

Section 7 Draft Statement of Commitments

This section has been prepared in accordance with the requirements of Part 3A of the Environmental Planning and Assessment Act 1979, and presents a compilation of the actions and initiatives the Proponent commits to implement if the modified “Ardmore Park” Quarry project is approved. These commitments are designed to effectively manage, mitigate, guide and monitor the project from initial construction through to full production and eventually rehabilitation of the Project Site.

The Environmental Assessment has identified a range of environmental, social and management outcomes and measures, all required to avoid or reduce the environmental and social impacts of the Project.

*All parties involved in the design, establishment and operational phases of the Project will be required to undertake their work in accordance with these commitments. The commitments are presented in tabular form for the Project Site operations (**Table 7.1**) and transport operations (**Table 7.2**) and identify the desired outcome, action and timing of commitments.*



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Table 7.1
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Desired Outcome	Action	Timing	
1. Area of Activities			
All approved activities are undertaken in the area(s) nominated on the approved plans and figures (unless moved slightly to avoid individual trees).	1.1	Survey and mark the boundaries of the areas of disturbance on the ground.	Prior to any vegetation clearing.
	1.2	Survey and peg the centre line of the Site Access Road.	Prior to construction of the Site Access Road.
2. Operating Hours			
Management of construction and operational activities in accordance with the approved operating hours.	2.1	Undertake all activities within the hours of: 7.00am to 6.00pm / Monday to Friday and 7.00am to 1.00pm / Saturday.	Ongoing.
3. Waste Management			
Minimisation of general waste creation and maximisation of recycling, wherever possible. Minimisation of the potential risk of environmental impact due to waste creation, storage and/or disposal.	3.1	Place all paper and general wastes originating from the Administration and Quarry Services Area, together with routine maintenance consumables from the daily servicing of equipment in garbage bins located adjacent to the various buildings.	Ongoing.
	3.2	Collect general waste bins daily and place contents in large waste skip bins positioned adjacent to the heavy vehicle maintenance building to await removal by licensed contractor.	Daily
	3.3	Organise the regular collection of industrial wastes.	Monthly
	3.4	Store waste oils and grease at the maintenance workshop for collection by a licensed waste recycling contractor.	Monthly
	3.5	Collect all parts and packaging and transfer to the maintenance workshop for disposal or recycling.	As required.
	3.6	Store potentially hydrocarbon-contaminated water in the oil/water separator for regular removal from site by a licensed contractor.	As required.
	3.7	Install adequate toilet and ablution facilities within the Administration and Quarry Services Area for the site workforce and visitors.	During site establishment.
	3.8	Direct sewage to either the existing septic system of the "Ardmore Park" property or a bio-cycle (or equivalent system) within the Administration and Quarry Services Area with effluent irrigation to land.	Ongoing.
4. Rehabilitation			
The creation of a stable final landform, available for the proposed future use(s) of agriculture and/or nature conservation.	4.1	Adopt a progressive approach to rehabilitation to ensure that completed areas are quickly shaped and vegetated to provide a stable landform.	Ongoing during rehabilitation activities.
	4.2	Stabilise earthworks, drainage lines and disturbed areas no longer required for quarry-related activities.	As areas become available.



