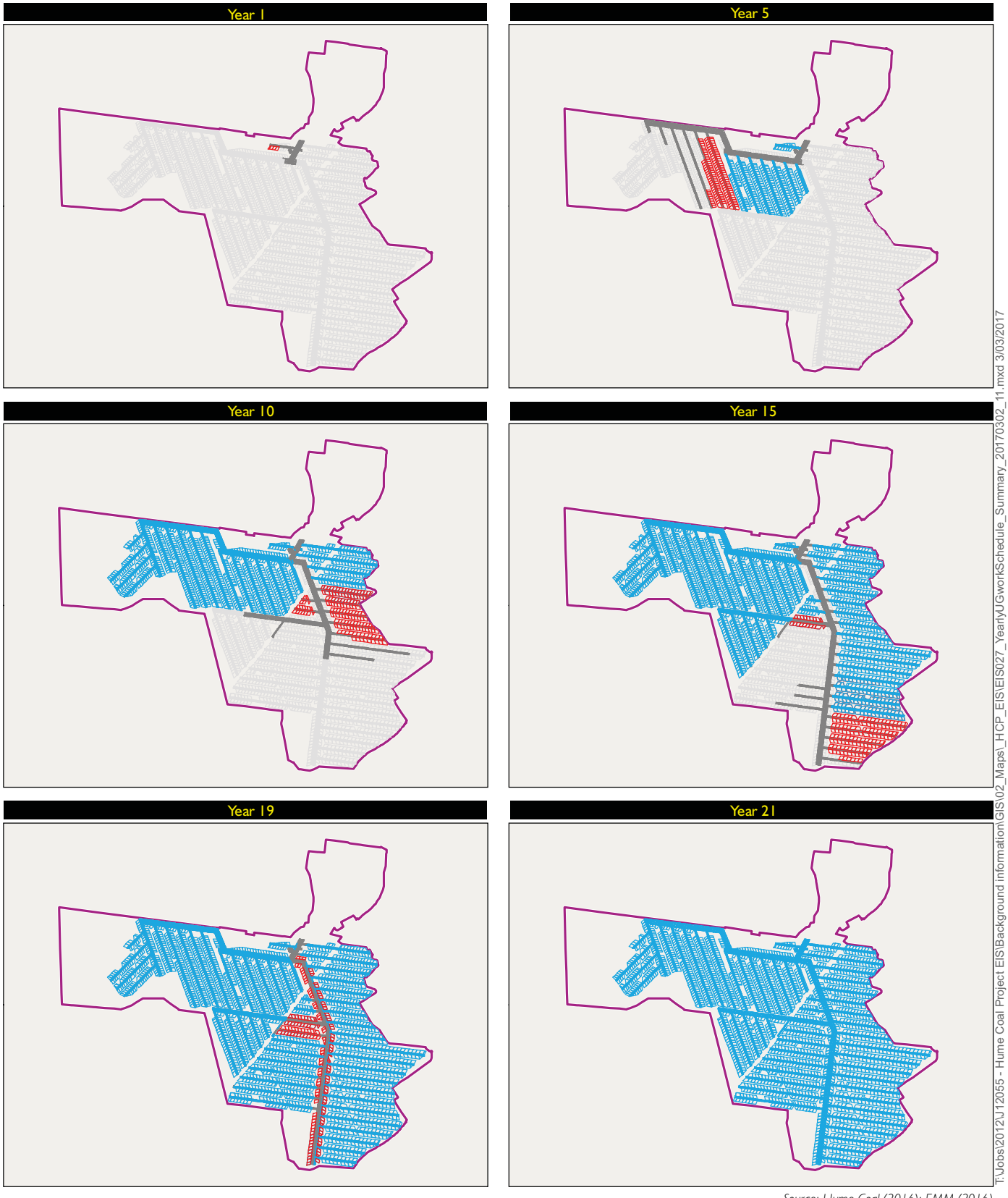


Source: Hume Coal (2016); EMM (2016)

Indicative underground mine progression

Hume Coal Project

Environmental Impact Statement

Figure 2.7

An all-weather access road will link the surface infrastructure to the personnel and materials drift portal located to the south.

The following infrastructure will be required at the main ventilation shaft site directly above the mine workings, including:

- main ventilation fans and associated motor control room(s), power supply, transformers and switch gear;
- hardstand area around the shaft and fans, with parking for five to 10 vehicles;
- a borehole compound with power, water and bulk materials such as concrete and ballast;
- surface water management infrastructure; and
- access roads/tracks, security fencing, lighting and other ancillary plant and equipment.

Similar facilities will be installed at the downcast shafts.

2.8 Coal washing and processing

i The process

The CPP and associated facilities will process up to 3.5 Mtpa of ROM coal.

ROM coal will be transported from the mining faces along panel conveyors and onto a trunk conveyor which will carry coal up the drift. Coal will then be transferred via a 2.2 km covered overland conveyor from the drift portal to a ROM coal stockpile next to the CPP. From there it will be reclaimed and transferred by conveyor to a fully enclosed tertiary sizing station for sizing and then to an enclosed screening station to remove oversize rock. It will then be conveyed to the CPP for washing to remove stone and other reject materials. The CPP will have a design capacity of 450 tph. The product coal will be conveyed to a transfer station and on to product stockpiles.

ii Coal washery reject management

During the life of the project approximately 11 Mt of coarse and fine reject material (the rock and stone separated from the coal during processing) will be produced. During the initial 12-18 months as the project is developed, the coal reject will be stored in a temporary coal reject stockpile adjacent to the CPP (refer to Figure 2.3) until sufficient void space is available underground, and the plant is commissioned to commence underground emplacement. During this initial period, the fines will be dewatered via belt press filters (avoiding the need for a tailings dam) prior to being combined with the course reject. This combined reject will be placed for co-disposal on the temporary coal reject stockpile, which will be progressively constructed, contoured and when full, top dressed and revegetated. At the end of the operational phase of the project the reject on the temporary coal reject stockpile will be put back through the reject plant and pumped underground prior to sealing the surface entries to the underground mine.

Once sufficient void space is created, coarse reject will be crushed to a top size of less than 10 mm and combined with fine reject and water to form a slurry. Crushed limestone will be added as required to mitigate any potential for acidity; although emplacing the reject material underground in sealed voids filled with water should remove the potential for oxidation of sulphide minerals even without the addition of crushed limestone. When sufficient void space is available underground and the pumping plant is commissioned, underground emplacement of the slurry will commence using conventional positive displacement piston pumps. Once the operation is at peak production, this backfilling will follow almost immediately after mining. Rejects will fill approximately 36% of the void space created by coal extraction.

The slurry pipe range will be constructed from the surface to the working parts of the mine, and will incorporate one or more redundant lines to allow continuous operation in case of blockages, and to allow for variable coal reject yields, whilst maintaining pipe velocities within the desired envelope. The pipelines will be designed to incorporate basalt or ceramic lined pipe in high-wear sections, with lighter cross sections used in parts of the mine where lower pipe pressures will be experienced and where the pipe installation is temporary, such as in the panels which will be sealed after the completion of mining and backfilling activities.

The backfill will be emplaced into the mined voids soon after mining. The long narrow drives separated by coal pillars greatly enhance safety and minimise the risk posed by any unplanned mass-movement (or flow) of material, which is one of the main hazards in stope backfilling operations in metalliferous mines. Individual mine panels have been designed to be developed down apparent dip where possible to further mitigate any risk of material flowing en-masse back to the underground main roadways.

The items of equipment to be used in the pumping plant are all off-the-shelf items such as crushers and screens, piping and instrumentation and piston pumps. Underground mine backfill is a mature technology used in metalliferous mines. If the slurry operation is interrupted, for example during maintenance works, reject will be temporarily diverted to an emergency surface stockpile for later reprocessing. This will allow coal washing to continue throughout any interruption. The belt press filters will be used for dewatering during these periods.

Once the mining and backfilling operation is completed in each panel, it will be sealed from the rest of the mine using mass concrete plugs (bulkheads) installed in each of the three gateroad headings. These bulkhead seals will hydraulically compartmentalise the mine. The parts of the mine behind the bulkhead seals will be allowed to fill with water, allowing the groundwater recovery process to commence. The engineering design and installation of the bulkhead seals will be undertaken generally in accordance with the relevant Australian and international standards and guidelines, such as those developed for coal mines in the United Kingdom and the United States.

2.9 Coal transport

Product coal will be reclaimed from product stockpiles and transferred by conveyors to a train load-out bin (Figure 2.3). The load-out bin will have weighing equipment to accurately load each train wagon. The load-out facility will be partially enclosed to control noise and dust emissions.

Product coal will be transported by train to Port Kembla for export and/or trained to domestic customers. Coal will be transported via a new rail spur and loop that will be connected to the Berrima Branch Line. Trains to Port Kembla will then continue via the Main Southern Line, the Moss Vale to Unanderra Line and the Illawarra Line (refer to Figure 1.2). This will generally require up to eight train paths per day (four in each direction), depending on throughput at the time. As noted in Chapter 1, rail works, including construction and use of the new rail loop and rail line, form a separate development application (the Berrima Rail Project, refer to Appendix D). The rail project is seeking approval for:

- upgrades to Berrima Junction (at the eastern end of the Berrima Branch Line) to improve the operational functionality of the junction, including extending the number 1 siding, installation of new turnouts and associated signalling;
- construction of a new rail line connected to the western end of the existing Berrima Branch Line approximately 700 m east of the Berrima Cement Works;
- construction of a railway bridge over Berrima Road;
- construction of a new rail connection into the Berrima Cement Works from the railway bridge;
- decommissioning of the existing rail connection into the Berrima Cement Works including the Berrima Road level rail crossing;
- construction of a new rail spur line from the Berrima Branch Line connection to the Hume Coal Project coal loading facility;

- construction of a grade separated crossing (railway bridge) over the Old Hume Highway;
- construction and operation of a maintenance siding and basic provisioning facility on the western side of the Old Hume Highway, including an associated access road, car parking and buildings; and
- construction of the Hume Coal rail loop with the Hume Coal Project Area, adjacent to Medway Road.

The potential impacts of the above works and use of the rail line for product coal transport from the mine have been assessed in the Berrima Rail Project, and are therefore not duplicated in the Hume Coal Project.

Up to 3.0 Mtpa of product coal will be produced by the CPP. However, the annual amount transported offsite by rail may be up to 3.5 Mtpa when stockpiled coal is added. It is noted that the indicative yearly coal production volumes modelled in the supporting technical studies, such as the economic assessment and air quality assessment, vary from year to year and are slightly less than 3.0 Mtpa (refer to the yearly production schedule documented in Appendix K - air quality and greenhouse gas assessment). Approval is sought for this maximum production amount to allow for factors that affect the production rate such as yield variations, efficiency improvements, geological conditions, stockpile movements, minor scheduling changes and market demand at the time.

2.10 Water management

2.10.1 Water demand and supply

i Construction activities

Approximately 90 ML/yr of water will be required during construction of both the Hume Coal Project and the Berrima Rail Project. This water will be primarily used for dust suppression on roads and earthworks, with other minor volumes required for the underground drift development (for example during drilling) and also for wetting bulk materials to aid compaction.

Construction water will be sourced from existing registered bores and from water produced during drift construction, which will be out of the existing licensed groundwater entitlement. The available registered bores to be used for water supply are on the Mereworth and Evandale properties within the project area. These bores are illustrated in Figure 2.10 (refer to Section 2.10.2) and listed in Table 2.2, along with their yields. The total licensed groundwater allocation associated with these bores is 667 ML/yr (excluding stock and domestic basic landholder rights), of which around 13% (ie 90ML/yr) will be required to satisfy the construction water requirements.

Table 2.2 Groundwater bores available for water supply in the project area

Bore	Yield (L/s)
GW031687	0.15
GW059306	Not recorded
GW025588	1.41
GW031685	19.33
GW031686	15.92
GW053331	15.00
GW057908	5.00
GW108194	21.00
GW108195	7.96
Total	85.77

Note: As recorded in work summary reports in DPI Water bore database (DPI Water 2016).

ii Construction accommodation village and offices

The water demand of the construction accommodation village and office facilities has been calculated using typical water demand assumptions for similar facilities in NSW, amounting to some 50 kL per person per annum, excluding greywater recycling. This generally agrees with Australian Bureau of statistics (ABS) estimates for per-capita domestic water consumption in NSW (78 kL per person per annum), when factored for greywater recycling and various consumptive activities that will not take place in the accommodation facility, such as garden watering, filling of swimming pools and laundering of linen. A survey of households by IPART (2003) found that around 30% of domestic water consumption in Greater Sydney was associated with garden watering, pools/spas and single-flush toilets.

On an annualised basis, and assuming the construction accommodation village is fully occupied, the potable water demand would be around 20 ML/yr, and no more than 30 ML/yr. Potable water will be supplied by existing registered bores (refer to Table 2.2), with water drawn from the existing licensed groundwater entitlement. The bore water will be treated via aeration, settling tanks, filtration and UV sterilisation, primarily to remove iron and kill pathogens. Waste filters and sludge will be disposed off-site at an appropriately licensed facility.

A maximum potable water demand of 30 ML/yr represents around 4.5% of the 667 ML/yr total groundwater licensed allocation associated with the six available bores around the surface infrastructure area. One bore pumping at 1 L/s 24 hours per day or 4 L/s at 6 hours pumping per day would meet this demand. This is easily possible from the existing six registered bores on Mereworth and Evandale. For example, bore GW053331 has been observed to yield 15 L/s on its own.

Rainwater, if used, could supply around 10% of the total water demand, based on an assumed annual rainfall of approximately 600 mm and a captured roof area of 9 square metres per person. The rain water would be mixed with bore water in the potable water supply system.

iii Operations

The project will require water for the following:

- dust suppression;
- coal and reject processing;
- belt cleaning;
- washing vehicles, machinery and conveyors;
- underground operations;
- amenities and other potable uses; and
- fire protection systems.

During construction, water will be sourced from licensed groundwater bores on Hume Coal owned land. Potable water will also be trucked to site and stored in tanks. The volume of potable water is immaterial to the operational water balance model so it was not necessary to include it in the model.

Water volumes to satisfy the various demands over the mine life are presented in Figure 2.8.

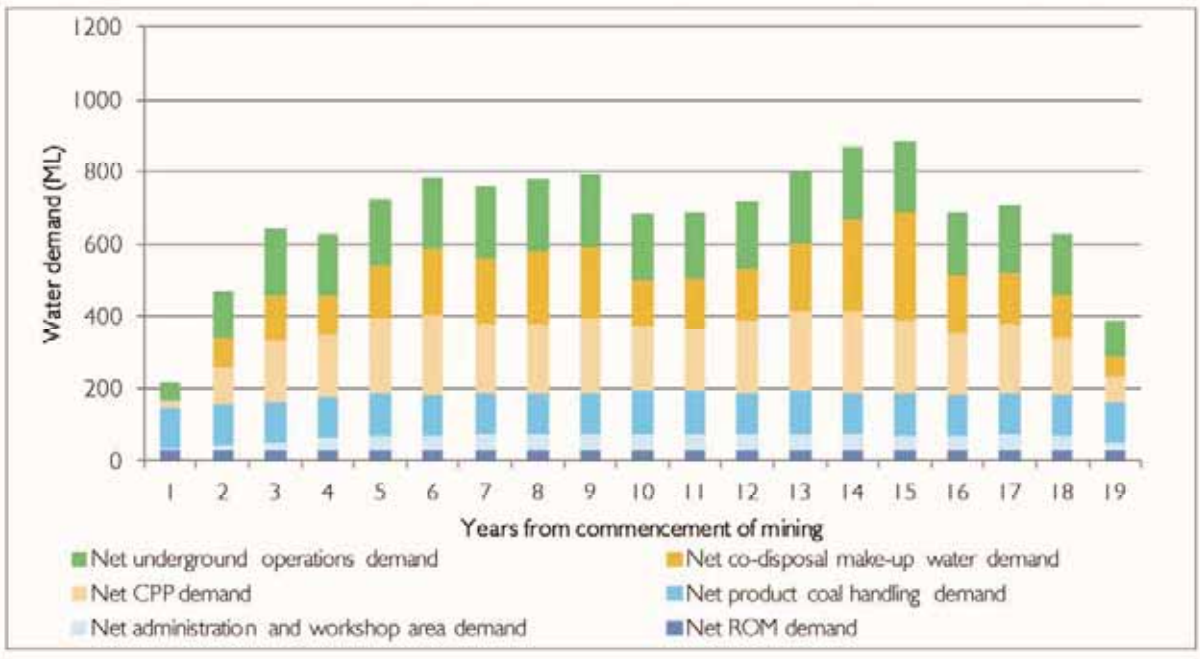


Figure 2.8 Project water demands

A water balance model was developed to determine surpluses and deficits in meeting project demands from available water supplies. Operational demands will be met by:

- rainfall-runoff from the stormwater basins and mine water dams;
- groundwater collected in the underground mine sump (where groundwater inflow to underground workings will be captured); and
- additional groundwater abstracted from behind the sealed mine void bulkheads as required.

Figure 2.9 shows the relationship between project water demand and water supply sources used to meet these demands. The primary sources of water for operational use will be captured rainfall-runoff and groundwater inflow to the underground sump. In most years additional water from within the sealed mine void will also be harvested to meet mine water demands. The primary water dam (refer to Section 2.10.2) has been sized to meet the project water demand requirements, with the capacity to store all surplus water generated by surface and underground activities without the need to release excess water to the local creeks. Further discussion on the management of excess water is provided in Section 2.10.3.

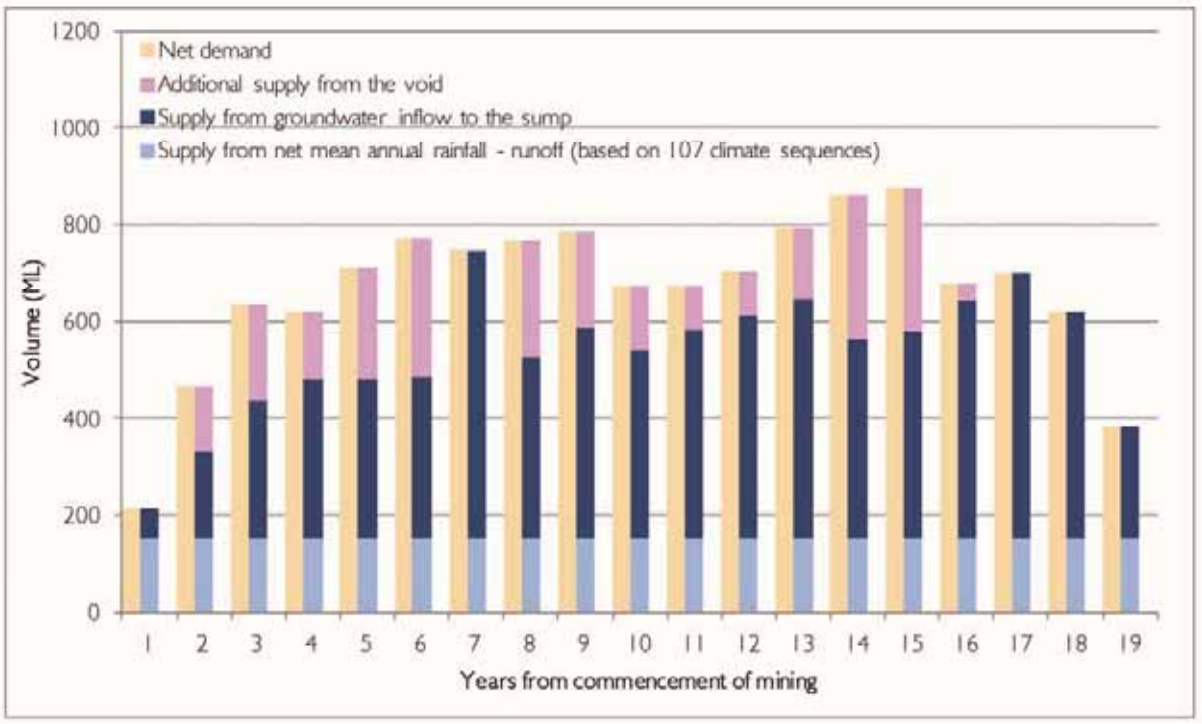


Figure 2.9 Project water demand and supply (combining rainfall-runoff and sump water)

Further detail on the water balance model is provided in Chapter 7 and Appendix E.

2.10.2 Mine water management

i Water management philosophy

The primary objectives of the water management system are to reuse water and minimise release to the more sensitive environmental areas. The water management system has been designed to therefore reuse as much mine water as possible, with it being used first to meet all demands except for potable water. If demand cannot be fully met from rainfall-runoff and the mine sump, supplies will be supplemented by groundwater from the sealed voids. Surface water runoff from areas of the site in direct contact with coal will be fully contained within the mine water management system to prevent discharge of this water to local waterways.

The overarching water management philosophy involves:

- runoff from undisturbed areas will be diverted around or away from the infrastructure into natural watercourses via clean water diversion drains.
- runoff from disturbed areas within the mine infrastructure footprint will be directed to stormwater basins (SBs), mine water dams (MWDs) and the primary water dam (PWD) for storage and reuse.
- runoff from areas where there is a low risk of coal contact (ie runoff from areas that do not contain coal stockpiles or processing plant but that could contain small amounts of coal due to mine vehicle traffic) may be discharged to local creeks after the first flush provided water quality is acceptable.
- runoff from areas where there is a low risk of coal contact that does not meet the adopted first flush criteria will be transferred to the PWD for storage.

- sewage from the administration and workshop area will be treated and reused on site. Grey water will be subject to primary treatment and used for drip irrigation of landscaped areas. Black water will be subject to tertiary treatment and harvested for reuse in the CPP.

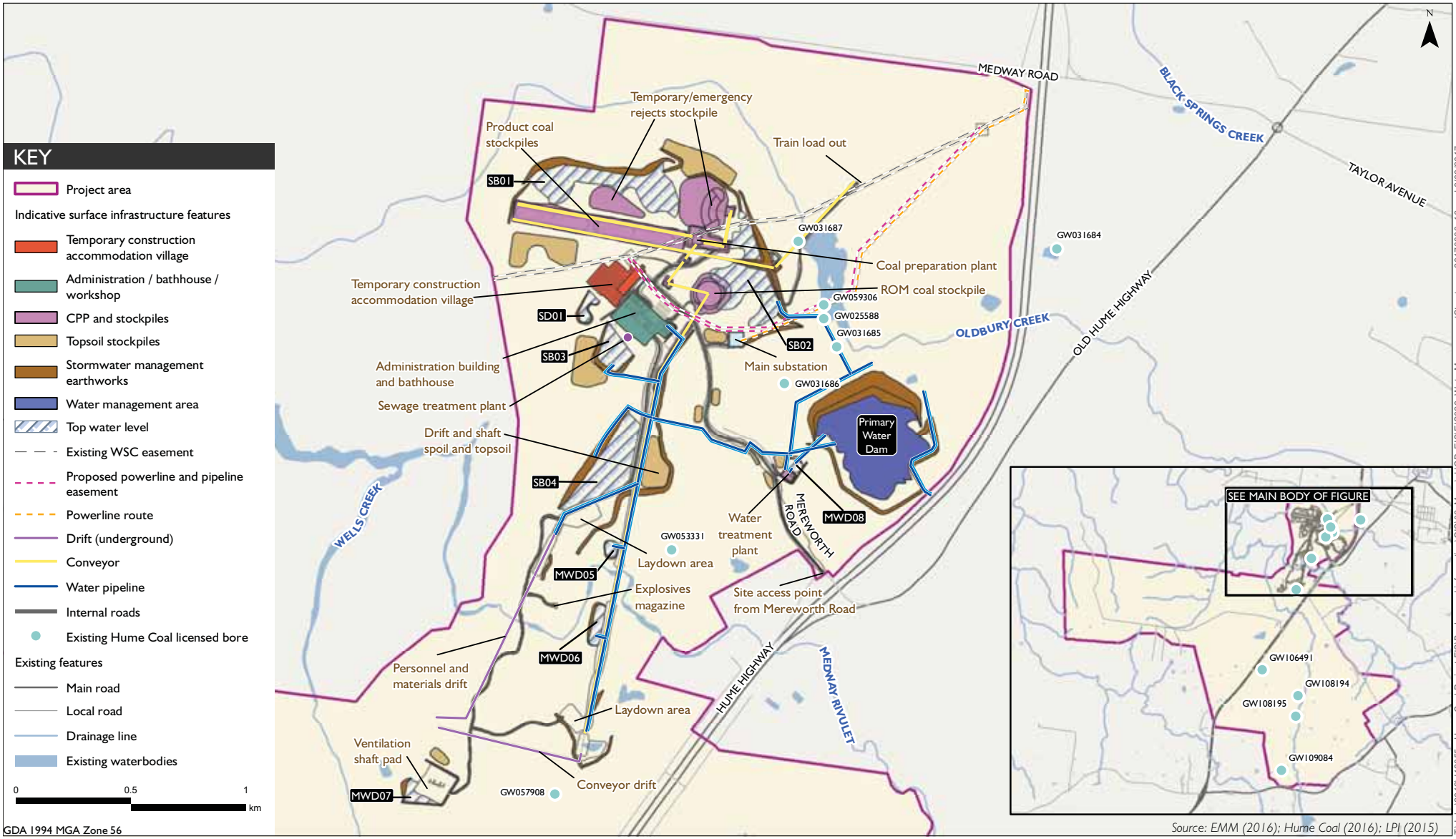
ii Dam functions and capacities

No existing dams will be used for the project, although some small farm dams inside the infrastructure footprint may be retained where there is no need to remove them. Dams and stormwater detention structures to be constructed are conceptually illustrated in Figure 2.10 and summarised in Table 2.3. Dams have been sized from detailed water balance modelling, with capacities based on physical constraints and a requirement to achieve no dam overflows when operated as part of the overall site water management system under historical climate conditions. All dams (SBs, MWDs and the PWD) will have the capacity to accommodate at least the 200 year annual recurrence interval (ARI) 72 hour storm runoff volume, with the exception of MWD07, which has capacity to store between the 100 and 200 year ARI 72 hour storm runoff volumes and directly discharges to the underground mine sump via a borehole. The PWD has also been sized to meet the project demand requirements, with the capacity to store all surplus water generated by surface and underground activities without the need to release excess water to the local creeks.

A schematic illustrating the water management system is provided in Figure 2.11.

