastructure, as discussed in Chapter 11 Water Supply and Management
- MIA mechanical services
- Workshop fuel and lubricant storage and reticulation
- draglines
- the CHPP, including associated product pad conveyors, overland conveyors, dump station coal processing plant, stacker reclaimers and train load out:
  - after the CHPP is commissioned, performance and reliability tests will be undertaken. Commissioning and testing is expected to occur for a period of eight months. The plant is therefore envisaged to be ready for operation approximately 26 months after the commencement of construction
- train movement and signalling
- gas supply pipeline (if required)
- gas fired power station (if required)
- raw water supply pipelines and storage, as discussed in Chapter 11 Water Supply and Management and in Volumes 2, 3 and 4
- all reticulation services, including raw and fire water, power and lighting, and telecommunications.

Site demobilisation

As the construction phase nears completion, construction areas will be progressively demobilised ready for operations in Year 1. However, complete demobilisation may continue up to the end of Year 4 to coincide with various construction activities across the mine.

Hardstand and laydown areas established during construction within the MLAs will continue to be used for similar purposes during operations.

As described above, the accommodation facilities will be converted from construction to operation facilities, with transportable three and four unit blocks progressively removed from site and replaced with the two unit blocks.

During demobilisation, final landscaping of MIA and accommodation facilities will be completed, ready for the operational phase. Selection and installation of plant species will be in accordance with that recommended in Chapter 17 Ecology and maintain safe sight-distances for vehicle movements.

5.4 CONSTRUCTION WORKFORCE

5.4.1 WORKFORCE NUMBERS AND PHASING

The total construction workforce (which includes the workforce engaged in site preparation) is expected to peak in Year -1 at around 1,375. Table 5-2 summarises the expected construction workforce figures. The Principal Contractor and subcontractors will retain responsibility for their construction methods, staff numbers and recruitment policy. However, the WJV will encourage local recruitment and use of local services as far as reasonably practicable (see Chapter 28 Summary of Commitments and Mitigation Measures).

Table 5-2: Construction workforce estimates

Year	Workforce estimate
Year -3 – Last 4 months of year (early works)	20
Year -2 – 1st 2 months of year (site preparation)	30
Year -2 – 1st 2-6 months of year (construction)	815
Year -2 – 6-12 months of year (construction)	1,150
Year -1 – All year (construction)	1,375
Year 1	150
Year 2	140
Year 3	15
Year 4 – 2nd Dump Station construction	220
Year 8 – 3rd Dump Station construction	220
Year 15 – Dragline 4 construction	75
Year 17 – Dragline 5 construction	75

5.4.2 SPECIALIST WORKFORCE

Specialist trade professionals will be expected to arrive on site, carry out their works and leave the site throughout the construction period once their work has been completed.

During the construction of the CHPP, the maximum number of personnel on-site at the peak construction period is estimated to be in the order of 875-900 personnel. The estimate is inclusive of all sub-contractors and construction management, with these personnel figures included in the total construction workforce figures of Table 5-2.

Aside from the CHPP, other specialist workforce personnel will include, but are not limited to:

- gas pipeline installation and gas-fired power station construction (if required)
- high voltage and low voltage substation construction
- high voltage and low voltage transmission line erection
- steel fabrication
- reticulated services
- residential building construction

- fuel and lubricant storage and reticulation
- reinforced earth wall construction
- dragline erection
- railway signalling
- telecommunications.

5.4.3 WORKING HOURS

Despite the majority of construction works, including works in Wandoan, being expected to occur during daylight hours, some activities may require continuous 24 hour working (including Sundays) while they are in progress. Examples of 24 hour construction activities include, but are not limited to:

- deliveries of materials, plant and equipment
- concrete batching and pouring
- electrical installation
- building fit-out
- plant and equipment commissioning.