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Desired Outcome	Action	Timing
4. Rehabilitation (Cont'd)		
The creation of a stable final landform, available for the proposed future use(s) of agriculture and/or nature conservation.	4.3 Blend the created landform with the surrounding land fabric.	As areas become available.
	4.4 Maintain a number of water storages to facilitate the subsequent use of the land for agricultural purposes.	Prior to quarry closure.
	4.5 Replant native vegetation along reinstated drainage lines and lower lying areas of the Project Site totalling approximately 14.7ha.	Ongoing during rehabilitation activities.
	4.6 Utilise native tree, shrub and grass species that would promote the re-establishment of the endangered ecological community White Box Yellow Box Blakely's Red Gum Woodland, and link existing areas of native vegetation to the southeast and northwest of the Project Site.	Ongoing during rehabilitation activities.
	4.7 Retain cleared trees and branches for use in stabilising slopes identified for rehabilitation with native woodland communities.	Ongoing during rehabilitation activities.
	4.8 Report each year's rehabilitation within an Annual Environmental Management Report (AEMR).	Annually.
	4.9 Undertake a targeted weed spraying programs, to eliminate or control noxious weeds currently occurring on the Project Site.	Annually.
5. Groundwater		
Prevention of groundwater contamination.	5.1 Securely store all hydrocarbon products within designated and bunded areas.	Ongoing.
	5.2 Refuel all of the project fleet within designated areas of the Project Site.	Ongoing.
	5.3 Undertake all maintenance activities within designated areas of the Project Site facilities area, ie. maintenance workshop.	Ongoing.
	5.4 Direct all water from wash-down areas and workshops to oil/water separators and containment systems.	Ongoing.
	5.5 Ensure all storage tanks are either self-bunded tanks or bunded with an impermeable surface and a capacity to contain a minimum 110% of the largest storage tank capacity.	Ongoing.
	5.6 Collect samples of groundwater in all monitoring wells on a 12-month basis and submit to a NATA registered laboratory for the testing of pH, Electrical conductivity (EC), Total Dissolved Solids (TDS) and the determination of major anions, major cations, iron and hydrocarbons.	Annually.



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Desired Outcome	Action	Timing
5. Groundwater (Cont’d)		
Prevention of any reduction in the availability of groundwater to local groundwater users.	5.7 Measure water levels on a monthly basis up to and throughout the extraction phase from Bores BHAP1, BHAP5, BHAP7 and BHAP10.	Monthly.
	5.8 Replace the bores that are destroyed during the staged extraction process with strategically positioned and suitably installed new monitoring wells where appropriate.	As required.
	5.9 (In the event that monitoring indicates a decreasing SWL trend attributable to the proposed extraction of groundwater), reduce pumping rates, initially through reducing water provided for ongoing stock watering and if required through a reduced processing rate at the sand washing plant.	In the event that monitoring indicates a decreasing SWL trend attributable to the proposed extraction of groundwater.
Prevention of any reduction in the availability of groundwater flows to local springs.	5.10 Assess the flow rate and water quality of groundwater from the “Inverary Park” and Southern Spring against low flow records.	6 monthly.
	5.11 Establish photo points at representative spring (“Inverary Park”, southern and western springs) and other locations to assess any changes in flow regimes and vegetation over time	Prior to the commencement of extraction.
	5.12 (In the event of a deterioration of flow rates and/or water availability to below historic low flows) undertake one of the following options: (i) supply groundwater to the affected water user from Multiquip’s proposed production bore (BHAP6) to the measured and documented loss and with a water quality commensurate or better; or (ii) provide monetary compensation to the affected water user; or (iii) install a replacement bore to provide the measured and documented loss of groundwater with a quality commensurate or better.	In the event of a deterioration of flow rates and/or water availability to below historic low flows.
Preparation of a contingency plan in the event that the availability or quality of groundwater is reduced for local groundwater users.	5.13 Undertake remedial action if the available drawdown attributable to the mine for the existing groundwater users is reduced by over 15%. The remedial actions that may be appropriate include the deepening of bores or replacement of bores to accommodate deeper, high lift pumps.	As required.
	5.14 Commission review of all monitoring results on an annual basis by a consulting hydrogeologist or other environmental professional and report in each AEMR.	Annually