Table 2.3 Summary of water management structures

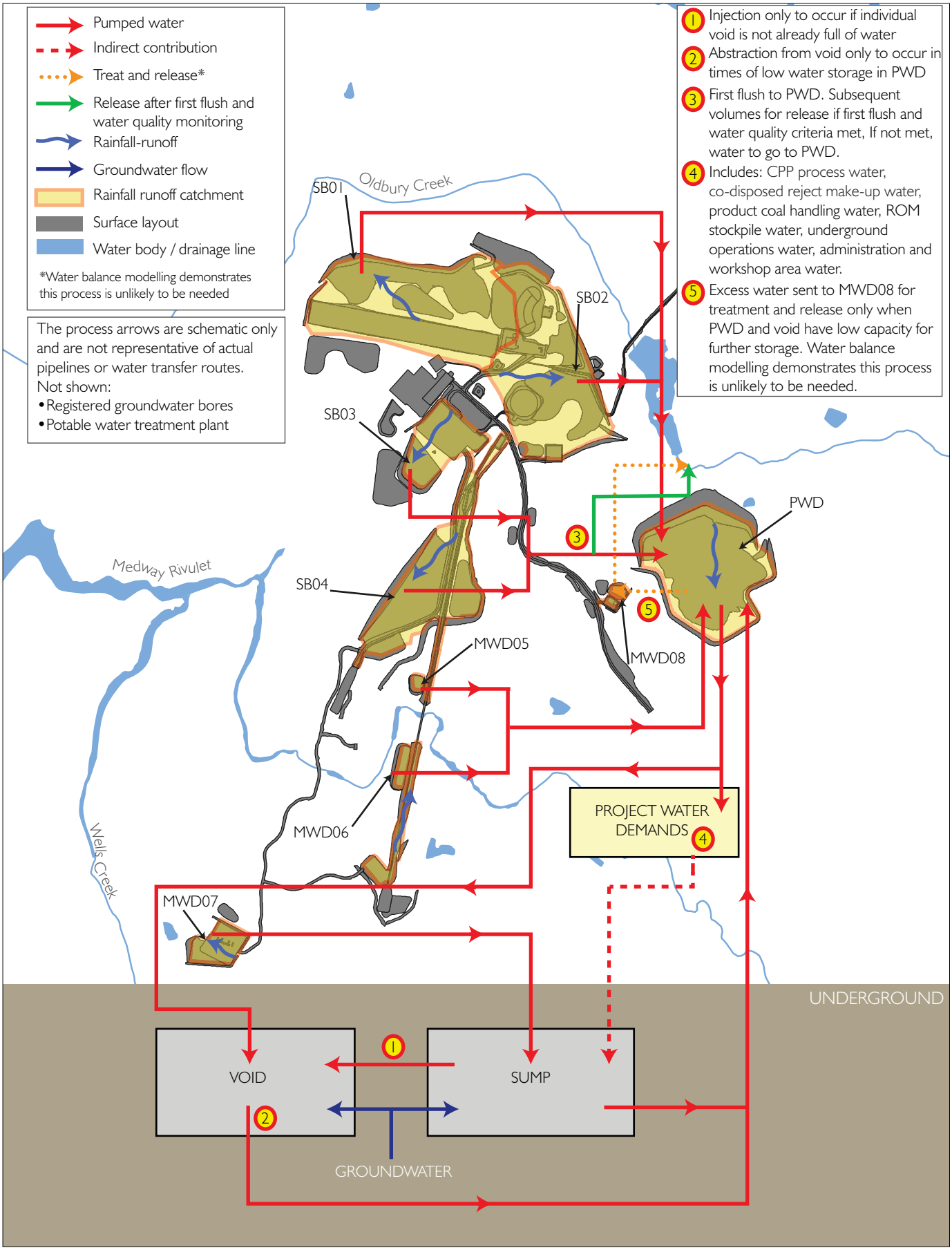
Dam ID	Sizing criteria from SEARs	Catchment area (ha)	Proposed approximate capacity (ML)
SB01	Collects runoff from the product coal and temporary reject stockpiles	26.36	107
SB02	Collects runoff from the ROM coal stockpile and CPP return water	22.64	92
SB03	Collects runoff from the administration, bathhouse, and workshop area	5.91	20
SB04	Collects runoff from the mine access road and conveyor embankment north of Medway Rivulet	14.73	141
MWD05	Collects runoff from the overland conveyor no. 1 corridor, north of Medway Rivulet	0.64	6
MWD06	Collects runoff from the area between the conveyor portal and the overland conveyor no. 1 corridor, south of Medway Rivulet	2.69	15
MWD07	Collects runoff from the ventilation shaft pad	2.60	6
MWD08	Stores excess water prior to treatment in the water treatment plant	0.27	5
PWD	Raw water dam storing mine water pumped from water storage structures around the surface infrastructure area and from underground mine sump dewatering	18.28	730



Water management structures

Hume Coal Project
Environmental Impact Statement

Figure 2.10



Water management schematic

Hume Coal Project
Environmental Impact Statement
Figure 2.11

EMM HUMECOAL PROJECT

Sediment dams will be constructed based on the recommended criteria in the guidelines *Managing Urban Stormwater - Soils and Construction - Volume 2E Mines and Quarries* (Landcom 2004).

Strategies for managing surplus water are as follows, based on the water balance modelling:

- releases from SB03 and SB04 to Oldbury Creek after first flush rainfall collection and water quality parameters are met;
- pumping to underground sealed panels; and
- storage in the primary water dam.

The management of surplus water is described further below.

2.10.3 Wastewater treatment and release

i Construction activities

Wastewater generated during construction (excluding the accommodation village and construction offices) will be limited to vehicle wash down, nuisance water from drift construction, as well as any water captured in bunded areas that are used for hydrocarbon storage.

Water used for vehicle wash down will be recycled, using one of the many commercial, off-the shelf washdown bay designs. Water from drift construction will be pumped to the surface and stored in a tank or temporary surface storage dam. This water will be re-used for drift construction or to meet construction water demands.

Any potentially contaminated rainfall water that is captured in bunded areas will be trucked off-site to a licensed treatment facility using a licensed contractor, as needed.

ii Construction accommodation village and offices

Greywater produced in the accommodation village and office facilities will be recycled. This includes all wastewater from these facilities other than water from toilets and kitchens. This water will be filtered to remove solids, and then reused for flushing of toilets and other non-potable uses. Any excess greywater will be irrigated in a suitable area adjacent to the accommodation village using subsurface drip irrigation; it will not be spray irrigated.

The Federal Government's 'Yourhome' website estimates that each person generates around 20 litres per day of sewage effluent from toilet use (or 'blackwater') (DoEE 2013). On this basis, the construction accommodation village is anticipated to generate around 3 ML/yr of blackwater. Blackwater will be trucked off-site to a licensed treatment facility using a licensed contractor until such time as the operational STP is commissioned. Once commissioned, treated water from the sewage treatment plant will be used on-site as process water. If the plant is commissioned prior to when the treated effluent is able to be used on-site, then the treated effluent will be used for dust suppression on roads and earthworks. Prior to such a system being implemented, an assessment will be undertaken to demonstrate that treated black water for irrigation will have a neutral or beneficial effect (NorBE) on surface water quality. Should this not be practical, the treated effluent will be trucked off-site to a licensed treatment facility by a licensed contractor.

iii Operations

Different strategies for managing surplus mine water will be employed throughout the mine life depending on the volume of water required to be managed. In the first instance, the mine will reuse most water onsite for coal processing and infrastructure requirements.

Water in addition to processing and infrastructure requirements is then pumped underground and into sealed mine panels. This key mitigation strategy will reduce the volume of groundwater inflow to finished workings and will assist the recovery of overlying groundwater levels. Directing water underground into sealed panels has been considered in the water management assessment, as summarised in Chapter 7 and Appendix E.

In times of high rainfall, the management of water on site will focus on releasing runoff not in direct contact with coal (ie from SB03 and SB04) to Oldbury Creek when first flush and water quality criteria are met, as discussed further in Chapter 7. Runoff from catchments in direct contact with coal will not be released to creeks but will be pumped to the PWD for reuse or storage. As described in Section 2.10.2ii, the PWD has been sized to store all surplus water generated by surface and underground activities without the need to release excess water to the local creeks. In the unlikely event that the first flush can not be released from SB03 and SB04, the PWD has the capacity to store this first flush volume also, if required. The project also includes provision for a water quality treatment plant to treat surplus water from the PWD before release to local creeks; however, the water balance modelling demonstrates that this facility is unlikely to be needed.

The water management system will include the following treatment systems:

- a potable water treatment plant to treat water from onsite groundwater bores;
- STP near the administration building/bathhouse;
- an oil and water separator to remove hydrocarbons from water from the washdown bay;
- primary greywater treatment to remove solids before drip irrigation of greywater; and
- a provisional water treatment plant at MWD08 to treat excess water before releasing it to Oldbury.. As noted above however; it is unlikely this treatment facility will be needed.

While the STP is being constructed, sewage will be collected in a buffer tank and trucked off-site by a suitably licensed contractor, although other options will be investigated during detailed design.

The STP will be constructed to required standards, codes of practice and industry guidelines, as well as relevant council requirements. Treated water from this plant will be pumped to the primary water dam as part of the mine's water management system. Sludge from the plant will be transferred to an appropriately licensed off-site facility.

2.11 Waste management

Waste will be managed in accordance with the requirements of the *Protection of the Environment Operations Act 1997* (POEO Act). Hume Coal will apply general waste minimisation principles such as reduce, re-use and recycle to minimise the quantity of waste that must be disposed off-site. No on-site rubbish disposal or landfill is proposed. Non-production waste streams will be managed as shown in Table 2.4.

Table 2.4 Non-production waste streams and management

Waste Type	Storage	Disposal
General Waste	Bins located at crib rooms, offices, the workshop and other areas as required. These will be regularly emptied into large, centrally-located covered bins.	General waste will be regularly collected by an appropriately licensed contractor for off-site disposal at a facility approved to accept such waste.
General recyclables	Bins located at surface crib rooms, offices, the workshop and other areas as required. These will be regularly emptied into large, centrally-located bins.	Recyclables will be regularly collected by an appropriately licensed contractor and taken to a licensed facility.
Oil and grease	Waste oils and grease will be primarily limited to the routine maintenance of plant and equipment and will include parts and packaging (for example, cartridges, filters and waste oil drums).	Oils and grease will be regularly collected by a licensed waste contractor for recycling and/or off-site disposal at a waste facility approved to accept such waste.
	This waste will be stored in bunded storage containers in workshop areas and transferred to a centrally-located, bunded waste oil tank.	Licensed contractors will regularly service and maintain the separator and remove all waste hydrocarbons for recycling.
	Oily water from the workshop, equipment storage and washdown bay areas will be drained to an on-site oil-water separator.	
Scrap Steel/Metal	Stored in designated scrap metal bins or specified areas in appropriate areas, such as adjacent to workshop.	Collected regularly by a scrap metal recycler.
Tyres	Stored in designated tyre bins or specific areas, such as adjacent to workshop.	Collected on a regular basis by an appropriately licensed contractor.

2.12 Utilities and services

2.12.1 Electricity supply

The electricity supply necessary for the project will come from Endeavour Energy via a 33 kV powerline from its Fairfax Lane substation in Moss Vale to the north-eastern corner of the project area (refer to Figure 2.3). From this point, a series of substations, buried and overhead electricity lines will be constructed within the project area to supply power to the mine, including the train load-out area, overland conveyors, the CPP, administration, bathhouse, and workshop area, and the underground workings.

As noted in Section 1.5, electricity supply works required from the Endeavour Energy substation to the project area will be subject to a separate approval process under Part 5 of the EP&A Act, and will comprise both upgrades to an existing powerline and extension of this powerline into the project area. Hume Coal is liaising with Endeavour Energy regarding this approval. Works that will be covered under Part 5 are illustrated in Figure 2.12 and are as follows:

- an upgrade of the existing 33 kV overhead powerline (feeder 7905) from the Moss Vale Fairfax Lane substation to the eastern outskirts of New Berrima. This existing electrical network does not have sufficient capacity to supply the proposed load of the development. Around 8.6 km of powerline will therefore be upgraded. These works will occur within the existing powerline easement, subject to Endeavour Energy's design approvals, and will generally involve:

- replacing existing transmission poles with new transmission poles to a height of up to 23 m to ensure statutory ground clearances are maintained. Approximately 66 poles will be replaced over 8.6 km;

- replacing existing conductors with new conductors; and

- replacing existing overhead earth wire (OHEW) above the poles. Where non-existent, OHEW will be erected.

- installation of a new 33 kV powerline (an extension of feeder 7905) from New Berrima to the project area. The majority of this new section of powerline will also be an overhead line, although the section through New Berrima (from Perth Street to the western side of Howard Street) is likely to be constructed underground. The new overhead transmission poles will be up to a height of 23 m to ensure statutory ground clearances are maintained along Taylor Avenue to Perth Street. The underground section will be installed below the road pavement in a 1.4 m deep and 700 mm wide trench, and around 1.2 m from the edge of the road seal. From here, the powerline will return to an overhead line, constructed generally along Taylor Road and Medway Road, then under the Hume Highway through the existing underpass and into the north-eastern corner of the mine project area. The section under the Hume Highway will be underground.

- The Endeavour Energy owned 33kV asset will terminate with an air break switch or similar isolating device at the north-eastern corner of the project area and a private section of 33kV line will continue to the Hume Coal main 33kV substation. The location of this substation is shown in Figure 2.3.

- Vegetation trimming/clearing will be undertaken along the route to ensure statutory clearances are maintained, both along the existing powerline to be upgraded, and the new overhead powerline route. This will generally be limited to the trimming of existing trees adjacent to the existing 33 kV line, and within the public road reserve, respectively.

The works described above will take a minimum of 12 months to complete. Plant and equipment required to construct and complete the proposed works are anticipated to include excavators, trucks, cable-hauling machines, saw-cutting and dust-suppression equipment, road installation machinery such as asphalting equipment and rollers, lifter-borers, cranes, bucket trucks, light vehicles, cable trucks and winches, flat-bed trucks for pole delivery, hand tools, and cement trucks.

Other ancillary works during construction are expected to include:

- stockpiling of required materials such as spoil, poles and conductor drums;

- erection of fences around delivered materials (such as poles) to secure them from unauthorised access and damage;

- erection of fences around worksite to prevent unauthorised access and improve worker safety;

- modifications to existing access gates and tracks where required to enable passage of construction vehicles and equipment, and restoration once work is complete;

- minor permanent modifications to existing metallic infrastructure (such as fences and buried pipes) to ensure compliance to earthing conditions can be met (step/touch potentials);

- establishment of construction pads for mobile equipment such as cranes;

- establishment of a site compound; and

- construction and rehabilitation of temporary access tracks, potentially using bog mats or similar methods to each pole location.

The environmental impacts of the electricity supply works are not anticipated to be significant. In particular, there is not anticipated to be any significant impacts on biodiversity and heritage items as a result of the works due to the following:

- the majority of the works will involve the replacement of existing poles and overhead conductors, and therefore limited surface disturbance will occur. Where the existing lines are extended, the route predominately follows existing public roads, with the portion through New Berrima underground, or is located within Hume Coal owned land;

- the underground section through New Berrima will be installed within the road pavement, avoiding the disturbance of new ground; and

- vegetation clearance will generally be limited to the trimming of trees within the public road reserve or adjacent to the existing 33 kV line to be upgraded. The powerline route within Hume Coal owned land will be selected to avoid tree trimming and removal where possible.

Appropriate erosion and sediment control measures will also be implemented during construction to effectively manage soil resources, and to minimise the risk of offsite impacts from the transport of sediment.

To minimise the construction noise and vibration related impacts on the nearest residential receivers to the proposed works, hours of work will generally following standard construction hours of:

- Monday to Friday, between 7am to 6pm;

- Saturday, between 8 am to 1 pm; and

- No work on Sundays or public holidays.

These hours will be subject to outages and road occupation licence conditions, and notice will be provided to any potentially impacted receivers should out of hours works be required.

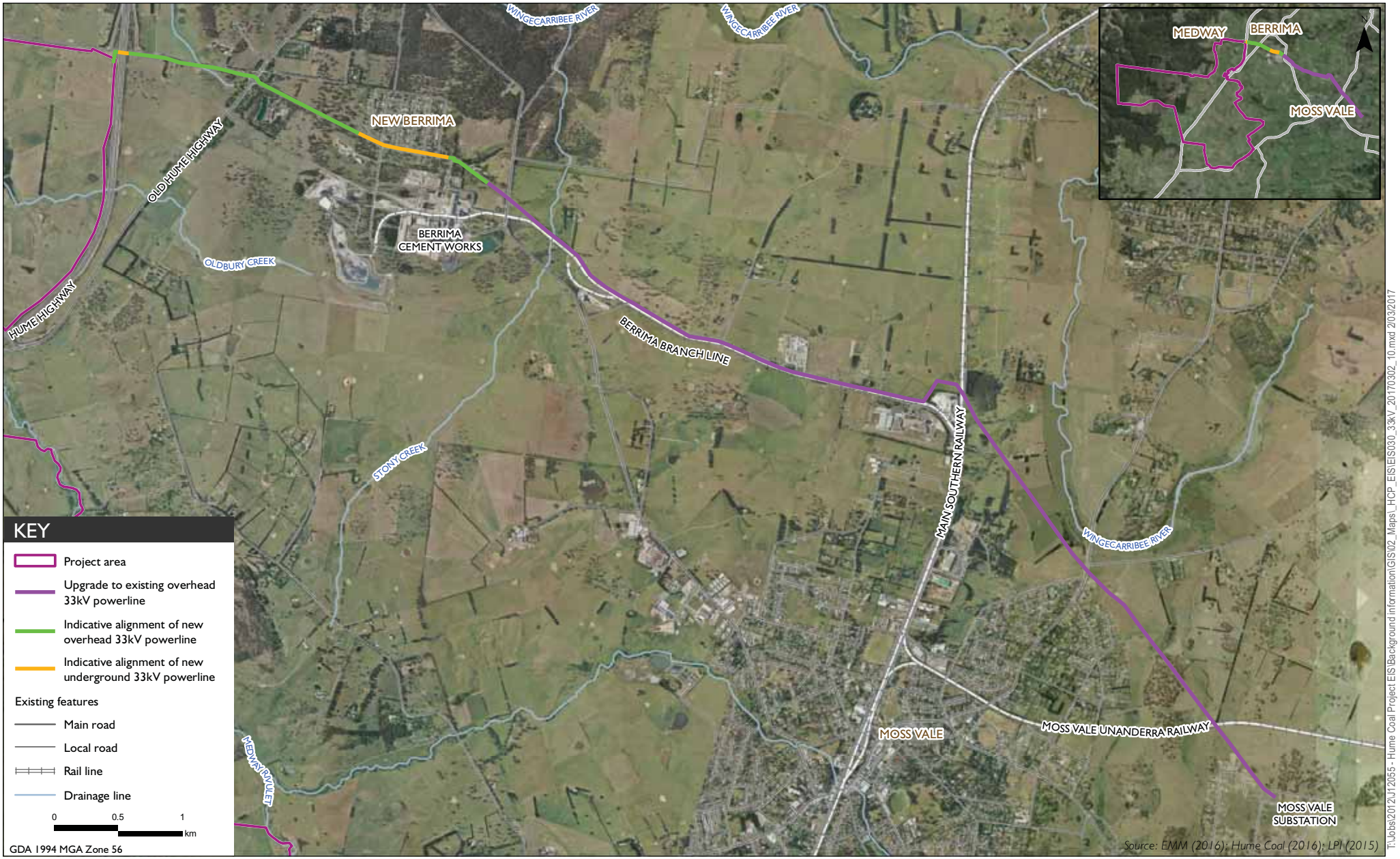
The visual impacts of the works are also not anticipated to be significant because:

- the upgrade of the existing powerline will involve replacing poles that are already there, and therefore the works will not be introducing a new visual element into the landscape; and

- the construction of the new powerline will generally be along Taylor Avenue and Medway Road within the public road reserve, where another powerline already exists. Once again, the works will therefore not be introducing a significant new element in the landscape.

The environmental impacts of the electricity supply works will be assessed in further detail as part of the application under Part 5 of the EP&A Act.

Following construction, works will be limited to maintenance and ongoing operational requirements. These activities will be undertaken in accordance with the relevant Endeavour Energy procedures in force at the time, and are anticipated to include pole inspections, pole/conductor replacement when required, tree trimming to maintain appropriate clearances, and emergency repairs/replacement of failed equipment such as poles, conductors, cables or joints.



Proposed electricity works subject to separate Part 5 approval under EP&A Act

Hume Coal Project

Environmental Impact Statement

Figure 2.12

2.12.2 Telecommunications

A communications network will be installed within the project area using either fibre-optic cable or wireless link. Detailed design of the network will be finalised prior to construction.

2.13 Workforce

To avoid a 'drive-in-drive-out' or 'fly-in-fly-out' workforce and assist in managing fatigue, all operational employees will be required to live in the Southern Highlands and immediate surrounds, within a 45-minute commute to the mine. This will not only assist in managing safety and wellbeing of employees but will mean that greater socio-economic benefits flow to the local community. Local suppliers and contractors will also be used wherever possible, although it is expected that some specialist tasks may require a workforce from further afield.

2.13.1 Construction

It is estimated that a peak workforce of 414 people will be required to construct the mine. Non-local construction employees will reside in the temporary construction village while rostered-on to avoid putting pressure on the local rental and tourism accommodation market.

Hume Coal has set up a training/apprentice program to up skill people from the local area. To date, 10 apprenticeship/trainee positions have been funded as part of the program. A further five to six positions will be funded.

2.13.2 Operations

A workforce of around 100 FTE employees will be required during the first year of operations, rapidly building up to around 300 FTE at peak production. Hume Coal's training and recruitment programs will aim to maximise local employment. During the peak of operations up to 70% of the workforce will be sourced from the Wingecarribee LGA and immediately adjacent areas, with the balance relocating to the area for employment. Further discussion on this is provided in Chapter 20.

2.14 Decommissioning and Rehabilitation

Progressive rehabilitation throughout the mine life will be limited due to the underground nature of the project, and will generally be restricted to minor surface disturbance such as drill pads and access tracks. When no longer required, infrastructure will be recovered; the area will be ripped (if required), re-topsoiled and seeded, and returned to its previous land use.

After construction, temporary facilities will be dismantled, including the accommodation village, and the areas rehabilitated, returning the area to predominately an agricultural land use.

Throughout the project life, mined-out panels will be progressively sealed and reject material placed in these voids as they become available. An indicative progression of sealing mined-out voids is shown in Figure 2.7.

Post-mining, mine infrastructure will be decommissioned and the area rehabilitated so that it can support current land uses, mainly grazing. This will be assisted by the surface infrastructure design, which retains as much of the existing landscape as possible.

Proposed rehabilitation at the end of mining is described in detail in Chapter 17 and Appendix O, and will generally include:

- placing all remaining stored rejects underground and rehabilitating temporary surface emplacements to integrate with natural landforms;
- where appropriate, removing underground plant and equipment;
- filling and sealing mine accesses (drifts and shafts) generally in accordance with relevant guidelines or standards (currently MDG 6000);
- pumping out stormwater detention basins and mine water dams, and treating the water if necessary for disposal. Dams and stormwater retention structures will be re-contoured to match surrounding topography, topsoiled and seeded; and
- dismantling and removing surface mine infrastructure and rehabilitating disturbed areas.

Part B

Legislative, policy and stakeholder considerations

Chapter 3: Legislation
Chapter 4: Consultation and issue identification

3 Legislation

3.1 Introduction

This section describes the relevant Commonwealth and NSW regulatory and policy framework under which the Hume Coal Project will be assessed and determined.

Two principal approvals are required. The first is State significant development consent under Division 4.1 of Part 4 of the NSW EP&A Act. The approval process under Division 4.1 of Part 4 is described below in Section 3.2. Pursuant to Section 89K of the EP&A Act, a number of approvals must be granted for a development approved under Division 4.1 of Part 4 on terms consistent with the consent (refer Section 3.3). Section 89J of the EP&A Act lists the approvals under other NSW legislation that are not required for approved State significant developments, which are discussed in Section 3.4.

The second is approval under the Commonwealth EPBC Act, as discussed in Section 3.7.

3.2 NSW Environmental Planning and Assessment Act 1979

3.2.1 Overview

The EP&A Act and NSW *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) form the statutory framework for planning approval and environmental assessment in NSW. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. It contains three parts that impose requirements for planning approval:

- Part 4, which provides for control of 'development' that requires development consent from the relevant consent authority. A division of Part 4 (Division 4.1) provides for control of SSD where the Minister for Planning (or delegate) is the consent authority.
- Part 5, which provides for control of 'activities' that do not require approval or development consent under Part 4.
- Part 5A, which provides for control of State significant infrastructure that does not require approval or development consent under Part 4.

The requirement for development consent is set out in environmental planning instruments (EPIs), being SEPPs or local environmental plans (LEPs).

3.2.2 State significant development provisions

Part 4, Division 4.1 of the EP&A Act specifically relates to the assessment of development deemed to be significant to the State (ie SSD). Under Section 89C(2) of the EP&A Act a development is SSD if it is declared to be as such by any SEPP. The relevant SEPP to the Hume Coal Project is the *State Environmental Planning Policy (State and Regional Development) 2011* (the SRD SEPP). In relation to SSD, Clause 8(1) of the SRD SEPP states the following:

> 8 Declaration of State significant development: 8C
>
> (1) Development is declared to be State significant development for the purposes of the Act if:
>
> a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
>
> b) the development is specified in Schedule 1 or 2.

Schedule 1 of the SRD SEPP identifies development for the purpose of coal mining as SSD. In addition, development for the purposes of coal mining is not permissible without development consent within the project area, as discussed below in Section 3.2.3. Accordingly, the project is SSD and will be subject to the provisions of Division 4.1 of Part 4 of the EP&A Act.

Under Section 89D of the EP&A Act, the Minister for Planning is the consent authority for SSD. However, pursuant to Section 23 of the Act, the Minister may delegate the consent authority function to the Planning Assessment Commission (PAC), the Secretary or to any other statutory authority.