5.5 MATERIALS, PLANT AND EQUIPMENT SOURCING AND TRANSPORTATION

During construction, all materials, plant and equipment will be delivered to the Project via road. Just-in-time delivery of materials is anticipated for the Project; however, this is subject to the final construction program of the Principal Contractor and subcontractors.

Transportation of building materials contributes to the Project's environmental impact, particularly in relation to vehicle emissions. Sourcing materials from local suppliers potentially reduces the Project's environmental footprint. However, due to the nature of the Project, specialist plant and equipment will be required to be sourced from across Australia and overseas.

Large and over-size loads are anticipated, particularly during the CHPP, dump station, stacker/reclaimer, dragline and heavy mining equipment erection and installation phase. Loads will mostly be hauled from either the Port of Brisbane or the Port of Gladstone, with some loads requiring an escort. Where possible, consideration will be given to the timing of such transportation to minimise disruption to other road users.

Construction traffic will involve rigid and articulated vehicles, and light goods vehicles. Traffic flows and vehicles types are expected to vary over the construction period, reflecting the types of materials and equipment required at a specific time. Chapter 12 Transportation, provides further assessment on transportation issues via road for the construction and operational phases of the Project.

5.6 HEALTH AND SAFETY

The activities involved in the construction program will be in compliance with the Queensland *Coal Mining Safety and Health Act 1999*, Coal *Mining Safety and Health Regulations 2001, Mineral Resources Act 1989* and other relevant legislation and regulations.

As required by the Acts, site specific management plans will be formulated which will address health and safety issues from the design stages through to the completion of the construction and commissioning phases and into operations. Plans will be reviewed as the Project progresses. Chapter 23 Hazard and Risk and Chapter 24 Health and Safety provide further information on the hazards, risks, health and safety issues associated with the construction and operational phases of the Project.

5.7 SITE MANAGEMENT AND SECURITY

5.7.1 CONSTRUCTION SITE MANAGEMENT

There will be a Site Superintendent or equivalent appointed by the WJV, and a Principal Contractor management team on site for the duration of the construction phase. The team will supervise the construction of the Project including monitoring the contractors' performance to ensure that the proposed construction phase mitigation measures are implemented and that construction impacts and nuisance are minimised. A site Occupational Health and Safety Manager will also be appointed by WJV and will be present on the site during the construction phase.

5.7.2 EMERGENCY RESPONSE PROVISIONS

An Emergency Management Plan which will address all foreseeable site specific risks, such as fire, flood, and accidents, including appropriate contact details of emergency services agencies.

Designated construction personnel will have appropriate environmental spill response training and the contact details of relevant responsible persons, should a significant spillage of oils or chemicals occur.

5.7.3 SITE SECURITY

Construction works on the MIA will have 24 hour security coverage. A manned security gate will be established at the entrance to the site. All personnel entering the site and the construction village will have to pass through the security gate. All construction areas will be monitored on a 24 hour basis.

The primary function of the site security team is to ensure that no unauthorised entry to the site occurs. This process will be made easier by all construction personnel possessing an ID card. ID cards will only be issued to personnel that have attended the site induction and passed a medical examination.

Tanks and drums of potentially polluting or otherwise hazardous materials will be stored in secure containers or compounds which are locked when not in use. Secure valves will be

provided on oil and fuel storage facilities. Equipment and vehicles will be locked, have keys removed and be stored in secure compounds (refer Chapter 23 Hazard and Risk).

5.8 POTENTIAL IMPACTS FROM SITE PREPARATION AND CONSTRUCTION PHASES

Potential impacts associated with site preparation and construction and further details on overall Project related impacts are given in respective chapters and associated technical reports of all volumes of the EIS.

5.9 REFERENCES

Department of Employment and Industrial Relations 1995, *Workplace Health and Safety Act 1995*, Queensland Government, Brisbane.

Department of Education, Employment and Workplace Relations 1991, *Occupational Health and Safety Act 1991*, Commonwealth Government, Canberra.