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Desired Outcome	Action	Timing
6. Surface Water		
Diversion of clean water flows away from areas of project related disturbance.	6.1. Construct diversion banks upstream of the extraction area and other related disturbance to the design specifications of Landcom (2004).	Prior to disturbance in relevant catchment of the Project Site.
	6.2. Construct clean water storage dam (Dam 8) at the discharge points of the main diversion structures.	Prior to disturbance in relevant catchment of the Project Site.
	6.3. Inspect the diversion banks and storage dams on a monthly basis, or following rainfall of >25mm/24 hours, and undertake maintenance work as necessary.	Monthly or following rainfall of >25m/24hours.
Capture of dirty water flows from areas of project related disturbance.	6.4. Construct catch banks downstream of disturbed ground to the design specifications of Landcom (2004).	Prior to disturbance in relevant catchment of the Project Site.
	6.5. Inspect the catch banks on a monthly basis, or following rainfall of >25mm/24 hours, and undertake maintenance work as necessary.	Monthly or following rainfall of >25mm/24 hours.
	6.6. Construct sediment basins and clarification ponds as identified on Figure 5.15 and to the design specifications of Landcom (2004).	Prior to disturbance in relevant catchment of the Project Site.
	6.7. Inspect the sediment basins on a monthly basis, or following rainfall of >25mm/24 hours, and clean out the sediment basins of consolidated sediment once capacity reduced by 20%.	Monthly or following rainfall of >25mm/24 hours.
	6.8. Review general performance of catchment and settlement structures and upgrade the existing structures or install additional structures to ensure all dirty water is captured and settled prior to discharge.	Ongoing.
Discharged water quality to meet nominated criteria.	6.9. Construct catchment and settlement structures 'in-line' such that overflow from one structure is directed to another downstream.	During construction.
	6.10. Divert drainage in the final landform to Dams 7 and 8.	Prior to project completion.
	6.11. Ensure drainage paths between the catchment and settlement structures are well grassed.	Ongoing.
	6.12. Ensure any water discharged meets the DECC Environment Protection Licence criteria, expected to be as follows. <ul style="list-style-type: none"> • TSS < 50mg/L. • pH: 5.5 to 8.5. • Oil & grease < 10mg/L. • Electrical conductivity < 350µS/cm 	Ongoing.



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Desired Outcome	Action	Timing
6. Surface Water (Cont'd)		
Prevention of hydrocarbon contamination of water on the Project Site.	6.13. Securely store all hydrocarbon products.	Ongoing
	6.14. Refuel all but the less mobile mining equipment which would be refuelled within the open cut area, within designated areas.	Ongoing.
	6.15. Direct all water from wash-down areas and workshops to oil/water separators and containment systems.	Ongoing.
	6.16. Ensure all storage tanks are either self-bunded tanks or bunded with an impermeable surface and have a capacity to contain a minimum 110% of the largest storage tank capacity.	When imported to site or constructed.
	6.17. Implement a 3-phase remedial action plan in the event of a major hydrocarbon spill as follows. <ul style="list-style-type: none"> • Phase 1 – Initial Recovery: Recover as much as possible at the source by pumping free hydrocarbon from the surface and excavating hydrocarbon-contaminated materials. • Phase 2 – Source Control: Begin hydraulic control of the source to prevent spreading of contamination. • Phase 3 – Recovery: If necessary, install boreholes to remove and treat contaminated groundwater. 	As required.
7. Noise		
All activities are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	7.1. Construct an acoustic bund wall to the west of the internal road network and around the sand processing area.	During construction period.
	7.2. Locate the mobile crushing plant and hard rock processing plant within a cut section of the Project Site, approximately 8m below surface level (to the east).	During construction period.
	7.3. Commence extraction from the southern sand resource area at the northern extremity of Stage 1 and move progressively southward toward Stage 2.	As part of extraction operations.
	7.4. Enclose the hard rock processing plant using Panel-Tech Thermaspan Colorbond panels, leaving openings only for plant conveyors.	During construction period.
	7.5. Adhere to the nominated hours of operation, ie. no extraction, processing and associated activities would take place before 7:00am or after 6:00pm.	Ongoing.