A development application (DA) for SSD must be accompanied by an EIS in accordance with Section 78(8A) of the EP&A Act and the EIS must be prepared in accordance with the EP&A Regulation. Before preparing an EIS, an applicant must request the Secretary's environmental assessment requirements (SEARs), which specify the issues to be addressed in the EIS. The SEARs for the project were issued by the DP&E on 20 August 2015 and are provided in Appendix B. The project was also declared a controlled action on 1 December 2015 by the then Commonwealth Department of the Environment (now DoEE). Accordingly, the DoEE issued supplementary SEARs to address matters of national environmental significance relevant to the project. The supplementary SEARs are also included in Appendix B, as well as identifying the sections of the EIS where the SEARs have been addressed.

The planning approval process for SSD under Division 4.1 of Part 4 of the EP&A Act is shown in Figure 3.1.

Section 89(E) of the EP&A Act is the primary provision of the Act giving the Minister (or delegate) the power to determine a DA for SSD. Section 89E(1) states:

> The Minister is to determine a development application in respect of State significant development by:
>
> a) granting consent to the application with such modifications of the proposed development or on such conditions as the Minister may determine, or
>
> b) refusing consent to the application.

The relevant factors in the assessment and determination of the project are addressed in the sub-sections below.

3.2.3 Permissibility

Pursuant to the Wingecarribee LEP, the project area is located on land zoned E3 Environmental Management, RU2 Rural Landscape, RU3 Forestry and SP2 Infrastructure, as illustrated in Figure 3.2. Development for the purposes of mining is prohibited in these zones under the Wingecarribee LEP. However, permissibility of mining developments is also governed by the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP), which prevails over any inconsistencies with a LEP. Clause 7 of the Mining SEPP defines mining development that can be undertaken with development consent. Clause 7(1) of the Mining SEPP states the following:

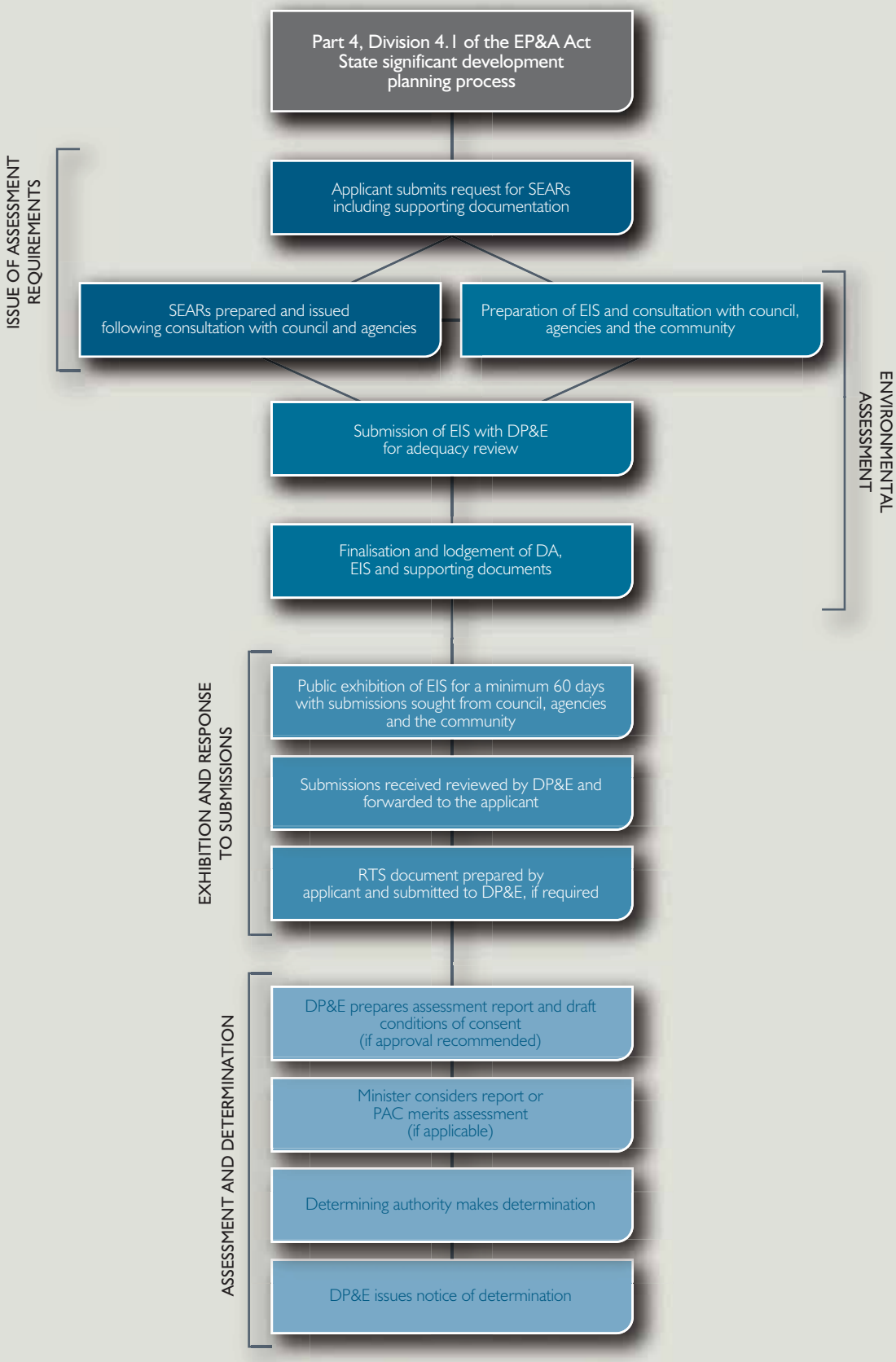
> Mining
>
> Development for any of the following purposes may be carried out only with development consent:
>
> a) underground mining carried out on any land,
>
> b) mining carried out:
>
> i) on land where development for the purposes of agriculture or industry may be carried out (with or without development consent), or
>
> ii) on land that is, immediately before the commencement of this clause, the subject of a mining lease under the Mining Act 1992 or a mining licence under the Offshore Minerals Act 1999,
>
> ...
>
> d) facilities for the processing or transportation of minerals or mineral bearing ores on land on which mining may be carried out (with or without development consent), but only if they were mined from that land or adjoining land…

Under the Mining SEPP, 'mining' is defined as:

> Mining means the winning or removal of materials by methods such as excavating, dredging, or tunnelling for the purpose of obtaining minerals, and includes:
>
> a) the construction, operation and decommissioning of associated works, and
>
> b) the stockpiling, processing, treatment and transportation of materials extracted, and
>
> c) the rehabilitation of land affected by mining.

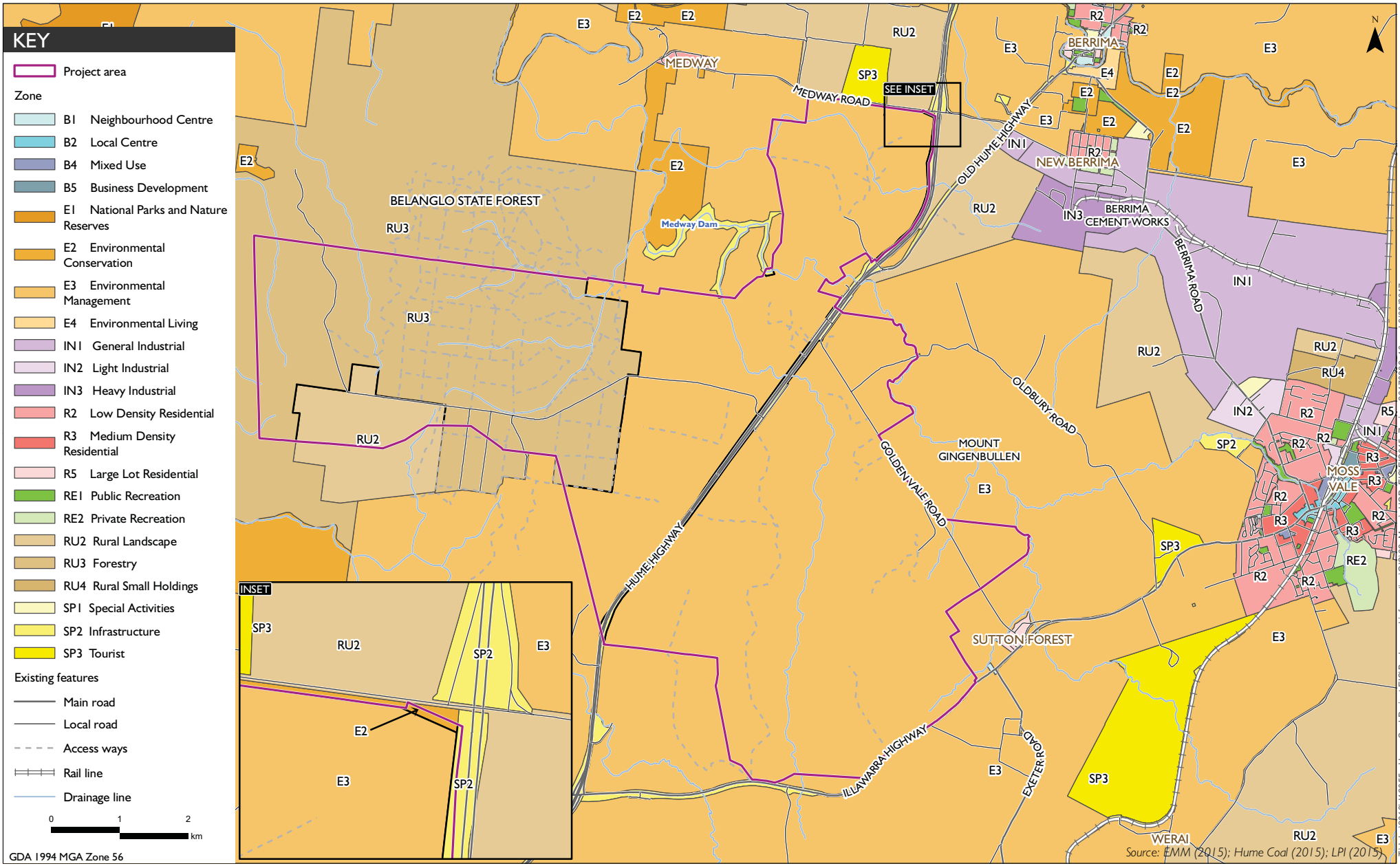
Additionally, 'underground mining' is defined as:

> a) mining carried out beneath the earth's surface, including bord and pillar mining, longwall mining, top-level caving, sub-level caving and auger mining, and
>
> b) shafts, drill holes, gas and water drainage works, surface rehabilitation works and access pits associated with that mining (whether carried out on or beneath the earth's surface),
>
> but does not include open cut mining.



EMM HUMECOAL PROJECT

Planning approval process
Hume Coal Project
Environmental Impact Statement
Figure 3.1



Land zoning

Hume Coal Project

Environmental Impact Statement

Figure 3.2

Therefore, under Clause 7(1)(a) of the Mining SEPP, the proposed underground mining area is permissible with consent in all land use zones as the project falls within the definition of underground mining.

The surface infrastructure area will be on land zoned as E3 Environmental Management and RU2 Rural Landscape pursuant to the Wingecarribee LEP. Under the LEP, the surface infrastructure activity is a prohibited land use in both zones. However, agriculture is permitted in both zones. The surface infrastructure activity falls within the definition of mining under the Mining SEPP and therefore, under Clause 7(1)(b)(i) of the SEPP, the surface infrastructure activity is permissible with consent. Further, one of the downcast ventilation shafts will be constructed in the Belanglo State Forest in the RU3 zone, with the other on the Carlisle Downs property in the E3 zone. 'Shafts' fall under the definition of underground mining, as noted above, and therefore construction of the shaft within the RU3 zone is also permissible with consent.

3.2.4 Objects of the Act

The objects of the EP&A Act are specified in Section 5 of the Act, and seek to promote the management and conservation of natural and artificial resources, while also permitting appropriate development to occur. The objects of the EP&A Act are reproduced below, followed by a consideration of the consistency of the project with these objects.

> To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.

The project will facilitate the recovery of 50 Mt of ROM coal reserves from the Wongawilli Seam. Through the project, Hume Coal will develop a valuable resource by providing the necessary capital and skills, without which the resource would remain in situ and the economic and social benefits documented in Chapters 19 and 20, respectively, of this EIS would be unrealised.

The natural resources in the project area include coal, land suitable for agricultural production, state forest, and land which has biodiversity and cultural heritage values. The project has been designed to efficiently recover the coal resource without unacceptable environmental impacts or impacts on existing and surrounding land uses. The project's main surface infrastructure area design avoids surface disturbance in the state forest and the disturbance of biodiversity and cultural heritage resources above the mine. Surface disturbance will be limited because mining will occur underground and will be first workings only, resulting in no predicted subsidence related impacts on biodiversity or cultural heritage assets. Impacts to surface water resources have also been assessed as minimal, with all potential impacts to surface water users and stream environments assessed as insignificant in accordance with the *Significant impact guidelines* (DoE 2013). Where other impacts cannot be avoided, these have been mitigated or offset as described in Part D of this EIS.

Hume Coal owns around 1,765 ha of land within and in the vicinity of the project area, making it one of the largest landholders in the area. The company has leased the properties to a pastoral company that is now running a productive agricultural business, comprising principally beef cattle, on these properties and will continue investing in initiatives to improve the land's agricultural productivity. In keeping with the current land uses, most of this land will continue to be farmed during and following mining. The project therefore encourages the proper management and development of agricultural land. Within the 5,051 ha project area, approximately 117 ha will temporarily not be used for agriculture during the mine life because it will be given over to surface infrastructure. This is around 2% of the project area, and will be returned to grazing land at the end of the project.

Hume Coal is committed to employing local residents, with all employees to live within a 45 minute travel distance of the mine. Up to 300 personnel will be employed when the mine is fully operational, bringing associated flow-on benefits to surrounding local communities where these employees will reside. A local procurement policy will also be adopted, which will require local goods and services to be used in the project's construction and operation where possible, thereby maximising opportunities for local businesses.

> To encourage the promotion and co-ordination of the orderly and economic use and development of land.

The orderly and economic use of land is best served by development which is permissible under the relevant planning regime, is in accordance with the prevailing planning controls and which does not unduly restrict other beneficial uses around a project site. The project is a permissible development which is consistent with the relevant planning controls, as documented in this chapter. The project will recover a valuable coal resource without significant residual impacts and will bring significant social and economic benefits to the region. The current land use of the surface infrastructure area is an agricultural use and, as described in the economic assessment (refer to Chapter 19), the estimated foregone value added of agriculture production (ie the land removed from production due to the project multiplied by the corresponding gross margins) is $1.72 million. With a net benefit of $295 million, the project therefore represents the highest value land use. Wages for labour will contribute to the regional economy, as well as regional spending for production related inputs.

The project is responsive to its surroundings and will limit all external impacts to acceptable levels. Accordingly, it will not displace other beneficial uses in the locality.

To encourage the protection, provision and co-ordination of communication and utility services.

Potential impacts to existing communications and utility services have been considered as part of the project design. The project will expand or replace any affected utility services such that currently prevailing service levels will be maintained or improved.

To encourage the provision of land for public purposes.

The project will be developed on land that is largely privately owned and therefore is not generally available for public purposes. Approximately 1,296 ha of the Belanglo State Forest is within the project area. Surface infrastructure within the state forest will be limited to one downcast ventilation shaft, some access tracks and environmental monitoring equipment, with the mine surface infrastructure area constructed on privately owned land outside the state forest. Therefore, the project will not restrict public access to this area. Parts of the project area also contain public roads. Access will be maintained along these roads throughout the project life.

To encourage the provision and co-ordination of community services and facilities.

The net economic benefit of the project will encourage the provision and co-ordination of community services and facilities. The project will result in considerable payments to the Commonwealth in company taxes, and to the NSW Government in the form of royalties. The latter will be available to the State government to provide services across NSW. Hume Coal will also enter into a VPA or similar, which could be used by WSC to fund local community services and facilities.

To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.

The project has been designed to address this objective. Iterative project planning informed by baseline studies has allowed a range of impacts to be avoided and others to be minimised throughout the life of the project. Surface infrastructure has been carefully located to avoid large tracts of native vegetation and first workings underground mining will not cause subsidence related impacts. To compensate for unavoidable disturbance, biodiversity offsets will be provided, as discussed in detail in Chapter 10.

To encourage ecologically sustainable development.

The concept of ecologically sustainable development (ESD) when used in the EP&A Act has the same meaning it has in Section 6(2) of the *Protection of the Environment Administration Act 1991*. The definition is discussed in greater detail in Chapter 24.

The Commonwealth Government's 1992 *National Strategy for Ecologically Sustainable Development* defines ESD as "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life now, and in the future, can be increased".

A comprehensive stakeholder engagement, planning and environmental assessment process has ensured that the principles of ESD are addressed. An extensive baseline monitoring program has ensured that impacts can be confidently predicted as outlined in this EIS. Mitigation and management measures have been identified, thereby addressing the Precautionary Principle.

The project will enhance community resources by generating employment and public revenues through royalties and taxes, contributing to improvements to local, State and National economies. The project will also conserve community resources directly by establishing offset areas and indirectly through effective impact mitigation.

As mining will be underground first workings, surface disturbance will be minimal. There will be no permanent surface emplacement of rejects, with all rejects ultimately returned underground.

Further discussion on the consistency of the project with the principles of ESD is provided in Chapter 24.

> To encourage the provision and maintenance of affordable housing.

A temporary accommodation village will be established at the mine to house non-local employees during the construction period. Hence there will be no increase in housing demand during project construction.

All employees will be required to live within the Southern Highlands region and immediate surrounds during the operational phase of the mine. The social impact assessment (SIA) conservatively assumed that some workers will relocate themselves and their families to the region. To assess the project-related increase in demand for housing, the SIA used two scenarios based on people currently working in the mining industry in the Wingecarribee and adjoining LGAs; 70% local employment resulting in 30% in-migration, and a more conservative scenario of 50% local employment with 50% in-migration. The outcomes of the SIA suggest that most relocating workers will move to the larger towns of Moss Vale and Mittagong, and under both scenarios will not result in a significant population increase or pressure on housing availability at any specific location. Further detail on local housing supply impacts is provided in the SIA attached as Appendix R and summarised in Chapter 20.

> To promote the sharing of the responsibility for environmental planning between the different levels of government in the State.

As outlined in Chapter 4, all Commonwealth, State, and local government agencies that have an interest in the project have been consulted prior to and while this EIS was being prepared. This will continue as the Response to Submissions (RTS) is finalised following public exhibition. All levels of government have been involved to date and this will continue as the project is determined.

> To provide increased opportunity for public involvement and participation in environmental planning and assessment.

As detailed in Chapter 4, Hume Coal has consulted extensively with the community over a number of years. This process included numerous public information sessions, one on one meetings and a Social Reference Group which held regular meetings. A community shopfront established initially in Moss Vale and then in Berrima gave members of the public an opportunity to find out about the project. Community feedback has helped shape the project and given local input to the EIS, as discussed in Chapter 4. The public will also be involved through the exhibition of the EIS. Any relevant public representations will be considered by the DP&E during assessment of the development application.

3.2.5 Section 79C matters for consideration

i General

When assessing a DA for SSD, the consent authority is required to take into consideration the matters given in section 79C of the EP&A Act, which states:

> (1) Matters for consideration – general
>
> In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:
>
> (a) the provisions of:
>
> (i) any environmental planning instrument, and
>
> (ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and
>
> (iii) any development control plan, and
>
> (iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and
>
> (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and
>
> (v) any coastal zone management plan (within the meaning of the *Coastal Protection Act 1979),*
>
> that apply to the land to which the development application relates,
>
> (b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,
>
> (c) the suitability of the site for the development,
>
> (d) any submissions made in accordance with this Act or the regulations,
>
> (e) the public interest."

Despite Section 79C(1)(a)(iii), clause 11 of the SRD SEPP states that development control plans do not apply to SSD. The paramountcy of clause 11 is given effect by the combined operation of Sections 89H ad 89L of the EP&A Act which state:

> 89H Section 79C applies, subject to this Division, to the determination of the application.
>
> 89L The provisions of this Division, the regulations of this Division and any other provisions of or made under this Act with respect to State significant development prevail to the extent of any inconsistency with any other provisions of or made under this Act relating to development to which this Part applies.

The matters for consideration that apply to the Hume Coal Project are discussed below.

ii Environmental planning instrument framework

All relevant environmental planning instruments are addressed in Section 3.6.

iii Planning agreements

Section 93F of the EP&A Act relates to planning agreements, which are defined as:

> …a voluntary agreement or other arrangement under this Division between a planning authority (or 2 or more planning authorities) and a person (the developer):
>
> a) who has sought a change to an environmental planning instrument, or
>
> b) who has made, or proposes to make, a development application, or
>
> c) who has entered into an agreement with, or is otherwise associated with, a person to whom paragraph (a) or (b) applies, under which the developer is required to dedicate land free of cost, pay a monetary contribution, or provide any material public benefit, or any combination of them, to be used for or applied towards a public purpose.

Section 93F enables the proponent of a development to enter into a VPA or other arrangements with planning authorities in lieu of a Section 94 contribution.

iv The regulations

As previously stated, a DA for an SSD project must be accompanied by an EIS, prepared in accordance with the EP&A Regulation. The requirements for preparation of an EIS are set out in Clause 6 and 7 of Schedule 2 of the EP&A Regulation. A summary of these requirements and where they are addressed in the EIS are provided in Table 3.1.

Table 3.1 Schedule 2 requirements for an EIS

Requirement	Where contained in the EIS
Clause 6 Form of environmental impact statement	
(a) the name, address and professional qualifications of the person(s) by whom the statement is prepared,	Certification page at the front of this EIS
(b) the name and address of the responsible person (the applicant),	Certification page at the front of this EIS
(c) the address of the land: (i) in respect of which the development application is to be made, or (ii) on which the activity or infrastructure to which the statement relates is to be carried out,	Appendix A (Schedule of lands)
(d) a description of the development, activity or infrastructure to which the statement relates,	Chapter 2
(e) an assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule,	Chapters 7-24
(f) a declaration by the person by whom the statement is prepared to the effect that: (i) the statement has been prepared in accordance with this Schedule, and (ii) the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and (iii) that the information contained in the statement is neither false nor misleading.	Certification page at the front of this EIS

Table 3.1 Schedule 2 requirements for an EIS

Requirement	Where contained in the EIS
Clause 7 Content of environmental impact statement	
(a) a summary of the EIS,	Executive summary
(b) a statement of the objectives of the development, activity or infrastructure,	Chapter 1
(c) an analysis of feasible alternatives to the carrying out the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,	Chapter 6
(d) an analysis of the development, activity or infrastructure, including:	
(i) A full description of the development, activity or infrastructure, and	Chapter 2
(ii) A general description of the environment likely to be affected by the development, activity or infrastructure, and	Chapter 5
(iii) The likely impact on the environment of the development, activity or infrastructure, and	Chapters 7-22
(iv) A full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure, and	Chapters 7-22, and summarised in Chapter 23
(v) A list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,	Chapter 3, and summarised in Section 3.8
(e) a compilation (in a single section of the EIS) of the measures referred to in item (d)(iv),	Chapter 23
(f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development.	Chapter 24

v Likely impacts of the development

This EIS comprehensively describes the likely impacts of the project, including predicted environmental impacts on both the natural and built environments, and social and economic impacts in the local area, region and State. It also describes commitments proposed by Hume Coal to mitigate and manage these impacts. The likely impacts as described in this EIS are based on technical studies prepared by specialists, which are appended to this EIS. The technical studies were prepared using the most recent and accurate scientific data relevant to the project in the light of current policies and legislation. The technical studies adopted conservative assumptions so the upper limit of likely impacts could be assessed.

The likely impacts of the project on the natural and built environment are described in chapters 7-18, the likely economic and social impacts are described in chapters 19 and 20 respectively, and the likely cultural impacts are described in chapters 21 and 22 of this EIS.

vi Suitability of the site for the development

The project area is suitable for an underground coal mine for the reasons detailed in Chapter 24.

Principally, the project will efficiently recover an economic coal resource beneath privately owned land where underground mining is permissible. Resources extracted in this way will avoid land use conflicts by continuing existing land uses at the surface and minimising impacts to significant environmental, cultural and built features. The site is well served by necessary services and infrastructure, particularly nearby rail infrastructure and Port Kembla. A range of commitments have been made by Hume Coal to mitigate potential impacts on surrounding land uses. When these commitments are applied, the project is unlikely to have a significant land use impacts.

vii Submissions

This EIS will be placed on public exhibition for a minimum of 60 days by DP&E and submissions will be sought from WSC, government agencies and the community. Any submissions received by the DP&E will be reviewed and forwarded to Hume Coal for consideration in the RTS report.

Following receipt of the RTS, the DP&E will prepare its assessment report considering this EIS, all submissions received during the exhibition process and the RTS.

viii Public interest

To assist the consent authority in determining whether the project is in the public interest, this EIS provides a detailed justification for the proposal in Chapter 24, taking into consideration its potential environmental, social and economic impacts and the suitability of the site. It also considers the project against the principles of ESD. The consent authority will also be required to consider all submissions received during the public exhibition of the EIS.

3.2.6 Other relevant sections of the EP&A Act

i Threatened species, populations and ecological communities

Section 5A of the EP&A Act relates to threatened species, populations and ecological communities. It requires a number of factors to be taken into consideration in deciding whether a proposed action is likely to have a significant effect on threatened species, populations or ecological communities, or their habitats. The impacts of the project on flora and fauna are assessed in detail in the technical study contained in Appendix H, with the outcomes summarised in Chapter 10.

ii Remaining provisions

Other sections of the EP&A Act which may be relevant to the project include:

- Section 23D outlines the functions of the PAC, including "to review any (or any aspect or part of any) development, activity, infrastructure or project to which this Act applies" and "hold a public hearing into any matter the subject of any such advice or review" if requested to do so by the Minister or Secretary;
- Section 94 enables the consent authority to impose a condition requiring the applicant to provide a development contribution if the consent authority "is satisfied that development for which development consent is sought will or is likely to require the provision of or increase the demand for public amenities and public services within the area". Section 93F enables the applicant to enter into a VPA with planning authorities in lieu of a Section 94 contribution;
- Section 97 which states that an applicant who is dissatisfied with a determination can lodge an appeal in the Land and Environment Court within six months after determination. If the appeal is against a deemed refusal under Section 82(1), the appeal must commence within six months from the expiration of the relevant period; and
- Section 98 allows an objector to appeal against a consent authority's decision to grant consent within 28 days of the notice of determination. Section 23F states that a decision made by the PAC cannot be appealed if it is made by the PAC after a public hearing.

3.3 Requirements of other NSW legislation

In addition to development consent, the project will require a number of other authorisations. Under Section 89K of the EP&A Act, the following authorisations cannot be refused and are to be substantially consistent with a development consent for SSD:

a) an aquaculture permit under section 144 of the *Fisheries Management Act 1994*;

b) an approval under section 15 of the *Mine Subsidence Compensation Act 1961*;

c) a mining lease under the *Mining Act 1992*;

Note. Under section 380A of the *Mining Act 1992*, a mining lease can be refused on the ground that the applicant is not a fit and proper person, despite this section.

d) a production lease under the *Petroleum (Onshore) Act 1991*;

Note. Under section 24A of the *Petroleum (Onshore) Act 1991*, a production lease can be refused on the ground that the applicant is not a fit and proper person, despite this section.

e) an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in section 43 of that Act);

f) a consent under section 138 of the *Roads Act 1993*; and

g) a licence under the *Pipelines Act 1967*.

Not all of the above approvals are relevant to the project, in that no aquaculture or petroleum production lease is needed. The approvals that are relevant to the project are discussed below.

3.3.1 Mining Act 1992

The NSW *Mining Act 1992* (Mining Act) regulates mining in NSW and provides for the granting of mining authorities, leases and licences. It also places controls on methods of exploration and mining, disposal of mining waste, land rehabilitation and environmental management activities. Under Section 5 of the Mining Act it is an offence to mine for minerals except in accordance with a valid authorisation.

The project will require two types of mining leases – a mining lease for the mining of coal which is within both Authorisation A349 and the project area, and a mining lease for mining purposes for the land which is within the project area but external to Authorisation A349. Hume Coal will obtain the necessary leases prior to commencing any mining operations. The mining lease application areas that have been submitted under the Mining Act (MLA 527, MLA 528 and MLA 529), are shown in Figure 1.2. In accordance with Section 51 (3) of the Mining Act, an application for a coal mining lease can only be made by the holder of an exploration licence or assessment lease over the land, or with the Minister's consent. Hume Coal holds exploration Authorisation A349 over the coal extraction area, so it can apply for a mining lease as of right.

Section 89K of the EP&A Act mandates that a mining lease for an approved SSD project cannot be refused and its terms must be substantially consistent with the terms of development consent for the SSD. It is also anticipated that the new mining lease and development consent will require the preparation and approval of a Mining Operations Plan (MOP).

3.3.2 Mine Subsidence Compensation Act 1961

The *Mine Subsidence Compensation Act 1961* is administered by the Mine Subsidence Board, which is responsible for reducing the risk of mine subsidence damage to properties by assessing and controlling the types of buildings and improvements which can be erected in Mine Subsidence Districts.

The project area is not in a Mine Subsidence District. No surface improvements will require approval by the Mine Subsidence Board prior to construction.

3.3.3 Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations Act 1997* (POEO Act) is the principal NSW environmental protection legislation and is administered by the NSW EPA. Schedule 1 of the POEO Act lists the 'scheduled activities' which require an environment protection licence (EPL). An EPL prescribes management standards and monitoring requirements to control environmental pollution. Schedule 1 includes 'mining for coal', meaning the mining, processing or handling of coal at open cut or underground mines that have the capacity to produce more than 500 tonnes of coal per day or will disturb a total surface area of more than 4 ha of land, and also 'coal works'.

The project meets both the above types of scheduled activity and will require an EPL. Pursuant to Section 89K of the EP&A Act, if development consent is granted for the project, an EPL cannot be refused and its terms must be substantially consistent with the terms of the development consent.

3.3.4 Roads Act 1993

The NSW *Roads Act 1993* (Roads Act) regulates activities that may impact on public roads. Consent is required from the relevant roads authority under Section 138 of the Roads Act for any work in, on or over a public road. In the case of SSD, Section 89K of the EP&A Act stipulates that an authorisation under Section 138 cannot be refused and must have terms that are substantially consistent with the development consent for the SSD.

The project will require some minor works to change the traffic priority at the Hume Highway off-ramp at the Mereworth Road intersection on the western side of the highway. Mereworth Road will become the priority traffic movement. These works will require a Section 138 approval under the Roads Act. Potential impacts on the existing road network are discussed in further detail in Chapter 15.

3.3.5 Pipelines Act 1967

The *Pipelines Act 1967* (Pipelines Act) sets licensing requirements to construct and operate pipelines. The project will involve the construction of pipelines to transfer clean water, mine water and wastewater around the project area. Under Section 5 of the Act not all pipelines are required to be licensed, including pipelines to supply water or convey wastewater, mine water or mineral tailings. The project will not require approval under the Pipelines Act.

3.4 Exemptions from other NSW approval requirements

Pursuant to Section 89J of the EP&A Act, the following authorisations under other NSW legislation are not required for an approved SSD project:

a) the concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of that Act;

b) a permit under section 201, 205 or 219 of the *Fisheries Management Act 1994*;

c) an approval under Part 4, or an excavation permit under section 139, of the *Heritage Act 1977;*

d) an Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974;*

e) an authorisation referred to in section 12 of the *Native Vegetation Act 2003* (or under any Act repealed by that Act) to clear native vegetation or State protected land;

f) a bush fire safety authority under section 100B of the *Rural Fires Act 1997*; and

g) a water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91 of the *Water Management Act 2000*.

Whilst the above approvals are not required and one is not relevant (*Coastal Protection Act 1979*) it is necessary to describe how they relate to the project. This discussion is provided in the sub-sections below.

3.4.1 Fisheries Management Act

The NSW *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. It lists threatened aquatic species and ecological communities and contains measures to conserve these.

An assessment of the potential impacts on aquatic ecology is contained in Chapter 10.

3.4.2 Heritage Act 1977

The NSW *Heritage Act 1977* (Heritage Act) aims to protect and conserve the natural and cultural history of NSW, including scheduled heritage items, sites and relics. Eight heritage items that are listed on the Wingecarribee LEP are within the project area. Of these, four are wholly within the project area; one occurs within the project's surface infrastructure area (*Mereworth House and Garden*) while the others are located above the underground mining area. All items have been assessed as being of *local* significance. The items are listed below with their relevant LEP item number in brackets:

- *The Harp* (I027);
- *Mereworth House and Garden* (I351);
- *The Pines* (I029); and
- *Sutton Farm House* (formerly the Red Cow Inn) (I035).

The remaining four listed items are partially contained within the project area; that is, some of the paddocks associated with the heritage listed items overlie the underground mining area. These listed items are:

- *Newbury* house, grounds and outbuildings (I202, I036);
- *Eling Forest Winery,* house, grounds and outbuildings (I004, I009, I010);
- *Bunya Hill* house, grounds and outbuildings (paddocks only) (I018); and
- *Comfort Hill* house, grounds and outbuildings (paddocks only) (I021, I356, I357).

Approvals under Part 4 or an excavation permit under Section 139 of the Heritage Act are not required for an SSD project by virtue of Section 89J of the EP&A Act. Nevertheless, potential heritage impacts of the project are assessed in detail in Chapter 22.

3.4.3 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NPW Act) provides for nature and cultural heritage conservation in NSW, including protection of native flora and fauna and the conservation of places, objects and features of significance to Aboriginal people.

Part 8A of the NPW Act protects threatened flora and fauna. Section 118A (1)(a) states that a person must not harm any animal that is, or is part of, a threatened species, an endangered population or an endangered ecological community (EEC). Potential impacts to flora and fauna are detailed in Chapter 10.

A person must not harm or desecrate an Aboriginal object or place without an Aboriginal heritage impact permit under Section 90 of the NPW Act. However, a Section 90 permit is not required for SSD by virtue of Section 89J of the EP&A Act. Notwithstanding, an assessment of potential impacts on Aboriginal cultural heritage in accordance with OEH guidelines is required. The project's potential impacts on Aboriginal heritage are discussed in Chapter 21.

3.4.4 Native Vegetation Act 2003

The NSW *Native Vegetation Act 2003* (NV Act) provides for the promotion, improvement and protection of native vegetation in NSW. Approval to clear native vegetation is required under the NV Act. However, under Section 89J of the EP&A Act, SSD is exempt from an authorisation to clear native vegetation under Section 12 of the NV Act if development consent has been granted. Notwithstanding, potential impacts to native vegetation are assessed in detail in Chapter 10.

3.4.5 Rural Fires Act 1997

The NSW *Rural Fires Act 1997* (Rural Fires Act) aims to prevent, mitigate and suppress bush and other fires in LGAs and other parts of NSW constituted as rural fire districts, such as the Wingecarribee LGA. It also coordinates bush fire fighting and prevention, and protects people, property and assets from fire damage.

The EP&A Act also requires bush fire protection measures on bush fire prone land to be considered at the DA stage. Generally DAs on bush fire prone land must be accompanied by a bush fire assessment report demonstrating compliance with the aims and objectives of *Planning for Bush Fire Protection* (RFS 2006) and the specific objectives and performance criteria for the land use proposed.

The far western section of the stockpile pad and water dam of the CPP will be within the 100 m vegetation buffer surrounding Vegetation Category 1 on the Wingecarribee bushfire prone land map, meaning that there will not be elevated bush fire risks to people or property. No CPP, administration/workshop buildings or accommodation village structures will be on bush fire prone land. Therefore, a bush fire hazard assessment in accordance with RFS (2006) is not required.

One of the downcast ventilation shafts will be in a pine plantation in Belanglo State Forest. The underground mine would be evacuated if there is a nearby bushfire.

Further discussion on hazard and risk, including bushfire, is provided in Chapter 18.

3.4.6 Water Act 1912 and Water Management Act 2000

The NSW *Water Act 1912* (Water Act) and NSW *Water Management Act 2000* (WM Act) regulate the management of water by granting licences, approvals for taking and using water, and trading groundwater and surface water. The WM Act applies to those areas where a water sharing plan has commenced. Alternatively, if a water sharing plan has not yet commenced, the Water Act applies. The WM act is progressively replacing the Water Act as relevant water sharing plans are introduced across the State.

Water sharing plans (WSPs) have commenced for most of NSW. Licensing of monitoring bores continues under the Water Act until a regulation for aquifer interference gives a mechanism to approve these activities. Licensing of reinjection into groundwater systems is also still currently managed under the Water Act.

Two WSPs are applicable to the project area; one covering surface water resources and the other applicable to groundwater. These are the *Water Sharing Plan for the Greater Metropolitan Region, Unregulated River Water Sources 2011* (Metropolitan surface water WSP), and the *Water Sharing Plan for the Greater Metropolitan Region, Groundwater Sources 2011* (Metropolitan groundwater WSP).

Section 89J of the EP&A Act removes the need for a number of approvals under the WM Act when development consent has been granted for SSD. These are a water use approval under Section 89, a water management work approval under Section 90 and an activity approval (other than an aquifer interference approval) under Section 91.

Required authorisations include water access licences under the WM Act and bore licences under the Water Act.

The water licensing requirements identified for the project are discussed in detail in Chapter 7.

3.5 Other relevant NSW legislation

3.5.1 Threatened Species Conservation Act 1995

The *Threatened Species Conservation Act 1995* (TSC Act) aims to conserve biological diversity in NSW by protecting threatened flora and fauna species, populations and EECs. The TSC Act also provides a framework to assess a project's potential impacts on threatened species. A detailed assessment of potential impacts on threatened species, populations and EECs is provided in Chapter 10.

3.5.2 Dams Safety Act 1978

The NSW *Dams Safety Act 1978* (Dams Safety Act) applies to dams prescribed in Schedule 1 of the Act and establishes the Dams Safety Committee (DSC). The role of the DSC is to approve and maintain records of prescribed dams in NSW. The Dams Safety Committee will be consulted to determine if any dams proposed for the project will be prescribed dams and require inclusion in Schedule 1 of the Dams Safety Act.

Medway Dam, which is located to the west of the surface infrastructure area and outside of the project area, is a prescribed dam under the Dams Safety Act. The notification zone extends into the central northern portion of the project area; however no mining is proposed in this zone.

3.5.3 Forestry Act 1916

The NSW *Forestry Act 1916* (Forestry Act) gives the statutory framework to dedicate, reserve, control and use state forests. Under Section 31 of the Forestry Act, an occupation permit is required for any component of the project within a state forest, for example, Belanglo State Forest. As illustrated in Figure 2.1, one downcast ventilation shaft will be constructed in the forest, so an occupation permit will be required.

3.5.4 Crown Lands Act 1989

The NSW *Crown Lands Act 1989* (Crown Lands Act) sets out how Crown land is to be managed. Applications to use Crown land generally need to be authorised by a lease, licence or permit. Approval of the NSW DPI - Crown Lands Division will be required for any works or mining on Crown land. This also applies to Crown roads in the project area.

There is approximately 12 ha of Crown land in the project area; mainly small sections of Crown roads and a small parcel within Belanglo State Forest, as shown in Figure 5.6 (refer to Chapter 5). No surface infrastructure will be constructed on Crown land.

3.5.5 Local Government Act 1993

Section 68 of the *Local Government Act 1993* (Local Government Act) requires approval of the relevant local council to build and operate a sewage management system. As described in Section 2.10.3, sewage will be treated at an onsite treatment plant.

3.5.6 Work Health and Safety Act 2011 and Work Health and Safety (Mines) Act 2013

The NSW *Work Health and Safety Act 2011* seeks to ensure the health and safety of workers. The NSW *Work Health and Safety (Mines) Act 2013* supplements the provisions of the NSW *Work Health and Safety Act 2011* by providing additional health and safety requirements specifically for mines. The project will implement the necessary policies, training and procedures required under these Acts, including obtaining licences to store and handle dangerous goods. Further information on hazards and safety is provided in Chapter 18.

3.6 Planning instruments and policies

3.6.1 State Environmental Planning Policies

i State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007

The Mining SEPP provides for the proper management and development of mineral, petroleum and extractive resources for the social and economic welfare of NSW. It also establishes planning controls to encourage ecologically sustainable development. The Mining SEPP defines the permissibility of mining projects, and the additional matters that must be considered by a consent authority when evaluating development applications for mining. These matters are considered below.

a. Aims

Clause 2 of the Mining SEPP outlines the aims of the policy, as follows:

> The aims of this Policy are, in recognition of the importance to New South Wales of mining, petroleum production and extractive industries:
>
> (a) to provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State, and
>
> (b) to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources, and
>
> (b1) to promote the development of significant mineral resources, and
>
> (c) to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources, and
>
> (d) to establish a gateway assessment process for certain mining and petroleum (oil and gas) development:
>
> (i) to recognise the importance of agricultural resources, and
>
> (ii) to ensure protection of strategic agricultural land and water resources, and
>
> (iii) to ensure a balanced use of land by potentially competing industries, and
>
> (iv) to provide for the sustainable growth of mining, petroleum and agricultural industries.

For the reasons established in this chapter, the Hume Coal Project is consistent with these aims.

b. Permissibility

The project is permissible with development consent as discussed in Section 3.2.3.

c. Matters for consideration

Non-discretionary development standards

Clause 12AB of the Mining SEPP sets out a number of non-discretionary development standards under section 79C (2) and (3) of the EP&A Act for mining developments. These relate to cumulative noise levels, cumulative air quality levels, airblast overpressure, ground vibration and aquifer interference. These standards are addressed in Chapters 11, 12 and 7 respectively for noise and vibration, air quality and water resources.

Compatibility of the mine with other land uses

Clause 12 of the Mining SEPP requires a consent authority to consider the compatibility of the development with other land uses. It states:

> Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:
>
> (a) consider:
>
> (i) the existing uses and approved uses of land in the vicinity of the development, and
>
> (ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and
>
> (iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and
>
> (b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and
>
> (c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).

Land uses near the mine are described in Chapter 5, and include industrial, forestry, environmental management, agricultural, rural residential and residential developments. Potential impacts on these land uses have been assessed in this EIS, demonstrating that the project will not have a significant impact on existing and approved land uses around the project.

Consideration of voluntary land acquisition and mitigation policy

Clause 12A of the Mining SEPP requires the consent authority to consider any applicable provisions of the voluntary acquisition and mitigation policy, before determining SSD mining, petroleum production or extractive industry applications. The policy referred to in Clause 12A is the *Voluntary Acquisition and Mitigation Policy* (the policy), which was published by the Minster for Planning in the Government Gazette on 19 December 2014. This describes how the consent authority is to deal with predicted noise and dust impacts from State significant mining proposals when determining DAs.

The policy establishes a framework for ensuring that if noise and dust impacts from a proposal exceed the relevant assessment criteria, land owners are provided with:

- a negotiated agreement between the land owner and the proponent; or
- obligations on the proponent to offer mitigation measures or acquisition of the land, in accordance with conditions of a project approval.

The policy expresses a preference for negotiated agreements, but specifies some minimum requirements for those agreements. It also notes the kinds of mitigation commitments and the terms of land acquisition offers which would be required in any approval conditions imposed under the policy.

The provisions of the policy have been considered in the noise and air quality assessments, as discussed in Chapters 11 and 12 respectively.

Compatibility of the proposal with mining

Clause 13 of the Mining SEPP relates to matters a consent authority must take into consideration when determining applications for development that is:

- near an existing mine, petroleum production facility or extractive industry;
- identified on a map as being the location of State or regionally significant resources of minerals, petroleum or extractive materials; or
- identified by an environmental planning instrument as being the location of significant resources of minerals, petroleum or extractive materials.

Clause 13(2) states:

> Before determining an application to which this clause applies, the consent authority must:
>
> a) consider:
>
> i) the existing uses and approved uses of land in the vicinity of the development, and
>
> ii) whether or not the development is likely to have a significant impact on current or future extraction or recovery of minerals, petroleum or extractive materials (including by limiting access to, or impeding assessment of, those resources), and
>
> iii) any ways in which the development may be incompatible with any of those existing or approved uses or that current or future extraction or recovery, and
>
> b) evaluate and compare the respective public benefits of the development and the uses, extraction and recovery referred to in paragraph (a)(i) and (ii), and
>
> c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).

Therefore this clause, insofar as it is relevant, requires the consent authority to consider the project's potential impact on other mining, petroleum production and extractive industries in the local area.

The project area is in the Southern Coalfield, where there is a long history of mining and a number of mines currently operating, as shown in Figure 5.7 (refer to Chapter 5). The project area for the Hume Coal Project adjoins Berrima Colliery's mining lease (CCL 748). Berrima Colliery ceased operation in 2013 after almost one hundred years of operation and is currently being closed. A number of small mining leases, mining purposes leases and a mining lease application area are in the vicinity of the project area, as shown in Figure 5.7. The majority of these are held by Boral Limited (MPL 603, MPL 604, MPL 622, MPL 623, MPL 628, MPL 654, MPL 559, MPL 592) or Boral Cement Limited (ML 1723). One mining lease is held by The Austral Brick Co Pty Limited (ML 6143) for the extraction of kaolin clay to the west of the project area in the Belanglo State Forest, and a mining lease application (M(MO)LA 26), also for kaolin clay, to the east of New Berrima.

As is evident in Figure 5.7, the project area is approximately 30 km from the next nearest coal mining tenement, ML1565, which is held by Wongawilli Coal. ML1565 expired in October 2015 and a renewal is currently being sought. Due to the large distances between the project area and other mining tenements, the project will not directly or indirectly impact on any of the other mines in the southern coalfield. Boral's Marulan Limestone Mine is approximately 30 km to the south-west of the project, and will also not be impacted by the proposal. There are no petroleum production facilities in the region that will be impacted by the project.

Natural resource and environmental management

Clause 14 of the Mining SEPP requires the consent authority to consider natural resource management, and states:

4. Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:

a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or minimised to the greatest extent practicable,

b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,

c) that greenhouse gas emissions are minimised to the greatest extent practicable.

An assessment of greenhouse gas emissions, biodiversity, and water resources are addressed in Chapters 13, 10 and 7 respectively.

Resource recovery

Clause 15 of the Mining SEPP requires the consent authority to consider the efficiency of resource recovery.

The project has adopted a mine plan and mining method that optimises resource recovery without causing unacceptable environmental impacts. The project has been developed after several years of detailed geological, engineering, environmental, financial and other technical investigations; a process which included the investigation of several alternatives which are discussed in detail in Chapter 6. The project presented in this EIS is the most practical and appropriate method for recovering the resource.

Transport

Clause 16 of the Mining SEPP requires the consent authority to consider the implications of transport of materials on public roads.

The project will not involve the transport of coal by public roads. All product coal will be transported by rail, either to Port Kembla and/or domestic markets via the Berrima Branch Line. ROM coal will be delivered by conveyors from underground to the ROM coal stockpile, from where it will be reclaimed and transferred by conveyor for sizing and washing in the CPP.

Rehabilitation

Clause 17 of the Mining SEPP requires the consent authority to consider rehabilitation.

The underground mine plan means that surface disturbance will be limited. The project will rehabilitate all land that is disturbed by mining operations, as described in Chapter 17.

d. Mining on strategic agricultural land and site verification certificates

Part 4AA of the Mining SEPP applies to 'mining or petroleum development' on strategic agricultural land.

Clause 17A provides a definition of mining and petroleum development for the purposes of Part 4AA. It states:

> (1) In this Part, mining or petroleum development means:
>
> (a) development specified in clause 5 (Mining) of Schedule 1 to State Environmental Planning Policy (State and Regional Development) 2011, but only if:
>
> (i) a mining lease under the Mining Act 1992 is required to be issued to enable the development to be carried out because:
>
> (A) the development is proposed to be carried out outside the mining area of an existing mining lease, or
>
> (B) there is no current mining lease in relation to the proposed development, or

The project is development specified in Clause 5 (mining) of the SRD SEPP and a mining lease is required. Therefore, Part 4AA of the Mining SEPP applies to the project.

Division 3 of Part 4AA relates to site verification certificates. The note to this division states:

> Note. Clause 50A of the *Environmental Planning and Assessment Regulation 2000* requires that a development application for consent to mining or petroleum development on certain identified land (including land shown on the Strategic Agricultural Land Map) must be accompanied by:
>
> (a) a gateway certificate, or
>
> (b) a site verification certificate that certifies that the land on which the proposed development is to be carried out is not biophysical strategic agricultural land.

Clause 50A of the EP&A Regulation states:

> (1) This clause applies to a development application that relates to mining or petroleum development (within the meaning of Part 4AA of State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007) on the following land:
>
> (a) land shown on the Strategic Agricultural Land Map,
>
> (b) any other land that is the subject of a site verification certificate.

(2) A development application to which this clause applies must be accompanied by:

(a) in relation to proposed development on land shown on the Strategic Agricultural Land Map as critical industry cluster land—a current gateway certificate in respect of the proposed development, or

(b) in relation to proposed development on any other land:

(i) a current gateway certificate in respect of the proposed development, or

(ii) a site verification certificate that certifies that the land on which the proposed development is to be carried out is not biophysical strategic agricultural land.

Detailed soil and related land resource studies were completed for the project in accordance with the NSW Government (2013) *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land.* This confirmed that there is no biophysical strategic agricultural land (BSAL) on Hume Coal's proposed mining lease areas. A site verification certificate (SVC) was subsequently issued by the Secretary of DP&E on 22 April 2016, which is attached as Appenidx U. Further discussion on the SVC is provided in Section 3.6.3i.

ii State Environmental Planning Policy (State and Regional Development) 2011

The SRD SEPP, amongst other matters, defines whether or not a development is SSD. The applicability of the SEPP is discussed in Section 3.2.2.

iii State Environmental Planning Policy No 33 – Hazardous and Offensive Development

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) requires the consent authority to consider a project's potential to cause hazards or be offensive, including consideration of the location of the development and the way in which it is to be carried out. A screening test was undertaken to determine is project is potentially hazardous or offensive development and, therefore, if a preliminary hazard analysis (PHA) is required. This used DP&E's guideline *Applying SEPP 33* (DoP 2011a). As described in Chapter 18, the screening test concluded the project will not be a hazardous or offensive development.

iv State Environmental Planning Policy No 44 – Koala Habitat Protection

State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44) encourages the conservation and management of Koala (*Phascolarctos cinereus*) habitat, to ensure permanent free-living Koala populations are maintained over their present range. SEPP 44 requires a consent authority to consider if land covered by a development application is 'potential Koala habitat' or 'core Koala habitat'.

Koala habitat was assessed as part of the biodiversity study of the project. This found that the vast majority of the area was not Koala habitat, comprising cleared land and infrastructure corridors. However some native vegetation, restricted to the north-west and central northern parts of the project area, contains Koala habitat. This native vegetation is on the edge of a larger area of contiguous Koala habitat. The project will remove isolated Koala feed trees on the edge of this habitat area and there could be potential localised impacts on an area of Koala habitat from groundwater drawdown during prolonged drought. An assessment of significance was completed to assess potential impacts on the Koala as part of the biodiversity assessment. This assessment concluded that the project is unlikely to result in significant impacts on the Koala as:

- the surface infrastructure has been optimised to avoid direct impacts to critical Koala habitat;
- removal of some paddock trees is not expected to significantly impact the species;
- measures will be implemented to minimise bush fire risk to Koala habitat, and indirect impacts including light, noise and dust; and

- measures will be implemented to monitor Koala habitat along Belanglo Creek in the event of prolonged drought.

More detailed discussion on the project's potential impact on Koala habitat, including proposed mitigation measures, is provided in Chapter 10 and Appendix H.

v State Environmental Planning Policy No 55 – Remediation of Land

State Environmental Planning Policy No 55 – Remediation of Land (SEPP 55) provides a state-wide approach to the remediation of contaminated land for the purpose of minimising the risk to human health and the environment. SEPP 55 requires that a consent authority not consent to development unless it has considered any potential contamination issues.

The likelihood of contamination occurring on the site was assessed to determine whether the site is suitable for the uses proposed. The focus of the investigation was on the surface infrastructure area, particularly the land proposed for use as the construction accommodation village and the project's administration facilities, as documented in Chapter 18. The investigation concluded there is no material evidence of wide spread or significant contamination activities and/or contamination sources in the project area. Accordingly, it is considered that the site is likely to be uncontaminated and is suitable for the uses proposed.

vi State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (Drinking Water SEPP) provides that a consent authority must not grant consent to a proposed development in Sydney's drinking water catchments unless it is satisfied that it will have a neutral or beneficial effect on the catchment's water quality. An assessment of the project against the '*Neutral or Beneficial Effect on Water Quality Assessment Tool 2011'* (Sydney Catchment Authority 2011) is included in Chapter 7.