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Desired Outcome	Action	Timing
7. Noise (Cont'd)		
All activities are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	7.6. Use equipment with lower sound power levels in preference to more noisy equipment.	Ongoing.
	7.7. Instruct all truck drivers to avoid the use of engine brakes when approaching the Project Site entrance.	Ongoing.
	7.8. Regularly service all equipment used on site to ensure the power sound levels remain at or below the levels specified in the noise assessment for the EA.	Ongoing.
	7.9. Grade the internal road network to limit body noise from empty trucks travelling on the Project Site.	Ongoing.
	7.10. Establish a noise monitoring program (NMP) to initially validate the predictions arising from the modelling and then record noise levels against the Project noise criteria. The NMP would include a noise monitoring protocol which would include the contingent measures to be followed should non-compliant noise levels be measured.	Within 6 months of project approval.
8. Air Quality		
Site activities are undertaken without exceeding DECC air quality criteria or goals.	8.1. Minimise clearing ahead of construction and operational activities.	Ongoing.
	8.2. Undertake soil stripping at a time when there is sufficient soil moisture to prevent significant lift-off of dust.	Ongoing.
	8.3. Avoid stripping soil in periods of high wind.	Ongoing.
	8.4. Use water application to increase soil moisture should stripping occur during periods of high wind or low soil moisture.	Ongoing.
	8.5. Apply water to the hard rock processing plant feed hopper and crushers.	Ongoing.
	8.6. Install bund walls and wind breaks as required.	Ongoing.
	8.7. Locate the mobile crushing plant within the cut section of the hard rock processing area.	During construction and initial production phase.
	8.8. Enclose the dust generating components of the hard rock processing plant with limited openings to allow entry and exit of conveyors and access by project personnel.	During construction.



Table 7.1 (Cont'd)
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Desired Outcome	Action	Timing
8. Air Quality (Cont'd)		
Site activities are undertaken without exceeding DECC air quality criteria or goals.	8.9. Use a 10 000 litre water truck to regularly wet the active internal unsealed roads.	Ongoing.
	8.10. Seed topsoil stockpiles, acoustic bund walls and areas where landform preparation is complete to assist in stabilising the exposed surface	Ongoing.
	8.11. Minimise the drop heights between front-end loader buckets and trucks carrying sand/basalt or overburden through operator training and education on the management of dust	Ongoing.
	8.12. Cover all trucks carrying quarry products with approved covers and securely fix the tailgates to prevent windblown dust emission or spillages.	Ongoing.
	8.13. Undertake an air quality monitoring program to demonstrate compliance with the nominated goals. <ul style="list-style-type: none"> • Deposited dust at selected residences and strategic locations surrounding the Project Site. • Continuous wind speed and direction at the Project Site weather station. 	Within 6 months of project approval.
9. Flora and Fauna		
Minimisation of long term impact on flora and fauna on and around the Project Site.	9.1. Construct the Project Site infrastructure to avoid where possible, remnant stands of vegetation.	During Construction.
	9.2. Minimise clearing and consistent with operational requirements.	During clearing.
	9.3. Undertake vegetation clearing on a campaign basis to provide for immediate extraction operations.	Ongoing.
	9.4. Clearly define all areas to be cleared.	Prior to clearing.
	9.5. Construct any additional internal roads required on the cleared lands well away from stands of native vegetation.	Ongoing.
	9.6. (Where practicable), directly transfer soil material and biomass stripped to completed sections of the final landform for spreading	Ongoing