3.6.2 Wingecarribee Local Environmental Plan 2010

The proposed mining and infrastructure areas are variously on land zoned E3 Environmental Management, RU2 Rural Landscape, RU3 Forestry and SP2 Infrastructure pursuant to the Wingecarribee LEP. Under the Wingecarribee LEP, the proposed activities are prohibited in these zones. However, as described in Section 3.2.3, the project is permissible under the Mining SEPP, which prevails over any inconsistencies with a LEP.

3.6.3 Strategic policies

i Strategic Regional Land Use Policy

The NSW Government released the Strategic Regional Land Use Policy (SRLUP) in 2012 to "provide greater protection for valuable agricultural land and better balance competing land uses". This was by "identifying and protecting strategic agricultural land, protecting valuable water resources and providing greater certainty for companies wanting to invest in mining and coal seam gas projects in regional NSW". The SRLUP provides a strategic framework and a range of initiatives to balance agriculture and resource development.

The SRLUP applies to mining proposals that are SSD under the Mining SEPP and require a new or extended mining lease under the NSW Mining Act. In such cases, applicants are required to obtain a gateway certificate or an SVC before lodging a development application. The Hume Coal project is a State significant mining proposal which requires a new mining lease and so the SRLUP applies.

The type of certificate required depends on whether a proposed development is on strategic agricultural land as defined in the SRLUP. Strategic agricultural land falls into two categories; land with a rare combination of natural resources which make it very valuable for agriculture (known as BSAL), or land which is important to a highly significant and clustered industry such as wine making or horse breeding (known as critical industry clusters (CICs)).

Developments that are verified to be on strategic agricultural land are required to go through the gateway process and obtain a gateway certificate. Conversely, developments which are not on strategic agricultural land need to obtain an SVC, certifying that the land is not BSAL.

The NSW Government has mapped strategic agricultural land across NSW at a desktop level. The Strategic Agricultural Land Map shows that there is no strategic agricultural land in Hume Coal's proposed mining lease areas. Accordingly, Hume Coal applied for an SVC in accordance with the *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land* (Interim Protocol) (NSW Government 2013).

As discussed in Section 3.6.1d, the SVC was issued on 22 April 2016, confirming that land within Hume Coal's proposed mining lease areas is not strategic agricultural land.

Although the project is not located on mapped strategic agricultural land, under the *Strategic Regional Land Use Policy* all SSD and coal seam gas projects that may impact on agricultural resources, whether or not they are located on strategic agricultural land as mapped in a strategic regional land use plan, require an agricultural impact statement (AIS) to accompany a DA. An AIS for the project is provided in Appendix G and summarised in Chapter 9.

The SRLUP also references the NSW Aquifer Interference Policy (AIP) which is discussed in the following section.

ii Aquifer Interference Policy

The AIP was released by the NSW Office of Water in 2012. It defines the regime for protecting and managing the impacts of aquifer interference activities (such as underground mining) on water resources. The AIP seeks to strike a balance between the water needs of towns, farmers, industry and the environment.

The AIP clarifies water licensing and impact assessment requirements for aquifer interference activities under NSW legislation, principally the Water Act and WM Act. This includes defining criteria or 'minimal impact considerations' for water table, pressure and quality that are to be applied in assessing the potential impacts of aquifer interference activities on water resources. That is, to evaluate whether or not more than minimal impacts might occur to a water-dependent asset as defined in the AIP, for example a water supply work or high priority groundwater dependent ecosystem.

The AIP also sets out the information that must be provided by the applicant to enable appropriate assessment of the activity by the Minister for Lands and Water.

The project has been assessed in accordance with the AIP, as discussed in detail in Chapter 7.

iii Sydney – Canberra Corridor Regional Strategy 2006-2031

The Sydney-Canberra Corridor Regional Strategy 2006-2013 is a long-term strategic land use plan for the area extending between Sydney and Canberra, including the local government areas of Wingecarribee, Upper Lachlan, Goulburn Mulwaree, Yass Valley, Palerang and Queanbeyan. This region is predicted to experience significant growth given its strategic location between two capital cities. The strategy provides a framework to manage and direct growth in housing and employment while protecting the natural and built environment in the region. Specifically, the strategy establishes a number of actions for rural land and primary industry, economic development and employment growth, regional transport, housing and settlement, the natural environment, water and energy resources and cultural heritage in the region.

The project is in the Wingecarribee LGA and therefore the strategy applies to the development. The strategy recognises the importance of the Wingecarribee LGA for economic development and employment growth due to:

- the proximity of the area to major metropolitan markets for regionally based business;
- the improved accessibility of the area through infrastructure such as the M7 and M5 in the southern part of the Sydney metropolitan area;
- land affordability; and
- high rates of commuting out of the subregion.

The strategy's overarching objective is to create employment and reduce pressure on housing prices in the region, whilst protecting environmental assets, local character and natural resources. The project is aligned with this objective, creating 414 FTE positions during the construction period and up to 300 FTE positions during the 19 years of mine operation. Non-local workers will be housed in onsite accommodation during construction, ensuring that there is no additional pressure placed on housing availability and affordability during this time. As described in Section 3.2.4, the outcomes of the SIA suggest that during the operational phase of the project most relocating workers will move to the larger towns of Moss Vale and Mittagong, which will not result in a significant population increase or pressure on housing availability at any specific location.

iv NSW Government Strategic Business Plan and Statement on NSW Coal

The NSW Government, in its strategic business plan entitled *NSW 2021: A Plan to Make NSW Number One* (the plan), sets out five strategies and a number of goals and targets for delivery by government over a 10 year period. They relate to rebuilding the economy, providing quality services, renovating infrastructure, strengthening the local environment and communities and restoring government accountability.

The Hume Coal project generally accords with the strategies detailed in the plan, and a number of elements and outcomes are consistent with achieving the plan's targets. They include job creation and training, driving economic growth in regional NSW, improving performance of the NSW economy and Hume Coal's community investment programs, including funding and support for education and indigenous programs. As described in Chapter 6, the project follows several years of detailed technical investigations to identify and address environmental and other constraints, giving a well-considered, practical and economic project that will recover resources, while minimising adverse environmental and community impacts, and land use conflicts. It incorporates a suite of environmental protection measures and addresses all constraints while delivering socio-economic benefits. If approved, the large investment to construct and operate the mine will provide substantial stimulus and benefits to the Australian, NSW and local economies, including increased government revenue.

The project is consistent with the plan's targets to increase the value of 'mining production by 30% by 2020' and 'grow exports from NSW'. It is also relevant to consider the Strategic Statement on NSW Coal, which states, in relation to the target to increase mining production, 'the NSW Government will work towards this goal while managing potential land use conflicts between coal mining and urban growth, agriculture and our environment' (NSW Government 2014a).

The strategic statement emphasises the importance of coal mining to NSW. It comments on the long history of coal mining and confirms that it is a key contributor to the State's wealth, economic growth and high standard of living. It states that royalties from the coal industry 'provide a significant source of tax revenue to fund essential services like hospitals, schools and roads'. The document notes the most significant contribution to the economy comes from exports, valued at around $15 billion in 2012-13, which made it 'easily the State's biggest single export earner' (NSW Government 2014a).

The strategic statement indicates that 'development of our coal resources has the potential to deliver significant economic benefits to local communities and provides a low cost and reliable source of electricity. A stronger mining industry will create new jobs in regional NSW, drive investment in regional communities and increase export growth' (NSW Government 2014a).

3.7 Commonwealth legislation

3.7.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides the legal basis to protect and manage internationally and nationally important flora, fauna, ecological communities, heritage places and water resources which are deemed to be matters of national environmental significance (MNES). MNES, as defined under the EPBC Act, are:

- World Heritage properties;
- places listed on the National Heritage Register;
- wetlands of international significance listed under the Ramsar Convention;
- threatened flora and fauna species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- water resources, in relation to coal seam gas or large coal mining development.

Under the EPBC Act, actions that will, or are likely to, have a significant impact on a MNES are deemed to be controlled actions and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that may potentially affect a MNES has to be referred to the DoEE for determination as to whether or not it is a controlled action.

The Hume Coal project was referred to then DoE (now DoEE) in July 2015 for consideration as a controlled action, based on potential impacts to listed threatened species and communities, and water resources. The project was deemed a controlled action by DoEE on 1 December 2015 on the basis that it may impact the following MNES:

- listed threatened species and communities (sections 18 and 18A of the EPBC Act); and
- a water resource in relation to a large coal mining development (sections 24D and 24E of the EPBC Act).

The potential impacts on listed threatened species and communities, and on water resources, are discussed in detail in Chapter 10 (biodiversity) and Chapter 7 (water resources), respectively.

3.7.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* recognises and protects native title rights in Australia. It allows a native title determination application (native title claim) to be made for land or waters where native title has not been validly extinguished, for example, extinguished by the grant of freehold title to land.

Applications for compensation for extinguishment or impairment of native title rights can also be made. All native title claims are subjected to a registration test and will only be registered if claimants satisfy a number of conditions. A register of native title claims is maintained by the National Native Title Tribunal.

Proposed activities or development that may affect native title are called 'future acts'. Claimants whose native title claims have been registered have the right to negotiate about some future acts, including mining and granting of a mining lease over the land covered by their native title claim. Where a native title claim is not registered, a development can proceed through mediation and determination processes, though claimants will not be able to participate in future act negotiations.

There are currently no native title applications over the project area. Notwithstanding, Hume Coal will comply with any requirements under this act as part of its mining lease application process.

3.8 Summary of approval requirements

A summary of the licences, approvals and permits that are likely to be required for the project is provided in Table 3.2.

Table 3.2 Summary of required licences, approvals and permits

Legislation	Authorisation	Consent of approval authority
EP&A Act	Development consent	Minister for Planning or delegate
	Construction certificate required for construction of relevant structures in the surface infrastructure area	WSC or private certifier
	Occupation certificate required prior to use of certain buildings in the surface infrastructure area	WSC or private certifier
Mining Act	Mining lease	DRE
	MOP	DRE
POEO Act	EPL for mining and processing operations	EPA
Roads Act	Section 138 permit for road and intersection improvements including works on the off ramp of the Hume Highway to Mereworth Road	RMS
WM Act	Water access licences	DPI Water
Water Act	Licensing of monitoring bores	DPI Water
Forestry Act	Approval for the occupation of land within Belanglo State Forest	Forestry Corporation of NSW
Dams Safety Act	Listing of water storage dams	Dams Safety Committee
WHS Act	Licensing of dangerous goods (eg diesel and ANFO magazine storage)	NSW WorkCover Authority
Local Government Act	Approval for carrying out sewerage work	WSC
EPBC Act	Approval to undertake controlled action	DoEE

4 Consultation and issue identification

4.1 Introduction

This chapter documents the stakeholder engagement and consultation activities undertaken for the project. It describes the engagement program including its objectives, the processes and activities undertaken, the results, and how these have been incorporated into the project design and mitigation measures.

4.2 Overview

Hume Coal has been actively engaging with stakeholders since 2011 when its exploration program began. Hume's goals were to identify stakeholders and then build relationships with them, to inform stakeholders about the project and to obtain feedback. To achieve these goals, Hume Coal prepared a stakeholder engagement and consultation plan (the plan) for the project with the following objectives:

- to identify relevant stakeholders and provide them with clear and timely information about the project and its potential impacts;
- to seek feedback on the project and the proposed approaches to minimising impacts;
- to ensure stakeholders' views are understood, appropriately managed and considered in the project's planning, design and implementation, and in the EIS;
- to provide feedback on how matters raised have been considered and addressed; and
- to establish enduring relationships with key stakeholders, based on trust and mutual respect and which can be used for mutual benefit, for example by partnering in community enhancement projects.

The plan sets out who, how, why and when various stakeholders are to be engaged. Each of these aspects are described in the sub-sections below. The plan assisted Hume Coal in planning, implementing and reviewing stakeholder engagement actions throughout the project planning phase and preparation of this EIS, and will continue to do so during the response to submissions and implementation phases. Information gathered through the consultation process has been used to identify and assess potential issues, opportunities, risks and concerns, and to help develop a community profile. It has been instrumental in learning what is important to people in the local community and profiling their socio-economic conditions, aspirations, fears and perceptions about the project. This information has been used to inform the project's planning and assessment process, and to develop well targeted mitigation and management measures.

4.3 Consultation requirements

One objective of the EP&A Act is "to provide increased opportunity for public involvement and participation in environmental planning and assessment". Accordingly, stakeholder engagement and consultation has been an important part of the preparation of this EIS. The SEARs for the project state that consultation with stakeholders must be undertaken, specifically stating:

> During the preparation of the EIS, you must consult with relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. The EIS must describe the consultation that was carried out, identify the issues raised during this consultation, and explain how these issues have been addressed in the EIS.

Stakeholder engagement has been undertaken in accordance with the project's stakeholder engagement and consultation plan. The effectiveness of consultation activities in achieving their objectives and meeting Hume Coal's consultation requirements has been routinely monitored and evaluated, and the approach revised as required in response to changing circumstances. The plan has also been internally reviewed and updated quarterly, and externally peer reviewed on an annual basis. Hume Coal will continue to undertake consultation and engagement activities to inform the project's development, construction, operations and closure phases.

4.4 Stakeholder engagement process

4.4.1 Stakeholder identification

The objective of stakeholder identification was to identify all stakeholders who may be affected by or have an interest in the project, as well as those who can affect it.

The broad community groups that have been identified by Hume Coal as stakeholders were:

- Landholders – those located within A349 and adjacent to the project area;
- Community – local businesses and industry groups, special interest groups, cultural heritage groups, service providers, non-government and not-for-profit organisations and media outlets; and
- Government – WSC, State and Commonwealth agencies, local, State and Federal members and Ministers.

Once stakeholders were identified, they were categorised according to the extent to which they were likely to be affected by and/or have an interest in the project, and how much and in what way they might like to be involved. For each stakeholder, their areas of interest were also identified covering both potentially adverse and beneficial aspects. These stakeholders have been consulted both formally and informally, using the methods outlined below.

4.4.2 Stakeholder engagement tools

Following the stakeholder identification and categorisation process, Hume Coal developed tailored stakeholder engagement strategies, methods and schedules for each stakeholder or stakeholder group. Engagement techniques and the level of involvement ranged from information dissemination, to consultation, to involvement and collaboration on aspects such as community investment programs and development of mitigation measures.

A summary of the consultation tools used by Hume Coal is provided in Table 4.1, and how they were used for the broad stakeholder groups identified is summarised in Table 4.2. A range of formal and informal stakeholder engagement tools were used, including phone calls, meetings, community information sessions, and project fact sheets and bulletins. Hume Coal also has a dedicated project website which provides regular project updates including details of exploration activities, environmental monitoring, land access and Hume's community investment program. All media releases, newsletters, factsheets and bulletins are also published on the website.

Hume Coal established a community shop front where interested people have been able to speak directly with Hume Coal's community liaison team. This team comprises two full-time community liaison officers who are responsible for responding to all queries and meeting requests related to the project.

Table 4.1 Consultation tools

Item	Summary
Project website: www.humecoal.com.au	Hume Coal has a dedicated project website that provides up-to-date information about the project, environmental matters and local engagement initiatives. Project factsheets, copies of media releases, monthly community bulletins, newsletters, frequently asked questions and copies of key documents are available on the website, as well as links for people to provide feedback or supply further information. The objective of the website is to make information available 24/7 in a format that is easily accessible.
Community shopfronts: Argyle Street, Moss Vale Old Hume Highway, Berrima 02 4877 2481	Community members are able to speak directly with Hume Coal's community liaison team by phone or face-to-face at the shopfront office in Berrima, where an information display and factsheets are also available. The Berrima shopfront opened in July 2016. Prior to this, the community shopfront was in Moss Vale, which closed when the Berrima shop front opened.
Hume Coal head office Unit 7–8 Clarence House 9 Clarence Street Moss Vale 02 4869 8200	Community members are able to speak directly with Hume Coal's project team or technical staff by phone or face-to-face at the head office in Moss Vale.
Project email address	Hume Coal has three dedicated email addresses that provide contact points for stakeholders: general enquiries (info@humecoal.com.au), media enquiries (media@humecoal.com.au) and Hume Coal's charitable foundation (charitablefoundation@humecoal.com.au). As with verbal correspondence, all email consultation is documented in Hume Coal's stakeholder engagement record program.
Information sessions	Hume Coal has held community information sessions during the project planning phase to provide information about the project and its environmental studies to members of the community. They were held across the Wingecarribee LGA between 2012 and 2016.
Briefing and representation	Hume Coal has provided project briefings to interested stakeholder groups and individuals, including local businesses and industry groups. Hume is also a member of many of these groups (including the Southern Highlands Chamber of Commerce and Industries and the Moss Vale Chamber of Commerce) and has attended executive meetings as members. Hume Coal has also provided many briefings to individuals (at their request) who are both supporters and non -supporters of the project.
Communication materials	Hume Coal has issued formal letters to landholders and community members on a number of occasions. These letters generally provide project updates, and offers of individual briefings about the project. In July 2015, Hume distributed 145 letters to those landholders located within and adjacent to the project area. These letters were personally addressed to each landholder and included information on project plans, approvals timeline and an offer to meet with the Hume Coal team to discuss the project in detail. Hume Coal publishes a monthly community bulletin which is distributed to all interested stakeholders, including both the community and relevant government agencies. The bulletin is also published in the Southern Highlands newspaper and the Hume Coal website, and copies are made available at the head office and community shop front. The bulletin is also distributed to all mailing list recipients. The objective of the community bulletin is to ensure a constant flow of information to the community and provide contact details for feedback and enquiries. Hume Coal has distributed flyers to several villages of the Southern Highlands, in order to communicate factual information about the project. As part of this bulk mail out, flyers were distributed to more than 9,500 households across the suburbs of Bowral, Burradoo, Moss Vale and Mittagong.
Media communications	Project information has been communicated through media releases, local newspaper publications and radio segments. Hume Coal regularly briefs journalists before and/or during project milestones or when stories of interest arise.
Surveys and focus groups	Telephone surveys and facilitated focus groups have been used to gauge public opinion and understand peoples' views on the project.
Advisory groups	Hume Coal established two advisory groups, the SRG and WAG. These groups generally held quarterly meetings and included representatives from the local community.
Social Media	In early 2016, Hume Coal introduced three social media platforms – Facebook, Twitter, and LinkedIn. These platforms provide daily project updates, facts about the project, contact details for the project team, information about upcoming events and links to media releases on the project website. Hume Coal has posts scheduled in advance and aims to publish daily to ensure a constant flow of information.

Table 4.2 Stakeholders and engagement activities

Stakeholders	Engagement activities
Landholders and local residents	• Face-to-face meetings • Project factsheets and bulletins • Letter, email and phone correspondence • Neighbour notification letters • Community information sessions • Community advisory groups • Mailing list • Surveys and focus groups
Local businesses and industry groups	• Project factsheets and bulletins • Project briefings • Participation in local business groups and organisations, including being an active member of the Southern Highlands Chamber of Commerce and Industry • Community advisory groups • Community information sessions
Special interest groups	• Project briefings and presentations • Community information sessions • Project factsheets and bulletins • Phone correspondence
Cultural heritage groups	• Face-to-face meetings • Letter, email and phone correspondence • Briefing sessions • Community information sessions
Service providers (utilities, education, health, emergency services)	• Face-to-face meetings • Letter, email and phone correspondence • Community information sessions • Project factsheets and bulletins
Other non-government and not-for-profit organisations	• Face-to-face meetings • Email and phone correspondence • Project factsheets and bulletins
Media groups and outlets	• Media statements and releases • Radio and face-to-face interviews • Email and phone correspondence
Government agencies	• Project briefings • Face-to-face meetings • Letter, email and phone correspondence • Mailing list

Table 4.2 Stakeholders and engagement activities

Stakeholders	Engagement activities
State and Federal political members	• Face-to-face meetings • Community information sessions • Mailing list
Local government (including the mayor, councillors and council officers)	• Face-to-face meetings • Project briefings • Letter, email and phone correspondence • Community advisory groups

4.5 Stakeholders

4.5.1 Government

All levels of government were consulted and engaged during the preparation of this EIS to identify key issues for consideration and seek guidance on assessment approaches and government policies that apply to the project. Consultation has been primarily through face-to-face or telephone meetings and briefings.

Table 4.3 provides a summary of matters raised by government agencies and service providers.

Table 4.3 Matters raised by government, service providers and agencies

Stakeholder	Theme	Matters raised	EIS reference
Government			
Wingecarribee Shire Council	Community services and demographics	General discussions	Social impact assessment (Appendix R)
	Community consultation	Types of community consultation being undertaken	Chapter 4
		Hume Coal apprenticeship program	EIS Section 2.13.1
		Hume Coal charitable foundation	Section 3.2 of the SIA (Appendix R)
	Heritage	New heritage listings	Statement of Heritage Impact (Appendix T)
	Traffic and transport	Potential impacts and possible road upgrade requirements Berrima Road deviation	Traffic assessment (Appendix M)
	VPA	Discussion regarding the VPA	Chapter 3 (Legislation)
	Local tourism	Impacts on local tourism and the need for a construction accommodation village	SIA (Appendix R)

Table 4.3 Matters raised by government, service providers and agencies

Stakeholder	Theme	Matters raised	EIS reference
NSW Department of Industry (formerly Department of Trade and Investment, Regional Infrastructure and Services)	Community consultation	Local jobs expo	SIA (Appendix R)
		Berrima Community shop reception to date	
		Community information sessions	EIS Section 4.5.2i
		Hume Coal apprenticeship program	EIS Section 2.13.1
		Hume Coal charitable foundation	Section 3.2 of the SIA (Appendix R)
	Subsidence	Local government concerns	Chapter 14
	Significant local issues	Youth employment in the Southern Highlands region	SIA (Appendix R)
	Section 31 court case	Updates/results	Not applicable to EIS
	Land access	Land access issues such as arbitration	Not applicable to EIS
NSW Department of Trade and Investment	Mine Plan	Conceptual Project Development Plan	Project description (Chapter 2)
	Determination process update	SEARS	Each relevant chapter of the EIS, and Appendix B
		SVC and EPBC Act referral	Legislation (Chapter 3)
NSW Office of Water	Water	General discussions	EIS Chapter 7
	Determination process update	SEARS	Each relevant chapter of the EIS, and Appendix B
		SVC and EPBC Act referral	Legislation (Chapter 3)
NSW Environment Protection Authority	Determination process update	SEARS	Each relevant chapter of the EIS, and Appendix B
		SVC and EPBC Act referral	Legislation (Chapter 3)
	Air quality	Assessment methodology	Chapter 12
		Preliminary results and mitigations	Chapter 12
	Noise	Assessment methodology	Chapter 11
	Surface water	Assessment methodology, options for disposing of surplus water	Chapter 7

Table 4.3 Matters raised by government, service providers and agencies

Stakeholder	Theme	Matters raised	EIS reference
NSW Department of Planning and Environment	Project update	Mine plan	Chapter 2
		SVC application	Chapter 3
		Environmental considerations	Chapters 7-18
		Aboriginal Heritage Impact Permit	Chapter 21
		Meeting at the Mereworth property in July 2016	
	Determination timeframe	Adequacy review period	Chapter 3 (Legislation)
NSW Office of Environment and Heritage	Project update	Project progression	Chapter 2
		Preliminary ecology and heritage results	Chapter 10 and Chapters 21 and 22
Office of the Minister for Industry, Resources and Energy	Project update	Mine plan	Chapter 2
		Mining Lease Application details	Section 1.1
Office of the Hon. Anthony Roberts, Minister for Industry, Resources and Energy	Exploration	Drill holes	Section 2.2
		Groundwater monitoring	Chapter 5 (Figure 5.2) and Chapter 7
		Baseline environmental works being undertaken	Chapter 5 (Figures 5.1 and 5.2)
	Community	Demographics	SIA (Appendix R)
		Perception research	Section 4.5.3
		Community engagement	Chapter 4
	Land access	Types of properties	-
		Action group misinformation	-
		Ongoing delays	-
Office of Andrew Stoner, NSW Deputy Premier	Exploration	Section 252 of the *Mining Act 1992*.	-
		Drilling program	Section 2.2
		Land access	-
		Southern Highland Coal Action Group	-
Office of the Minister for Primary Industries	Water licensing	General discussions	Chapter 7
Office of Pru Goward, NSW Member for Goulburn	Water	Aquifer Interference Policy	Chapter 7
		Water Monitoring	Chapter 7 and Figure 5.2
		Location of bores in the area	Figure 5.2
	Mine design	Mining method	Chapter 2
		Subsidence	Chapter 14

Table 4.3 Matters raised by government, service providers and agencies

Stakeholder	Theme	Matters raised	EIS reference
Office of Angus Taylor, Federal Member for Hume	Project updates	Mine plan	Chapter 2
	Community perception	Community perception research results	Section 4.5.3
		Community response to mine plans	Chapter 4
	Transport	Covering coal wagons during transport	Chapter 12
	POSCO	Investments in Australia	Section 1.6
		Importance of the Hume Coal Project to POSCO's consideration for any further investment in the Australian market	Section 1.6
Office of Stephen Jones, Federal Member for Throsby	Local opposition	Anti-Asian/Korean sentiment as Xenophobic	-
	Transport	Transport of material by road, confirming transport of coal by rail	Chapter 2 (Project description) and Chapter 15 (Traffic)
	Water	Water systems, particularly groundwater in the Southern Highlands	Section 5.2.5
		Hume Coal Project Water Advisory Group	Section 4.5.2ii
Office of Jai Rowell, Member for Wollondilly	Employment	Number of future jobs	Section 2.13
		Employment catchment area	Section 2.13
	Community perception	Results of community perception research	Section 4.5.3
	Financial viability	Mining systems used by the project	Chapter 2
		Extraction rate	Chapter 2
	Water	Groundwater, confirmed mining method (ie no secondary extraction to take place)	Chapter 7 (Groundwater) and Chapter 2 (Project description)
	Agriculture	Current farming practices on the project site	AIS (Appendix G)
Office of Steve Whan, Shadow Minister for Primary Industries	Proposed mine design and best practice standard in environmental management	Coal seam gas misconceptions – Hume Coal provided gas testing results to confirm that there are no commercial quantities of CSG in the area.	-
Premier	Project update	Letter sent in October 2015 regarding: Anti-coal group, SHCAG & Battle for Berrima claims; POSCO; EIS timeline.	-
RMS (Southern Region)	Clarify agency requirements	Mining system used by the project	Chapter 2
		Subsidence assessment	Chapter 14
		Flood assessment	Chapter 7
Australian Rail Track Corporation	Project update	Four meetings held (April 2013, July/August 2014, May 2015 Access arrangement to ARTC owned track Scope/feasibility of engineering studies	Section 2.9, Appendix D (Berrima Rail Project EIS)
	Technical briefing	August 2014 Project timing Train size and numbers Maintenance, signalling and operational impacts Downstream impacts	Section 2.9, Appendix D (Berrima Rail Project EIS)

Table 4.3 Matters raised by government, service providers and agencies

Stakeholder	Theme	Matters raised	EIS reference
EPBC Advisor, Commonwealth Minister of Environment	Progress briefing	Mine plan and Commonwealth referral	Chapter 2 Chapter 3
Chair of Coalition Backbench Committee on Infrastructure, Energy and Resources	Progress briefing	Mine plan and Commonwealth referral	Chapter 2 Chapter 3
Federal Minister for Industry, Ian Macfarlane	Progress briefing	Mine plan and Commonwealth referral	Chapter 2 Chapter 3
Commonwealth Department of Environment and Energy	Progress briefing	Commonwealth referral and lodgement timing	Chapter 3

4.5.2 Community and special interest groups

i Community information sessions

Hume Coal conducted a number of community information sessions about the project covering topics like the project timeline, mine plans and results of environmental surveys. These sessions gave the community the opportunity to engage directly with Hume Coal representatives, to provide feedback on the project and raise any concerns or queries. The community information sessions were held in several towns within the local area, with two held in 2014:

- East Bowral (5 March 2014); and
- New Berrima (14 May 2014).

A series of information sessions were also held throughout August 2015, namely:

- New Berrima (6 August 2015);
- Moss Vale (11 August 2015);
- East Bowral (12 August 2015);
- Robertson (19 August 2015);
- Exeter (20 August 2015); and
- Moss Vale (relocated from Sutton Forest) (25 August 2015).

In addition to a presentation by Hume Coal representatives, 3D mine models were presented during the information sessions which showed the proposed surface infrastructure layout concept (as it was at the time) and the underground mine concept.

ii Advisory groups

Hume Coal established two advisory groups, the WAG and the SRG. The WAG was established in 2011 in recognition of the high level of interest in ground and surface water issues. The WAG generally met on a quarterly basis. In 2014, Hume Coal established a SRG with residents from across Sutton Forest, Berrima, Robertson and Bowral. The group met regularly to discuss social issues related to the project including employment, housing availability, recruitment of workers and opportunities for local business participation. Information obtained from the SRG has been used in project planning to both enhance social outcomes and mitigate potentially negative impacts, as discussed in the social impact assessment.

iii Summary of issues

Table 4.4 provides a summary of matters raised by community and specialist interest groups.

Table 4.4 Matters raised by community and special interest groups

Theme	Matters raised	EIS reference
Project	Is exploration of coal seam gas (CSG) part of the project?	Not applicable – no CSG exploration
	Fear of foreign ownership – % of money remaining locally versus % of money going abroad	Chapter 19 (Economics)
	Project timeline	Chapter 2 (Project description)
	Justification of the location of the surface infrastructure	Chapter 6 (Alternatives)
	What will the coal be used for?	Section 1.7
Mining system	Has the mining method been used elsewhere?	Chapter 24 (Justification)
	Why is only 35% of the coal being removed?	Chapter 24 (Justification)
	Is the mine system safe?	Section 2.5.2 and Pillar stability report (Appendix L)
	Dimensions of the panels	Chapter 2 (Project description)
	How will the voids be backfilled?	Chapter 2 (Project description)
Groundwater	Impacts on groundwater including drawdown depth and contamination	Chapter 7 (Water resources)
	Impacts on private bores	Chapter 7 (Water resources) and Section 4.5.4
	Groundwater recovery time	Chapter 7 (Water resources)
	How will the water be used?	Section 2.10
	Methods for removing water from the mine	Section 2.10
	Impacts of groundwater drawdown on agriculture	Chapter 9 (AIS)
	Groundwater monitoring and management	Chapter 7 (Water resources)
	Water for future generations	Chapter 7 (Water resources)
Surface water	Impacts on Medway Dam	Chapter 7 (Water resources)
	Surface water storage locations	Chapter 7 (Water resources)
	Will Wingecarribee Shire water supplies be used?	Section 2.10.1 (Water supply)
Ecology	Impact on koala habitat	Chapter 10
	Impacts on Paddy's River Box trees	Chapter 10
	Habitat disturbance	Chapter 10
	Impacts on bats and bat habitat	Chapter 10
Agriculture	Loss of productive agricultural land	Chapter 9 (AIS)
	Is the land BSAL?	Section 8.2.5 (Existing environment – Soils)
	Location of soil sampling points	Chapter 8
Air quality	Dust impacts on surrounding land uses	Chapter 12
	Dust mitigation and management measures	Chapter 12
	Assessment of $PM_{2.5}$ including health impacts	Chapter 12
	Location of weather monitoring station and tapered element oscilating microbalance (TEOMs)	Chapter 5 (Figure 5.2)
	Height and location of stockpiles	Chapter 2

Table 4.4 Matters raised by community and special interest groups

Theme	Matters raised	EIS reference
Noise	Noise attenuation measures including noise walls	Chapter 11
	Noise impacts on health	Chapter 11 and Appendix I
	Are the impacts of explosives included in the noise modelling?	Chapter 11 and Appendix I
	Impacts of noise on Berrima	Chapter 11
	Noise generation from the conveyor belt	Chapter 11 and Appendix I
Visual	Impacts on visual amenity	Chapter 16
Subsidence	Impacts on houses	Chapter 14 (negligible subsidence predicted)
	Impacts of a panel failure	Chapter 14 (negligible subsidence predicted)
	Impacts on water supplies	Chapter 14 (negligible subsidence predicted)
Transport	Vehicle access to the mine	Chapter 15
	Potential congestion on local road network	Chapter 15
Social	Impacts on community life and sense of place	Chapter 20
	Opportunities for apprenticeships	Chapter 20
	Benefits to landholders in the project area	Chapter 19
	Source of workers	Chapter 20
	Residential location of workers	Chapter 20
	Sponsorship of community events and activities	Chapter 20
Economy	Opportunities for local businesses and suppliers	Chapter 20
	Impacts on tourism industry	Chapter 19 and 9 (AIS)
	Impacts on local land and property prices	Chapter 19
	Economic feasibility of project	Chapter 19
Aboriginal heritage	Management of Aboriginal heritage sites	Chapter 21
	Impacts on Aboriginal artefacts	Chapter 21

As described above, Hume coal has undertaken extensive consultation with stakeholders since 2011. Since this time, the type of issues raised by stakeholders has evolved. A summary of the main stakeholder issues raised during consultation activities between 23 September 2015 and 22 September 2016 is provided in Figure 4.1. The percentage of enquiries related to employment issues has experienced a significant increase since consultation began in 2011 and now accounts for close to 20% of all issues raised during consultation. In addition to the issues summarised in Figure 4.1, other issues raised during this period of consultation included:

- project support and opposition;
- social impacts;
- land access agreements; and
- the Hume Coal Charitable Foundation.

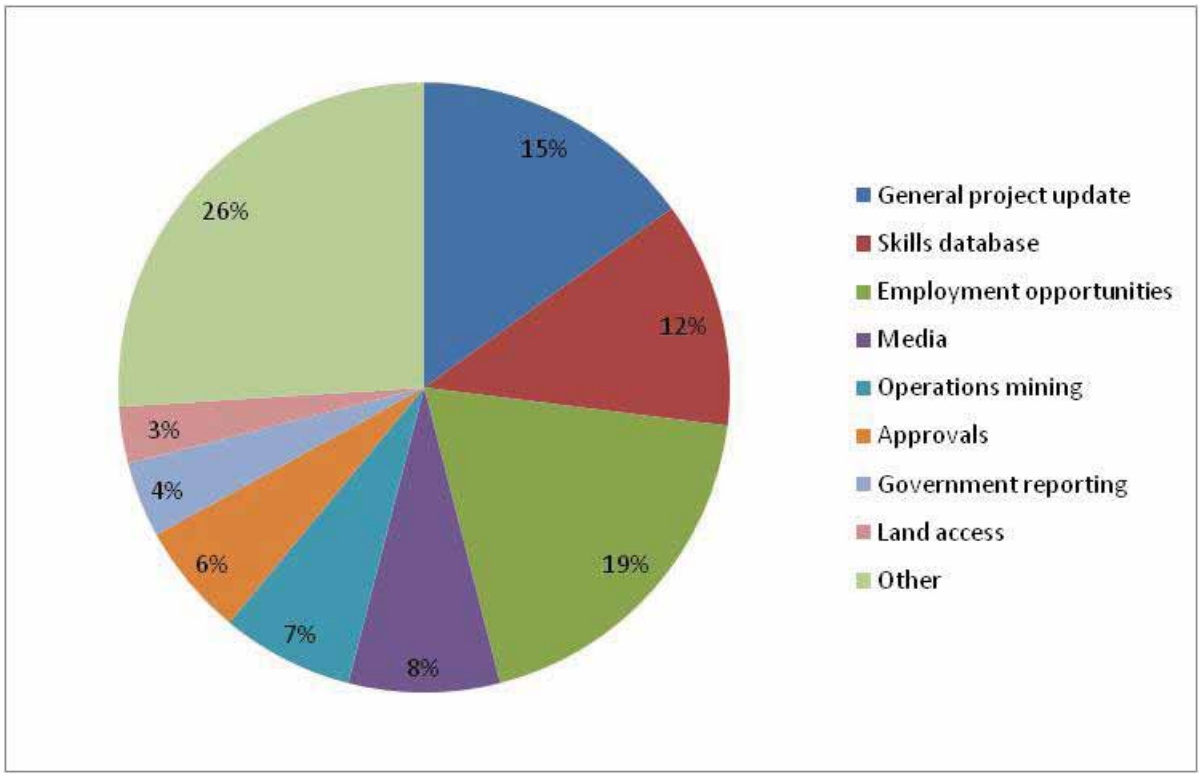


Figure 4.1 Issues raised during consultation between September 2015 and September 2016

4.5.3 Stakeholder surveys

An independent research consultant, on behalf of Hume Coal, researched community perceptions using quantitative surveys and qualitative focus groups in November and December 2013, October and November 2014, and June and September 2015.

The quantitative surveys each had a sample size of at least 400 people drawn from across the Wingecarribee LGA. In each case a random stratified sample was used to obtain representative samples of the population. Interviews were structured and all stakeholders were asked pre-determined questions so that consistent data were collected.

The focus groups were generally held in the evening and lasted for two hours. Participants were recruited to obtain a representative sample of the population.

The concerns identified by the focus groups are shown in Figure 4.2. It can be seen that a range of issues were identified, but one clearly dominated being the effects on local aquifers and/or water supplies. Further discussion on consultation with relevant landholders relating to potential effects on groundwater bores is provided in Section 4.5.4.

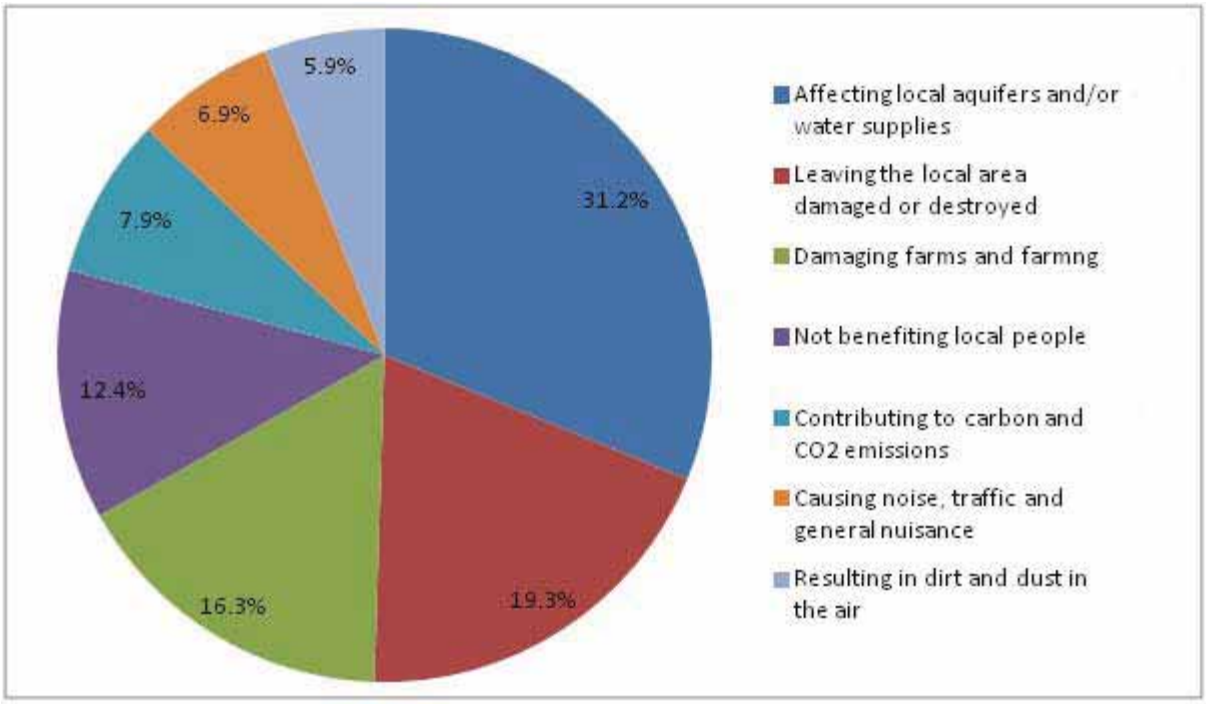


Figure 4.2 Issues of concern raised during stakeholder surveys, by focus

4.5.4 Private landholders and registered bores

Landholder groundwater use is common in the project area and surrounds, and therefore users of these bores were identified as relevant stakeholders as part of the stakeholder engagement and consultation plan. A search of DPI Water's groundwater bore database (December 2015) identified less than 400 registered landholder bores and three DPI Water monitoring sites within a 9 km radius from the middle of the project area.

A regional numerical groundwater flow model was developed for the project as part of the water assessment (refer to Chapter 7 and Appendix E). This model identified and quantified the potential impacts of the project on groundwater resources, and on groundwater users including environmental and landholder users. Drawdown, collectively referring to the lowering of the water table or pressure head reductions in the piezometric surface, was predicted at the landholder bores using the numerical model simulations under mining conditions. The groundwater model predicts that the minimal impact criteria specified in the AIP (NSW Office of Water 2012b), which governs the assessment of groundwater drawdown and associated impacts to groundwater users, will be exceeded in 93 of the landholder bores.

Where predicted impacts are greater than the minimal impact criteria and the long-term viability of the water-dependent asset is compromised, then the impact is subject to make good provisions. The process for identifying the bores entitled to make good provisions and for consulting and negotiating with landholders has commenced, and is illustrated in Figure 4.3. Further details of the make good provisions proposed to compensate the identified landholder bores predicted to be impacted by the project are provided in Appendix O of the water assessment report (refer to Appendix E).

4.5.5 Aboriginal community consultation

Consultation with Aboriginal stakeholders began in 2012 as part of the project's Aboriginal cultural heritage assessment. All Aboriginal stakeholder consultation has been undertaken in accordance with the Department of Environment, Climate Change and Water (DECCW – now OEH) (2010) *Aboriginal Cultural Heritage Consultation Requirements for Proponents*.

The outcomes of Aboriginal stakeholder consultation are documented in Chapter 21 and Appendix S, including the main issues raised and mitigation measures proposed to address the issues.

4.5.6 Ongoing stakeholder consultation

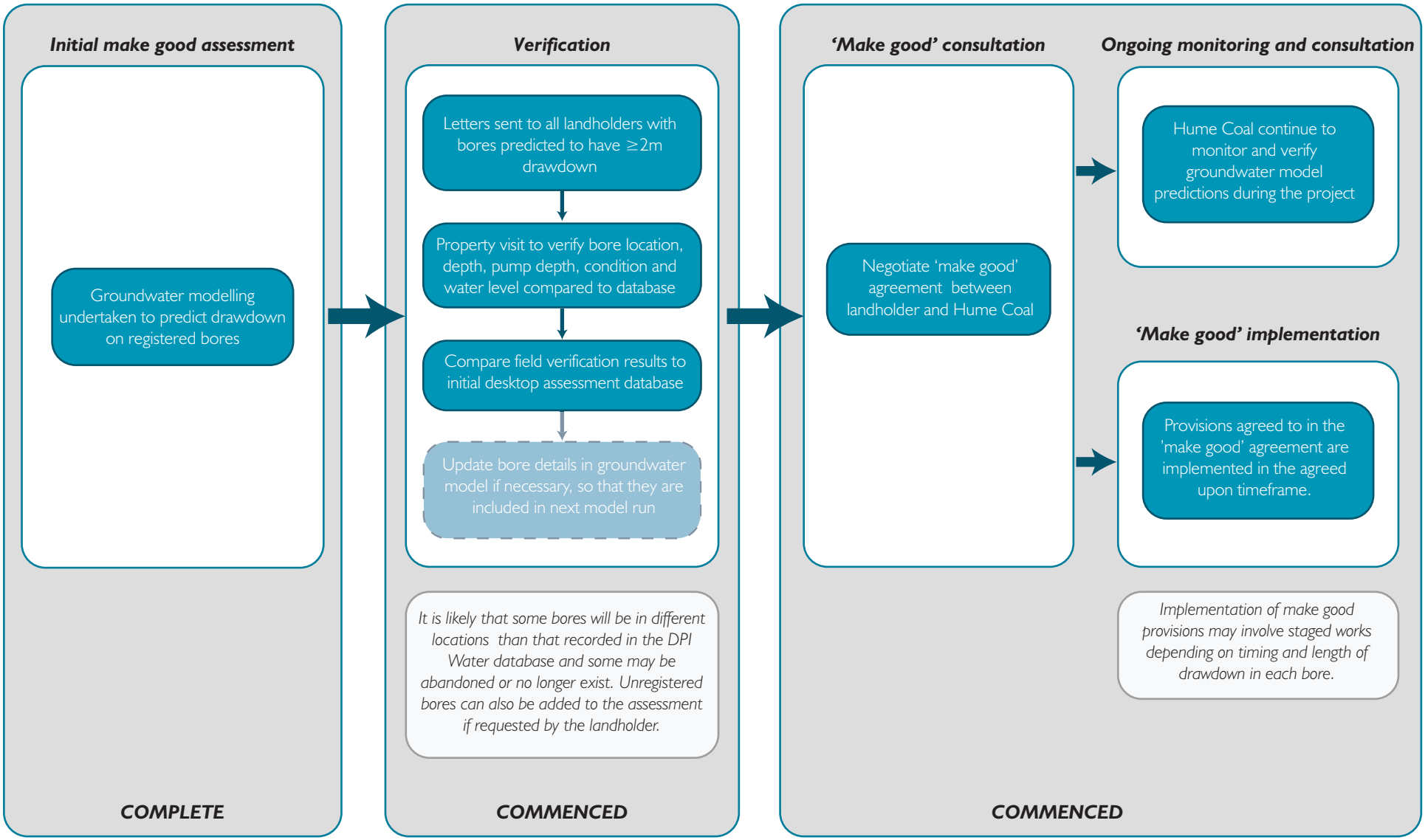
Hume Coal has undertaken a comprehensive program of stakeholder engagement to ensure community issues and perceived impacts of the project are well understood. Hume will continue to work closely with relevant stakeholders including directly and indirectly affected landholders, local businesses, the local community and all levels of government to continue to inform the project's final design and management. This consultation will continue to be undertaken in accordance with Hume's stakeholder engagement and consultation plan which will be regularly reviewed and updated to reflect the project's status and consultation outcomes.

4.6 Preliminary risk assessment

4.6.1 Method

In addition to stakeholder engagement and consultation, a qualitative preliminary risk assessment of environmental, social and economic characteristics of the project was undertaken during the project planning phase. This was undertaken to identify and prioritise matters to be considered in the planning phase and to inform an appropriately focussed EIS. The risk assessment was based on knowledge of the existing environment from baseline monitoring, previous environmental studies and preliminary environmental assessments, and consideration of the project's proposed footprint and activities.

The risk assessment identified potential impacts for each characteristic and ranked them as low, medium or high priority for assessment, according to their likelihood of occurrence and the potential consequences of the impact to people, property, environment and/or community if they occurred. The assessment did not include any environmental safeguards and measures to address potential impacts and therefore, it was for a hypothetical, unmitigated scenario.



EMM HUMECOAL PROJECT

Groundwater bore 'make good' consultation and negotiation process with landholders

Hume Coal Project

Environmental Impact Statement

Figure 4.3

4.6.2 Issue prioritisation

Each of the characteristics considered in the risk assessment was assigned a qualitative risk level of 1, 2 or 3, based on the likelihood and consequence of potential impacts due to the project, with 1 being the highest, as follows:

- 1 – groundwater and surface water;
- 2 – flora and fauna, noise and vibration, traffic and transport, Aboriginal heritage, historic heritage, visual, socio-economic, hazards, geochemistry; and
- 3 – air quality, energy use and greenhouse gases, soil and land resources, subsidence, bushfire and waste.

Assessments for each of these characteristics have been undertaken as part of this EIS. The risk assessment process only considered potentially adverse impacts and, as the project will have a number of significant benefits, both positive and negative impacts will have to be considered in making conclusions about the project's overall merits. Positive impacts are not assessed here but are considered in the respective chapters.

Since the preliminary risk assessment was undertaken, Hume Coal has completed detailed studies, subsequently refining and optimising the final project design, as presented in Chapter 2. Technical studies have been undertaken based on this final design. In addition, the risk assessment did not consider the application of mitigation measures. Therefore, based on the results of the risk assessment, mitigation measures, if required, were devised, tested and, if appropriate, adopted, and the technical assessments were finalised based on the application of these measures. Accordingly, all of the technical studies included in this EIS consider and assess any residual impacts following the application of mitigation measures.

The findings of the technical studies have therefore superseded the outcomes of the preliminary risk assessment and provide a more accurate and realistic understanding of the environment and how the project will interact with it than originally understood during preparation of the risk assessment. For this reason, the risk register has not been included as it does not accurately reflect the current detailed and accurate understanding of the risks associated with the project, as documented in this EIS.

4.7 Conclusion

Identification and ranking of potential environmental, social and economic impacts, together with extensive consultation with government agencies and other stakeholders, has enabled the project's characteristics requiring assessment to be prioritised. Groundwater and surface water were identified as the highest priority areas for assessment; however an assessment of each characteristic has been undertaken as part of this EIS to a level of detail commensurate with the scale of the proposal, the existing features of the project area and surrounds, and the legislative framework under which the project is to be assessed and determined. Hume Coal has already made substantial modifications to the project to avoid and minimise environmental impacts, as described in Chapter 6 (project evolution and alternatives), and has committed to a range of leading practice environmental management measures, as detailed in Part D of this EIS.

Part C

Existing environment and project evolution

Chapter 5: Site and surrounds
Chapter 6: Project evolution and alternatives

5 Site and surrounds

5.1 Project location and character

The project area is approximately 100 km south-west of Sydney and 4.5 km west of Moss Vale town centre in the Wingecarribee LGA (refer to Figure 1.1 and Figure 1.2). The nearest area of surface disturbance will be associated with the surface infrastructure area, which will be 7.2 km north-west of Moss Vale town centre. It is in the Southern Highlands region of NSW and the Sydney Basin Biogeographic Region.

A variety of land uses exist in and surrounding the project area. Land uses within the project area include grazing properties, small-scale farm businesses, natural areas, forestry (in the Belanglo State Forest), scattered rural residences, and major transport infrastructure comprising the Hume Highway. A number of industrial operations exist to the east of the project area, including the Berrima Cement Works (which is evident in the background in Photograph 5.1 below), Berrima Feed Mill, and Omya's Moss Vale plant.

Photographs 5.1 to 5.4 illustrate the character of the project area and its surrounds.

Photograph 5.1 **The project area in the foreground - looking east from the Mereworth property towards the Hume Highway**

Photograph 5.2 The project area from the edge of Mereworth garden - looking north-east towards the proposed train load-out area

Photograph 5.3 The project area looking south from Medway Road

Photograph 5.4 **The project area, looking south towards the product stockpile area from south of Oldbury Creek on 'Mereworth'**

5.2 Biophysical factors

5.2.1 Baseline monitoring overview

To gain an understanding of the biophysical properties of the project area and surrounds, Hume Coal began to establish an extensive network of baseline monitoring in 2011. The network includes groundwater and surface water monitoring, meteorological monitoring, air quality and background noise monitoring. Baseline meteorological, air, and noise monitoring locations are illustrated in Figure 5.1. Water monitoring locations are illustrated in Figure 5.2.

Analysis of the results from the water, noise and air baseline monitoring networks is discussed in detail in chapters 7, 11 and 12, respectively.

5.2.2 Climate

The project area is characterised by a cool temperate climate, with warm summers and cool winters. A number of long-term automatic weather stations operate in the area from which data was collated for use in the EIS; and particularly the air quality, noise and water assessments, as follows:

- Bureau of Meteorology (BoM) automatic weather station at Moss Vale (station number 068239), approximately 11.5 km east-south-east of the surface infrastructure area;
- BoM long-term climate station at Moss Vale (Hoskins Street, station number 068045), approximately 8.3 km south-east of the surface infrastructure area; and
- Boral-owned meteorological station at the Berrima Cement Works, approximately 4.5 km east-south east of the surface infrastructure area.

Hume Coal also operates two weather stations, which were installed within the project area to capture site specific climatic data. Both stations are sited in accordance with Australian Standards, taking into consideration surface terrain and vegetation. The first station (Hume No. 1) was installed in March 2012 and is approximately 8.1 km south of the surface infrastructure area.

In order to demonstrate the representativeness of data recorded by the Hume No. 1 station to the surface infrastructure area, a second weather station was commissioned by Hume Coal and installed in the vicinity of the proposed product coal stockpiling area in October 2015 (Hume No. 2) (refer to Figure 5.1).

Average climatic data recorded at the BoM station 068045 in Moss Vale is summarised in Table 5.1.

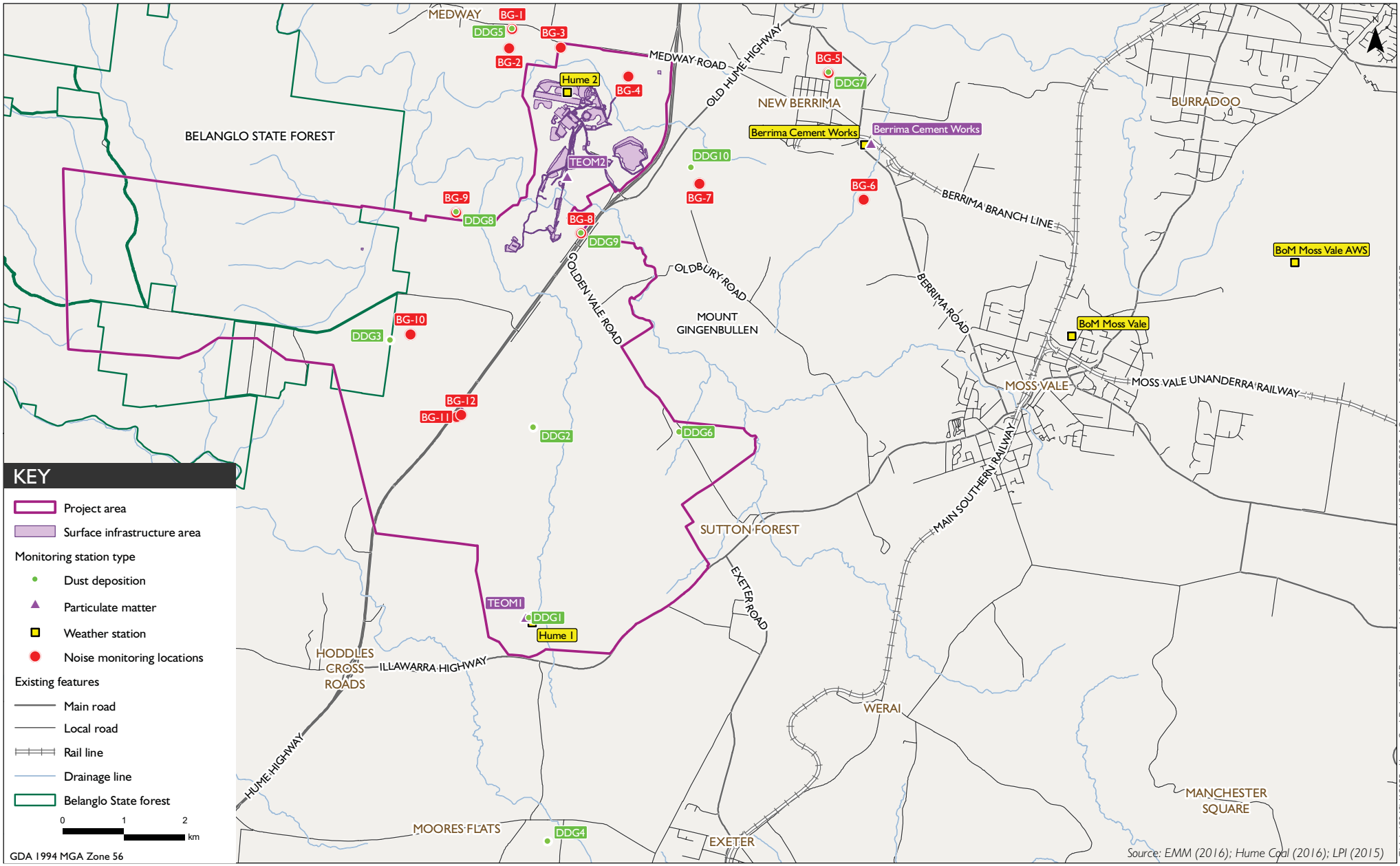
Table 5.1 Summary of climate data recorded at Moss Vale BoM station 068045

Parameter		Measurement	Month
Temperature			
Mean maximum	Annual	19.2°C	-
	Highest monthly	25.8°C	January
	Lowest monthly	11.8°C	July
Mean minimum	Annual	7°C	-
	Highest monthly	12.6°C	February
	Lowest monthly	1.3°C	July
Mean rainfall			
Annual		966.7 mm	-
Highest monthly		100.5 mm	June
Lowest monthly		59.7 mm	September
Mean 9am wind speed			
Annual		11.5 km/hour	-
Highest monthly		13.5 km/hour	September
Lowest monthly		9.3 km/hour	February

The data shows that temperatures range throughout the year from an average maximum of 25.8°C in January to an average minimum of 1.3°C in July. The area experiences moderate to high rainfall, with an average annual rainfall of approximately 967 millimetres (mm). Rainfall is generally evenly distributed throughout the year, with the highest mean rainfall in winter and the lowest in spring. According to long-term BoM records, an average of 120 rain days occur per year in Moss Vale.

The dominant wind direction in the area is westerly. Within the project area, winds are predominately westerly between autumn and spring while north-easterly winds are predominant during summer. Wind speeds are greatest during winter and spring and are notably higher during daylight hours compared with night time hours. The highest wind speeds at the site occur from the west.

Further discussion on climate data relevant to the project area, and its use in the air quality and noise assessments, is provided in Chapters 11 and 12 respectively.

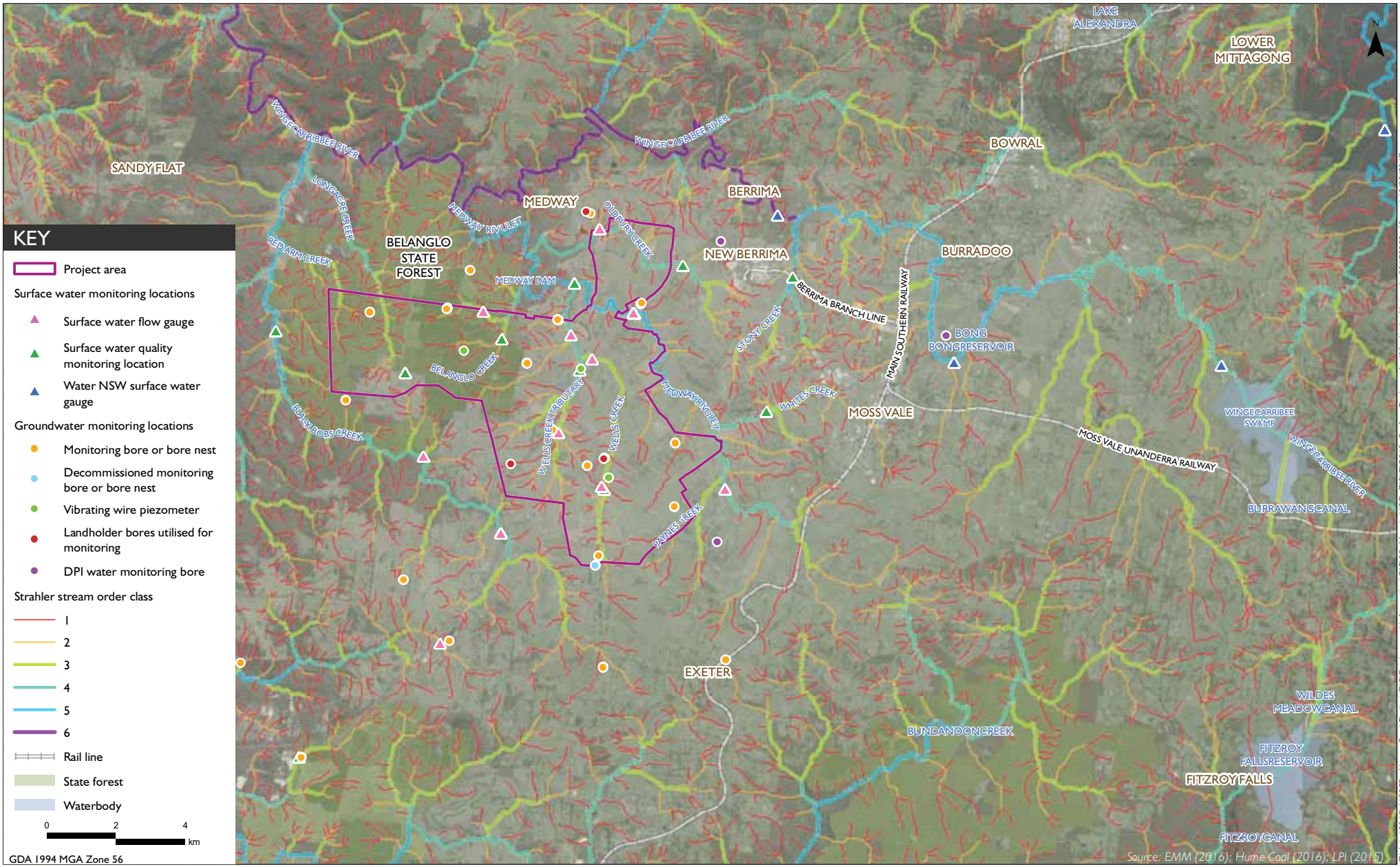


Baseline monitoring network - meteorology, air quality and noise

Hume Coal Project

Environmental Impact Statement

Figure 5.1



Baseline monitoring network - surface water and groundwater

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Figure 5.2

5.2.3 Topography

The project area is situated on the elevated, relatively flat Woronora-Nattai Plateau, within the Great Dividing Range. The topography of the area typically comprises long rolling hills, with elevations ranging from approximately 550 m to 735 m Australian Height Datum (AHD). Most of the central and eastern parts of the project area consist of very low rolling hills with occasional elevated ridge lines. However, there are steeper slopes and deep gorges in the west of the project area in the Belanglo State Forest. The majority of the project area, with the exception of these steeper slopes in the west, has slopes of less than 10%.

The region has some peaks of igneous origin. These include Mount Gingenbullen in the north-east of A349 (refer to Figure 1.2), which has a maximum elevation of approximately 800 m AHD, and Mount Gibraltar near Bowral, which has an elevation of approximately 860 m AHD. These peaks comprise erosion resistant igneous rocks. Both are outside the project area.

The topography of the project area and surrounds is illustrated in Figure 5.3.

5.2.4 Geology

i Regional geology

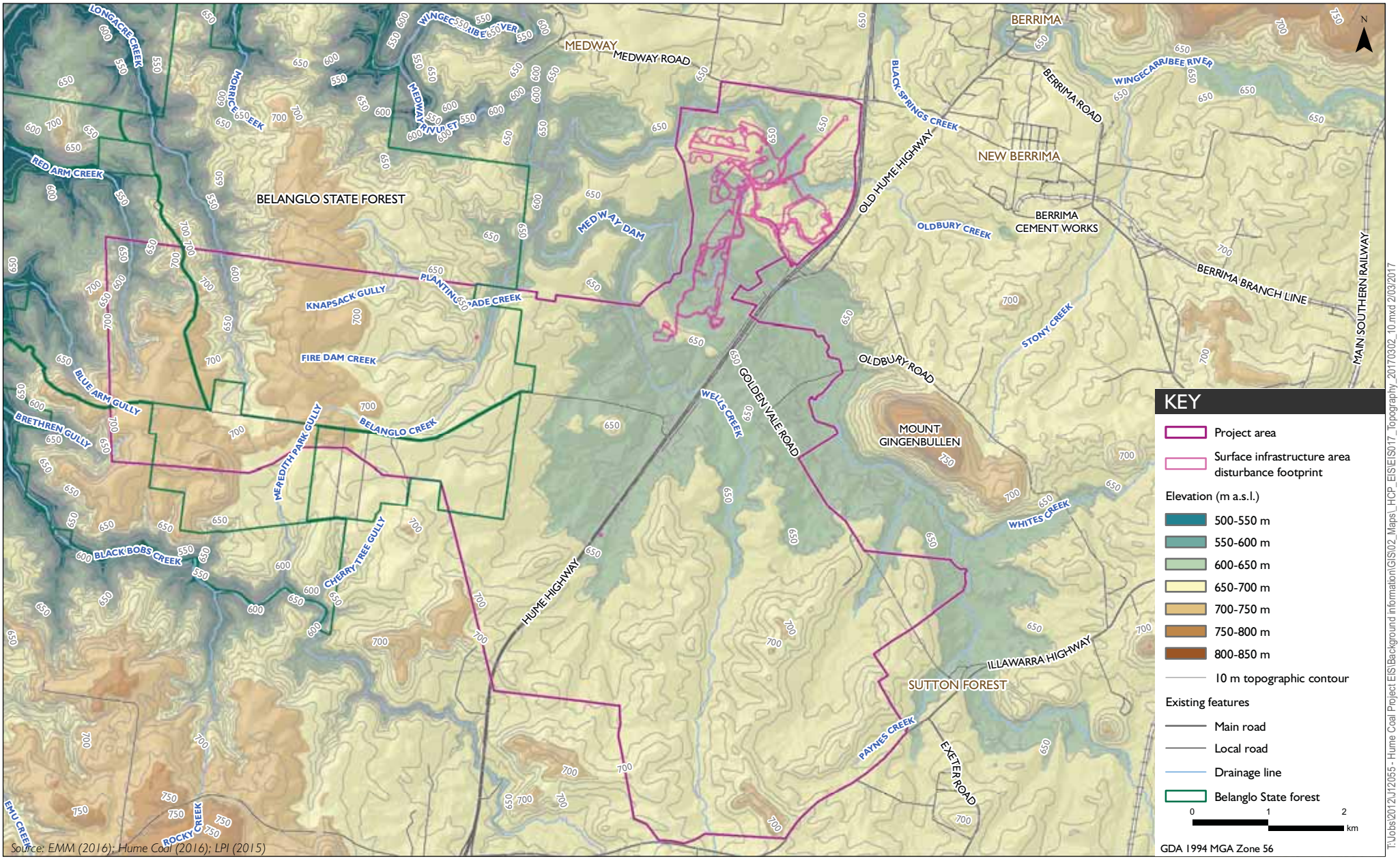
The project area is in the Southern Coalfield, on the south-western edge of the Permo-Triassic Sydney Basin. The Southern Coalfield is one of the Sydney-Gunnedah Basin's five major coalfields and the only coalfield in NSW which is currently a source of hard metallurgical coal for steel production (Department of Planning, 2008). The Sydney Basin is the southern-most portion of a longer trough that extends along the eastern flank of modern day Australia, which includes Sydney, Gunnedah, and Bowen Basins. Organic material that turned into coal was deposited throughout this major trough system throughout the Permian period.

The Sydney Basin primarily consists of sediments deposited in a 'basin' environment, which were deposited between two major 'fold belts'; the Lachlan Fold Belt to the north-east and the New England Fold Belt to the west, both of which constrain this central depositional trough. Initially, sediments were deposited into the basin from the north and interspersed with several sequences of coal seams. The Illawarra Coal Measures contains some 10 recognised coal seams, some of which are of economic importance, in particular the Bulli and Wongawilli Seams. The Hume Coal Project proposes to mine the Wongawilli Seam.

The Illawarra Coal Measures are at least 50 m thick across the Southern Highlands area, and increase to more than 250 m thickness to the east near Wollongong. Across the Southern Coalfield, the Wongawilli Seam is typically 10 m thick, with the lower 3 m generally making up the working section. In the project area the seam has been eroded and ranges in thickness from being completely missing to 8.5 m thick.

The basal sedimentary units of the Permian are contained in the Talaterang Group which also includes the Clyde Coal Measures. This in turn is overlain by the marine sedimentary rocks of the Shoalhaven Group, which form the immediate base of the Illawarra Coal Measures, which is, in turn overlain by the Triassic aged Narrabeen Group, the Hawkesbury Sandstone and the Wianamatta Group, the latter being the uppermost unit in this regional context. Hawkesbury Sandstone dominates the natural topography of the Sydney region and is typically composed of medium to coarse grained quartzose sandstone with a clay matrix. The Hawkesbury Sandstone is up to 200 m thick in certain areas of the Sydney Basin.

There are numerous igneous intrusive and extrusive rocks in the regional area including Jurassic aged micro-synenite at Mount Gibraltar and silling at Mount Gingenbullen as well as Tertiary aged basalts at Robertson and within A349.



Source: EMM (2016); Hume Coal (2016); LPI (2015)

Topography of the project area and surrounds

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Environmental Impact Statement

Figure 5.3

ii Geology of the project area

A typical stratigraphical profile of the project area is illustrated in Figure 5.4, and a conceptual hydrogeological cross section (north to south) is provided in Figure 5.5. Commensurate with the geology of the broader Sydney Basin, the geology of the project area is as follows:

- The overlying Triassic sequence, comprising:
    - the overlying Wianamatta Group, which is a sequence of shales with minor interbedded sandstones, reaches a maximum thickness of about 100 m in this area. It forms the undulating grazing hills of the landscape in the eastern portion of the project area; and
    - the Hawkesbury Sandstone, which is the main landform influence in the west and generally comprises flat lying massive quartzose sandstone. It is the main cliff forming sequence where gorges are present and varies in thickness from approximately 60 to 100 m in the project area.
- The lower Permian sequences, comprising:
    - the Illawarra Coal Measures, deposited in an onshore environment and approximately 50 m thick, composed of conglomerates, quartz, quartz-lithic sandstone, grey shales, carbonaceous shales and coals, including the Wongawilli Seam; and
    - the underlying basal Shoalhaven Group, which are sandstones of marine origin interbedded with remnant igneous extrusions (latites).

During the late Triassic to early Jurassic period, the region experienced episodes of volcanic activity. Accordingly, there are also igneous necks, sills, basalt flows, diatremes, dykes and faults in the project area.

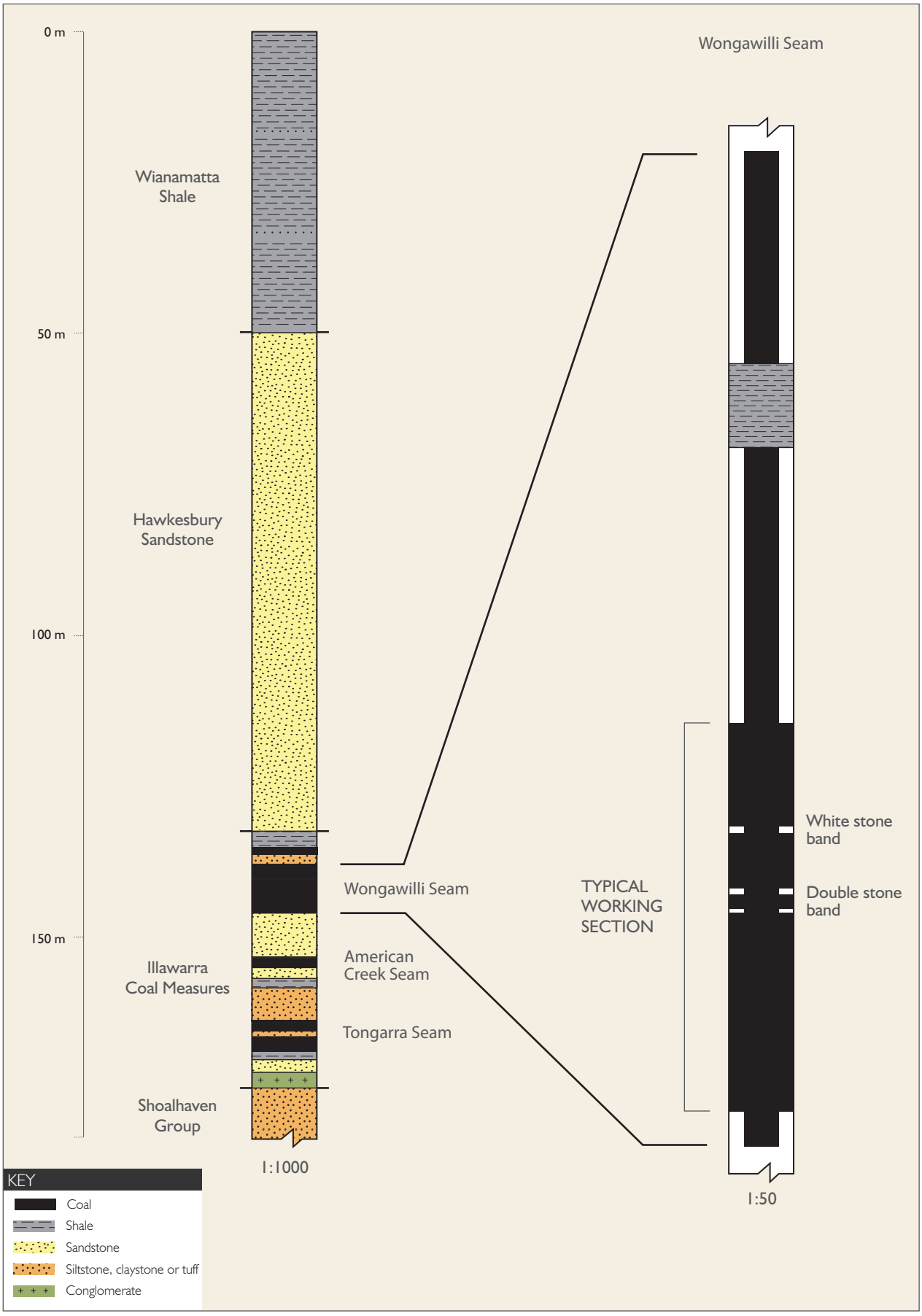
Within A349 the thickness of the Illawarra Coal Measures has been significantly reduced to approximately 50m, initially by slow development of sedimentation due to the proximity to the edge of the basin and then by significant erosion. The lowest seam present in the project area appears to be the Tongarra Coal, which suggests that at this location towards the edge of the basin the lower coal seams were not developed. The major coal seam of economic significance within A349 is the Wongawilli Coal.

In the Wollongong to Appin area the rocks immediately overlying the Illawarra Coal Measures comprise the Triassic Narrabeen Group. However, in the Southern Highlands within the area of A349, the Narrabeen Group have been totally eroded out of the sequence. In addition much of the upper portion of the Illawarra Coal Measures have also been eroded out of the sequence, causing the Triassic Formation of the Hawkesbury Sandstone to directly overly the Wongawilli Coal. The Hawkesbury Sandstone is a clean quartzose, generally coarse grained and conglomeratic cross bedded sandstone, that was deposited in a fluviatile environment with sediments derived from the south (Snowy Mountains). Overlying the Hawkesbury Sandstone Formation is the Wianamatta Group. This Group consists of a sequence of fine gained shales interspersed with sandstones.

Hawkesbury Sandstone is the dominant surface geology across the western side of the project area. The majority of the central and eastern parts are covered by unconsolidated clayey sands and weakly consolidated sandy clays interspersed with Bringelly Shale, quaternary alluvial sand and silt, Ashfield Shale, alkaline olivine basalt and conglomerate.

iii Coal resource

Extensive exploration has taken place within A349, dating back to the 1950s by a range of different organisations. Hume Coal conducted extensive exploration between 2011 and 2015 to further define the economic resource and locations of geological structures such as dykes and faults in the project area.



Example stratigraphic profile in the eastern project area

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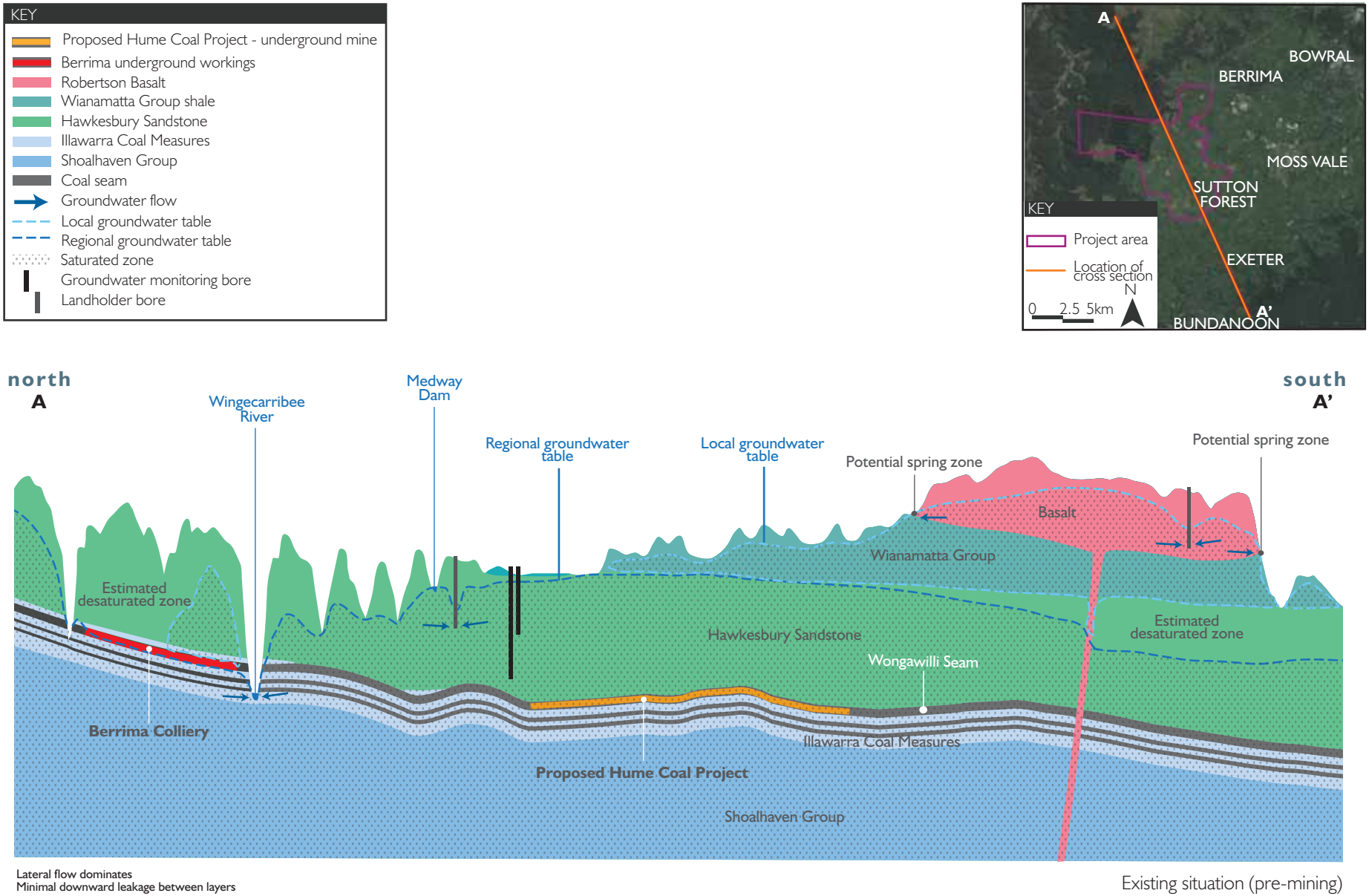
Figure 5.4



Schematic - not to scale
(vertical scale is exaggerated and this is a schematic representation only and does not accurately represent the size or locations of bores)

Conceptual cross-section: north to south

Hume Coal Project
Environmental Impact Statement

Figure 5.5

The target seam of the project is the Wongawilli Seam, which dips to the east at gradients between 1° and 2° across the project area. The seam varies in thickness across the project area, and is greater than the proposed mining height of 3.5 m, in the northern, central and eastern portions of the underground mining area, whilst thinning to the south and western extents. Seam thickness varies across the project area due to historic erosion events and subsequent deposition of Hawkesbury Sandstone.

The most economically significant portion of the seam in the project area, and therefore the proposed working section height of the project, is the lower 3.5 m. The immediate floor generally ranges from coal to carbonaceous mudstone and siltstone to sandy siltstone, and varies in thickness. Below this, the Kembla Sandstone forms a strong, competent floor. Coal towards the roof of the seam generally contains a high proportion of non-coal partings and has higher ash content. The seam roof also varies across the project area, mainly comprising a thin Permian siltstone, although direct contact with the Hawkesbury Sandstone occurs in some areas.

The coal has high fluidity and swell, and ultra-low phosphorus content. The ROM coal will be washed on-site to meet export coking coal market specifications as required, including ash content specifications. The primary product (approximately 55%) will be marketed as metallurgical coal. Such coal is used to make coke; a porous solid used in blast furnaces in the steel production process (Geoscience Australia 2016). Approximately 45% will be marketed as thermal coal.

The estimated recoverable resource within the project area is approximately 50 Mt of ROM coal, at depths of between approximately 70 m and 180 m.

The spontaneous combustion potential of the coal was assessed using samples from the seam, roof and floor, including using the SponComSIM test conducted by CB3 Mine Services Pty Ltd. These tests demonstrated that the coal is typical of the Wongawilli Seam and South Coast coals and has a low potential for spontaneous combustion. To date, there have not been any recorded incidents of spontaneous combustion in South Coast mines (Ramboll Environ 2017).

5.2.5 Hydrogeology

Groundwater units within the project area are defined as:

1. localised low permeability groundwater systems associated with the Robertson Basalt and Wianamatta Group shales.

2. regional porous fractured rock regional groundwater system associated with the Hawkesbury Sandstone.

3. localised water bearing zones associated with the Permian aged Illawarra Coal Measures and the Shoalhaven Group.

Minor, discontinuous groundwater systems can be associated with unconsolidated Quaternary alluvium in major streams and river valleys within the region, although not generally within the project area.

i Localised low permeability systems

Both the Robertson Basalt and the Wianamatta Ashfield Shale are isolated low permeability systems. Within the project area, the Robertson Basalt overlies the Wianamatta Shale in most locations with a few exceptions in the northern part of the project area. Spring discharge is observed at the contact between the basalt and underlying Wianamatta Group Ashfield Shale (McLean & David 2006). The basalt is likely to be a stable, low volume source of recharge to the shale (Coffey 2016b).

The Wianamatta Group shale has low permeability and acts as a regional aquitard, suppressing direct groundwater recharge and downward vertical flow. Fracturing within the shale can allow minor hydraulic connection with the underlying Hawkesbury Sandstone and minor supplies of poor quality water (Ross 2014). Groundwater within the shale is generally brackish to saline and bores within the shale are generally very low yielding (SCA 2006).

The connectivity between the overlying basalt and shale and the Hawkesbury Sandstone is conceptualised as a stable low volume of leakage from the above low permeability system into the below high permeability regional sandstone system.

The water level in the regional (underlying) Hawkesbury Sandstone varies across the project area. For the majority of the area where shale is present, the water level in the sandstone is in direct contact with the overlying shale but in some instances the water level in the sandstone is not in direct contact, ie the top of the sandstone is unsaturated. This is apparent in the area to the south of the project area where there is a structural feature underlying the main area of Robertson Basalt.

South of the structural feature there is no connectivity between the basalt and Hawkesbury Sandstone, while north of the feature there is some degree of connectivity (Coffey 2016a).

Regardless of whether the localised low permeability systems are in direct connection with the underlying sandstone or not, the leakage volume from the upper units to the lower regional unit will be marginal.

ii Regional groundwater system

The Hawkesbury Sandstone forms a major unconfined to semi-confined porous rock groundwater system, and constitutes most of the groundwater storage volume in the Southern Coalfield (McLean & David, 2006; Ross 2014). Confined conditions are greatest where the overlying Wianamatta Group shales and Tertiary Basalt are present and relatively thicker (McLean & David 2006). Unsaturated conditions in the uppermost Hawkesbury Sandstone are widespread where the Wianamatta Group overlies (Coffey 2016a). The unsaturated zone is thickest (approximately 60 m) to the east of Mt Gingenbullen (Coffey 2016a), highlighting the fact that transfer from the Wianamatta Group to the Hawkesbury Sandstone does not transfer easily into the Hawkesbury Sandstone.

Groundwater monitoring bore drilling through the Hawkesbury Sandstone typically intersected multiple water bearing zones associated with bedding plane joints, sub-vertical joints and faults, and to a lesser extent coarse cross-beds. Local zones of perched groundwater can exist associated with bedding planes and shale or siltstone lenses (Coffey 2016a; SCA 2006).

Groundwater within the Hawkesbury Sandstone in the project area is generally fresh and bores range in yield from low to high (Ross 2014). The median bore yield for bores in the project area as reported in the DPI groundwater database is 2 L/sec. As the groundwater within the Wianamatta Group is of poorer quality, it is inferred that the majority of the water within the Hawkesbury Sandstone is recharged directly at outcrops with limited leakage through the shale.

iii Localised water bearing zones Illawarra Coal Measures and Shoalhaven Group

The low permeability and porosity of the Permian Illawarra Coal Measures and Shoalhaven Group generally restrict groundwater flow, however, there are some water bearing zones associated with the Illawarra Coal Measures coal seams. Hydraulic connection between the Wongawilli Coal Seam and the Hawkesbury Sandstone potentially occurs where there is no interburden between the two units (ie in the southern part of the project area).

5.2.6 Surface water resources

The project area is located entirely within the Wingecarribee River catchment of the Upper Nepean and Upstream Warragamba Water Source, which is managed under the *Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources 2011*. The Wingecarribee River catchment is approximately 225 km^2 in area and is a southern (upstream) sub-catchment of the larger Hawkesbury-Nepean catchment. It forms part of the 9,051 km^2 Warragamba Dam catchment, which supplies water to Sydney. The Hawkesbury-Nepean catchment has an approximate area of 21,400 km^2.

The Warragamba Drinking Water catchment is managed by WaterNSW. Around one quarter of Warragamba Dam's catchment comprises 'special areas' where public access and land use are carefully regulated to protect water quality. The project area is not within a special area, nor is the nearby Medway Dam (refer to Figure 5.2).

The project area is traversed by several drainage lines generally flowing in a north to north-westerly direction, all of which discharge to the Wingecarribee River, at least 5 km downstream from the project area. Surface water features in and surrounding the project area are shown in Figure 5.2, and include the following local sub-catchments of the Wingecarribee River catchment:

- Medway Rivulet catchment, incorporating the Oldbury Creek sub-catchment, where a majority of the project area and the surface infrastructure is located; and

- Black Bobs Creek catchment, incorporating Redarm Creek and Longacre Creek catchments.

The Wingecarribee River flows east to west, north of the project area. The median flow in the river (30.1 ML/day) sees contributions from both the Medway Rivulet (5 ML/day) and Oldbury Creek (2.5 ML/day) (EMM 2017d).

Medway Rivulet is the predominant drainage line within the project area. Its major tributaries include Oldbury Creek, Paynes Creek, Wells Creek, Wells Creek Tributary and Whites Creek. The headwaters of the Medway Rivulet catchment commence near Manchester Square. Surface water flow is influenced by several in-stream storages that impede continuous flow within the upper catchment. Near the project's surface infrastructure area, Medway Rivulet is confined by steep gullies (WSP PB 2016c). Downstream of the project area, Medway Rivulet has been dammed to create Medway Dam, a 1,350 ML reservoir which is part of Wingecarribee Shire Council's water supply system.

Medway Dam, shown in Figure 5.2, is a prescribed dam under Schedule 1 of the NSW *Dams Safety Act 1978*. This dam is outside the project area and no mining will occur beneath it. It supplied an 8 ML/day capacity water treatment plant which provided water to Berrima and supplementary supply to parts of Bowral and Mittagong and the Wingecarribee LGA system when it was operational.

Medway dam and water treatment plant is a third tier source of supply within the partially interconnected water supply system of the Wingecarribee LGA. The dam receives direct point source discharge from the Moss Vale STP, as well as agricultural runoff which has resulted in prolonged periods of toxic cyanobacteria blooms within the reservoir (Beca 2010). A report commissioned by Wingecarribee Shire Council in 2010 found that "the risk of waterborne disease causing organisms in the treated water from the Medway WTP is between 100 and 1000 times greater than is considered acceptable where indirect potable reuse [of sewerage discharge] is planned" (Beca, 2010). The water treatment plant was shut down on 12 June 2013 (WSC 2016), with a plant upgrade included in the Wingecarribee Shire Council's draft budget in coming years.

The main water supply for the local community and the locality more broadly is from Wingecarribee Reservoir, around 14 km east of the proposed underground mining area, which has a 40 ML/day capacity water treatment plant (WSC 2012) and is connected to the Fitzroy Falls reservoir and Tallowa Dam. Additional supplementary supply is from Bundanoon Creek Dam.

Oldbury Creek commences near New Berrima and joins Medway Rivulet approximately 1.5 km downstream from Medway Dam. Similarly to Medway Rivulet, the creek is characterised by several in-stream storage dams that impede continuous flow within the upper catchment. A large existing agricultural in-stream storage dam is located adjacent to the proposed CPP location, within the project's surface infrastructure area. Berrima STP discharges around 250 kL per day of treated effluent into Oldbury Creek near the Old Hume Highway (WSC 2016).

There are no wetlands or swamps within the project area. There are several temperate highland peat swamps in the broader region; the Paddys River Swamps (comprising Long, Hanging Rock, Mindego, and Stingray Swamps) are approximately 9 km to the south-west of the project area, and the Wingecarribee Swamp is 13 km to the east. Both are listed as high priority groundwater dependant ecosystems (GDEs) in the *Water Sharing Plan for the Metropolitan Region Groundwater Sources 2011*.

Paddys River Swamps contain the Temperate Highland Peat Swamps on Sandstone listed in the NSW TSC Act. These swamps are also listed in the *Directory of Important Wetlands in Australia* (Environment Australia 2001). The potential for project-related impacts on swamps and GDEs was assessed as part of the biodiversity assessment, which is summarised in Chapter 10.

Hume Coal has been monitoring surface water levels and quality in and around the project area since 2012. The monitoring network is shown in Figure 5.2 and covers each of the main drainage lines in the vicinity of the proposed mining and surface infrastructure areas. The monitoring program was developed in consultation with DPI Water and comprises stream gauges and water quality monitoring sites. It is documented in the Hume Coal Groundwater Monitoring and Modelling Plan.

Longer-term stream flow and water quality monitoring data for the Wingecarribee River have been obtained from WaterNSW and Berrima Colliery's monitoring sites. Surface water quality varies, however it is generally fresh with slightly acidic to neutral pH. Elevated nutrient concentrations have been recorded, which are probably associated with local agricultural activities. The river also receives around 2.5 ML per day of treated effluent from the Bowral STP.

Further detail on the outcomes of the extensive baseline monitoring surveys conducted is provided in Chapter 7 and in the Water Assessment Report in Appendix E.

5.2.7 Soils

Considerable soil and landform data has been collected across the project area from field-based soil surveys, as well as analysis of high-resolution remotely-sensed data, including LiDAR (light detection and ranging), radiometric, geological and ASTER (advanced space bourne thermal emission and reflection) data and satellite imagery to further characterise soils and landforms.

Fourteen soil landscape units have been mapped in the project area at a broad scale of 1:100,000 by the Department of Environment and Climate Change (now OEH) (2008). Soil landscape units are areas that have broadly common soil types and landscape attributes. The soil landscape units in the project area are presented in Table 5.2, including the associated potential land uses, vegetation and propensity to erosion for each landscape unit.

Detailed soils surveys conducted across the project area identified five major soils types. These are kandosols, dermosols, rudosols, hydrosols, and tenosols, which are further defined as follows:

- Dystrophic Yellow Kandosol (duplex loams over mottled non-sodic clay subsoils);
- Paralithic Leptic Tenosol (poorly developed sands);
- Lithic Leptic Rudosol (shallow weakly developed sands);
- Eutrophic Grey Dermosol (silty loam over medium to heavy clay); and
- Kandosolic Redoxic Hydrosol (light to medium poorly drained clays).

Yellow Kandosols are the dominant soil type within the project area (61%), followed by Rudosols (17%) and Tenosols (14%), with Hydrosols and Dermosols making up the remaining 5% and 3% respectively. Further information on the soil types within the project area is provided in Chapter 8 and Appendix F.

The Australian Soil Resource Information System (ASRIS) and Acid Sulfate Soil (ASS) maps show small areas along some watercourses that are mapped as potential ASS. However, given the elevation of the project area it is evident that the surface strata has not been subject to seawater intrusion, which is a prerequisite for ASS formation, and so it is unlikely to contain ASS. ASRIS is large scale reconnaissance level mapping and may or may not be supported by laboratory data. Many soils in the project area are acidic, that is, they have a pH less than 5.5; however, this is different to comprising ASS. If disturbed and exposed to air, ASS has potential to oxidise, releasing acid and metals, while an acidic soil has very limited potential to liberate acidity.

Table 5.2 Description of the soil landscapes in the project area

Soil landscape	General landscape (project area and surrounds)	Land use	Soils and vegetation	Erosion
Avoca	Rises and low hills on Tertiary Basalt (basalt). Local relief 10-90 m; altitude 519-1,041 m; slopes 3-20%; rock outcrop <2%.	Beef production on improved pastures along with some olive and grape enterprises.	Gravelly Brown and Red Ferrosols. Most of this landscape has been extensively cleared and improved pasture varieties have been sown. Small areas of woodland still remain.	Sheet erosion is common in cultivated paddocks. Localised steeper slopes are prone to mass movement.
Hawkesbury	Scarps and benches within hills on Hawkesbury Sandstone. Local relief 40-200 m; altitude 1-1,016 m; slopes 20-70%; rock outcrop >50%.	Belanglo State Forest (Forestry)	Leptic and Orthic Tenosols and Rudosols, Yellow Kandosols, and Kurosols.	Severe sheet erosion during storms and after bushfires.
Kangaloon	Foot slopes within plain on Wianamatta Group Shale. Local relief 0-9 m; altitude 531-745 m; slopes 1-3%; rock outcrop nil.	Grazing	Brown Kurosols and Hydrosols. Extensively cleared open grassland.	Waterlogging as a result of tree clearing.
Kinnoul Hill	Hills on Tertiary Basalt (basalt). Local relief 30-100 m; altitude 489-1,123 m; slopes 20-50%; rock outcrop nil.	Improved pastures used for grazing.	Rudosols and Red Ferrosols. Most of this landscape has been cleared for cattle grazing.	Clearing of many steep slopes has resulted in a large amount of soil loss. Localised landslips occur.
Lower Mittagong	Rises and low hills on Wianamatta Group Shale (shale). Local relief 5-90 m; altitude 534-820 m; slopes 0-25%; rock outcrop nil.	Beef cattle grazing, rural residential development, olive and vineyard development, plus urban development around Mittagong and Moss Vale.	Brown Kurosols, Red Kurosols, Brown Dermosols and Red and Brown Kandosols, with Yellow Natric Kurosols in drainage lines. Generally Mittagong Sandstone Woodland community.	Minor to moderate gully erosion occurs in cleared drainage plains. Minor sheet erosion is common.
Larkin	Plain and rises on laterite, shale and sandstone-quartz. Local relief 0-10 m; altitude 576-1,012 m; slopes 2-6%; rock outcrop nil.	Cattle grazing plus some minor areas of sheep grazing.	Red Ferrosols and Red Kurosols on shales with Red Kandosols and Ferrosols on sandstones. Due to the moderate fertility of these soils most areas of the original open forest have been cleared for grazing.	Moderate sheet erosion in overgrazed paddocks.
Moss Vale	Rises on Wianamatta Group Shale (shale). Local relief 5-30 m; altitude 544-740 m; slopes 0-5%; rock outcrop nil.	Beef cattle grazing and rural residential development.	Yellow Kurosol, Red Kurosols, Brown Kurosols and Yellow Kandosols. Mostly cleared pasture with isolated paddock trees.	Minor to moderate gully erosion occurs in cleared drainage plains.
Nattai Tablelands	Rises and low hills on Hawkesbury Sandstone. Local relief 10-90 m; altitude 87-793 m; slopes 2-25%; rock outcrop 10-20%.	Predominantly uncleared native vegetation due to steep slopes and remote location.	Yellow Kandosols, Orthic Tenosols, Rudosols, Yellow Kurosols and Chromosols on shales. Soils are discontinuous, with sandstone benches and small scarps outcropping.	Minor to moderate sheet erosion is common where shrub/understorey has been cleared.
Nattai Tablelands variant A	Plateau on Hawkesbury Sandstone. Local relief 10-90 m; altitude 412-782 m; slopes 2-25%; rock outcrop >50%.	Predominantly native bushland and scrub.	Discontinuous Leptic Tenosols (Earthy Sands) interspersed with significant rock outcrop. Uncleared woodland to open-forest communities.	Minor to moderate sheet erosion is common where shrub/understorey has been cleared.

Table 5.2 Description of the soil landscapes in the project area

Soil landscape	General landscape (project area and surrounds)	Land use	Soils and vegetation	Erosion
Soapy Flat	Rises and low hills on Hawkesbury Sandstone. Local relief 10-30 m; altitude 477-796 m; slopes 2-10%; rock outcrop <2%.	Crown reserve, including Soapy Flat reserve.	Brown Dermosols, Yellow Kurosols and Chromosols, Orthic Tenosols on ridges and Hydrosols (Acid Peats) in swamps (noting no swamps occur in the project area.	Minor sheet erosion occurs where ground cover is cleared.
Soapy Flat variant A	Footslopes within rises on Hawkesbury Sandstone. Local relief 10-30 m; altitude 490-716 m; slopes 2-10%; rock outcrop <2%.	Crown reserve, including Soapy Flat reserve as well as pine forestry operations in Belanglo State Forest.	Orthic Tenosols (Deep Earthy Sands). Extensively cleared woodland.	Minor sheet erosion occurs where ground cover is cleared.
Wingecarribee River	Plains and stream channels within flood plain on Quaternary Alluvium. Local relief 0-5 m; altitude 629-688 m; slopes 0-1%; rock outcrop nil.	Extensively cleared open woodland, grassland and water communities. Area predominantly used for grazing.	Dermosols (Chocolate Soils and Wiesenbodens).	Localised erosion of stream banks and faecal contamination of waters due to stock.
Wingecarribee River variant A	Plains and levees within terrace and flood plain on Quaternary Alluvium. Local relief 0-5 m; altitude 630-667 m; slopes 0-1%; rock outcrop nil.	Extensively cleared open woodland, grassland and water communities. Area predominantly used for grazing.	Hydrosols (Gleyed Podzolic Soils)	Occasional erosion of banks and unformed roads and tracks.
Wollondilly River	Alluvial plain and terrace on Quaternary Alluvium. Local relief 0-15m; altitude 110-720m; slopes 1-6%; rock outcrop nil.	Belanglo State Forest.	Rudosols, Brown Dermosols, Yellow Kandosols, Brown Chromosols. Riparian woodland.	Minor sheet and streambank erosion. Common gullying along drainage lines.

A detailed BSAL assessment of the project area and surrounding buffer area was undertaken in accordance with the NSW Government (2013) *Interim Protocol for Site Verification and Mapping of Biophysical Strategic Agricultural Land.* Each soil type identified in the project area was assessed against the specified BSAL verification criteria and no type was found to satisfy the criteria, with most failing multiple physical and chemical soil criteria. The result is that no BSAL is present in the project area, a conclusion that is consistent with the results of the broader scale NSW Government's BSAL mapping.

An application for a SVC for the project area was subsequently lodged by Hume Coal with the DP&E on 17 August 2015. The Secretary of DP&E issued the SVC on 22 April 2016. The complete BSAL verification assessment report is presented as an appendix to the Soil and Land Assessment (refer to Appendix F) and the SVC is attached in Appendix U.

5.2.8 Biodiversity

The majority of the project area has been previously cleared and is currently used for cattle and sheep grazing, with some limited crop irrigation. Cleared lands contain grassland dominated by exotic grasses and herbs. Remnant native vegetation covers approximately 1,800 ha (or 20%) of the project area and is highly fragmented. Native vegetation is mainly restricted to the north-west of the project area, in Belanglo State Forest, though some occurs in the central northern area, associated with creeks, and there are isolated paddock trees in places. There are also scattered patches of poorer condition native vegetation in agricultural areas in the centre of the project area, generally comprising isolated stands of native trees with an exotic groundcover.

Eight native vegetation communities were recorded in the project area during field surveys conducted for the biodiversity assessment (refer to Appendix H), as follows:

- wet sclerophyll forest:
  - River Peppermint (*E. elata*) Narrow-leaved Peppermint (*E. radiata*) tall open forest;
- dry sclerophyll forests/woodlands:
  - Grey Gum (*E. punctata*) Blue-leaved Stringybark (*E. agglomerata*) open forest;
  - Brittle Gum (*E. mannifera subsp. gullickii)* Scribbly Gum shrubby woodland; and
  - Gully Gum (*E. smithii*) Scribbly Gum open woodland.
- grassy woodlands:
  - Gully Gum Narrow-leaved Peppermint open woodland;
  - Broad-leaved Peppermint (*E. dives*) Argyle Apple (*E. cinerea*) grassy woodland;
  - Broad-leaved Peppermint Narrow-leaved Peppermint grassy woodland; and
  - Snow Gum (*E. pauciflora*) Black Sallee (*E. stellulata*) grassy woodland.

Two of these vegetation communities - the Broad-leaved Peppermint Argyle Apple Woodland and Snow Gum Black Sallee Grassy Woodland - are components of TSC Act listed EECs; the Southern Highlands Shale Woodland in the Sydney Basin Bioregion EEC, and the Tableland Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions, respectively. These vegetation types occur on clay soils derived from Wianamatta Shale.

The Broad-leaved Peppermint Argyle Apple Woodland community was also found to meet the key diagnostic characteristics of a critically endangered ecological community (CEEC) under the EPBC Act; that is the Southern Highlands Shale Forest and Woodland of the Sydney Basin Bioregion.

The project area also contains two exotic vegetation types, Pine Forest and Cleared Land.

A total of 353 native and 90 exotic flora species were recorded in the project area and immediate surrounds during numerous field surveys conducted for the project. The majority of weed species were recorded in the eastern part of the project area, on land which is cleared and used for agricultural activities. Belanglo State Forest in the north-western part of the project area contains a large exotic pine plantation, as well as areas of remnant native vegetation with few weeds.

Of the native plant species recorded in the project area, Paddy's River Box (*Eucalyptus macarthurii*) is listed as a vulnerable species under the TSC Act.

A total of 180 terrestrial fauna species were recorded in the project area and its immediate surrounds, comprising:

- 119 native and three introduced bird species;
- 11 native reptile species;
- 10 native frog species; and
- 32 native mammal species (15 microbat, 6 arboreal, 10 ground-dwelling and 1 semi-aquatic) and 8 introduced mammal species.

Of the fauna species recorded during targeted surveys within and adjacent to the project area, the following are listed under the TSC Act:

- woodland birds: Brown Treecreeper (*Climacteris picumnus*), Diamond Firetail (*Stagonopleura guttata*), Little Eagle (*Hieraeetus morphnoides*), Glossy Black Cockatoo (*Calyptorhynchus lathami*), Gang-gang Cockatoo (*Callocephalon fimbriatum*), Little Lorikeet (*Glossopsitta pusilla*), Powerful Owl (*Ninox strenua*), Scarlet Robin (*Petroica boodang*) and Varied Sittella (*Daphoenositta chrysoptera*); and
- mammals: Koala, Southern Myotis (*Myotis macropus*), Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*), Eastern Freetail Bat (*Mormopterus norfolkensis),* Little Bentwing Bat (*Miniopterus australis*), Large-eared Pied Bat and Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*).

Two of these species, the Koala and Large-eared Pied Bat, are also listed as vulnerable under the EPBC Act.

Calls likely to have been from the Masked Owl (*Tyto novaehollandiae*) were also recorded in the study area for the biodiversity assessment; however the record could not be confirmed. Using the precautionary principle and given the presence of suitable habitat, it is assumed that this species is present.

Further information on the biodiversity of the project area and surrounds is provided in the biodiversity assessment in Appendix H, and the key findings summarised in Chapter 10.

5.3 Socio-economic factors

5.3.1 Land ownership

Land tenure in the project area is illustrated in Figure 5.6. The project area covers approximately 5,051 ha. Of this, the vast majority is freehold land, covering around 5,039 ha, of which 1,253 ha is owned by Hume Coal and its subsidiaries. For simplicity, land owned by Hume Coal and its subsidiaries is herein referred to as Hume coal owned land. Hume Coal's total landholding within and in the vicinity of the project area is approximately 1,765 ha.

Approximately 1,383 ha of the 5,039 ha of freehold land in the project area comprises government controlled roads (such as the Hume Highway and Golden Vale Road) and the Belanglo State Forest, which covers the north-western portion of the project area. The State Forest is controlled by the Forestry Corporation of NSW and totals approximately 1,296 ha within the project area. Crown land in the project area covers around 12 ha and includes Crown paper roads.

A summary of land tenure in the project area is provided below.

Table 5.3 Land tenure in the project area

Land tenure	Area (ha)
Freehold land (government)	1,383
Freehold land (Hume Coal and its subsidiaries)	1,253
Freehold land (other)	2,403
Crown land	12
Total	**5,051**