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Desired Outcome	Action	Timing
9. Flora and Fauna (Cont'd)		
Minimisation of long term impact on flora and fauna on and around the Project Site.	9.7. Carry out, where possible, tree removal, especially the mature trees in late spring and early autumn to avoid spring nesting birds and over-wintering bats.	Ongoing.
	9.8. Retain felled trees for use in rehabilitation of the final landform.	Ongoing.
	9.9. Ensure the quality of water discharged from the Project Site has a neutral or beneficial impact on the downstream catchment.	Ongoing.
	9.10. Control noxious weeds at all times.	Ongoing.
	9.11. Commence progressive rehabilitation of the open cut area, including establishment of Vegetation Offset Area as soon as possible.	During Year 1 of project.
	9.12. Undertake landscape plantings to screen the proposed quarry and associated facilities from view, stabilise the soils and drainage lines and provide habitat for fauna	During first 3 years of the project.
	9.13. Maintain the existing fences around the remnant forest communities associated with the knolls on the "Ardmore Park" property.	Ongoing.
10. Aboriginal Heritage		
Provide appropriate protection to identified Aboriginal artefacts.	10.1. Ensure the in-situ protection of the identified artefacts through workforce education.	Ongoing
	10.2. Apply for the relevant permit to undertake test pitting over the southern sand resource (in accordance with the recommendations of AASC (2008).	Prior to the commencement of extraction.
Minimise potential to impact upon unidentified Aboriginal artefacts.	10.3. Invite Aboriginal monitors to site to review the results of test pitting activities.	Ongoing.
	10.4. Cease work at any area if further Aboriginal objects are uncovered during the course of the Project, and contact the DECC (NPWS) for advice.	Ongoing.
Employees who are sensitive and respectful of possible identified Aboriginal sites and artefacts.	10.5. Conduct a Cultural Heritage Awareness Induction Course for staff, contractors and any heritage monitors working on the Project Site.	Ongoing.
Notification of Aboriginal Sites under Part 6 s91 NPWS Act.	10.6. Supply formal site cards for all identified Aboriginal artefacts to the DECC Aboriginal Heritage Information Management System (AHIMS) Registrar.	Following identification of an Aboriginal artefact or site.



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Desired Outcome	Action	Timing	
11. Non-Aboriginal Heritage			
Provide appropriate protection to site of non-Aboriginal heritage significance.	11.1	Locate the Project Site entrance 150m to the south to avoid any potential impact on the "Larbert Tree".	Complete.
	11.2	Prepare a Cultural Heritage Management Plan (CHMP) for the project which would: <ul style="list-style-type: none"> • be prepared in consultation with the NSW Heritage Office • include an inventory of all listed heritage items locally; • provide opportunity for further research as to any physical evidence of the Old Argyle Road; • include a protocol for surface disturbing activities in the vicinity of the recorded location of the Old Argyle Road; and • include a protocol to be followed in the event that archaeological material is exposed as a result of surface disturbing activities. 	Prior to commencement of the project.
12. Visibility			
Reduce the impact of the project on the visual amenity of private and public vantage points.	12.1	Orient the various components of the Project Site in such a way that the existing topographical features would offer maximum screening of the Project Site.	Complete.
	12.2	Minimise the extent of land disturbance / clearing in advance of extraction.	Ongoing.
	12.3	Construct a 4m bund wall around the sand washing plant, along the internal product transport route and ultimately along the Project Site access road to the west of the "Ardmore Park" residence.	During construction activities.
	12.4	Seed the bund wall with native grass, shrub and tree species to act as an additional visual screen.	Following construction.
	12.5	Plant out the elevated areas immediately west of the processing plants and internal road network as part of an ongoing commitment to re-establish areas of native vegetation (particularly those of the White Box Yellow Box Blakely's Red Gum Woodland community).	Ongoing.
13. Soils, Land Capability and Agricultural Suitability			
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion.	13.1	Strip topsoil and subsoil to the depths nominated in the EA. Only those areas required for immediate construction or extraction activities would be stripped.	Ongoing.
	13.2	Provide mobile equipment operators with clear instructions to keep the topsoil and subsoil separate	Ongoing



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Desired Outcome	Action	Timing	
13. Soils, Land Capability and Agricultural Suitability (Cont'd)			
Maintenance of soil value for rehabilitation and minimisation of soil loss through erosion. (Cont'd)	13.3	Transfer and respread directly stripped soil materials directly over areas to be rehabilitated following the first 18 to 24 months of mine operations.	Ongoing.
	13.4	Stockpile soil away from natural surface drainage lines.	Ongoing
	13.5	Seed any stockpile retained for in excess of three months with cereal and pasture species	As required.
	13.6	Cover long-term subsoil stockpiles with a cover of topsoil.	As required.
	13.7	Install erosion protection around soil stockpiles.	Ongoing.
	13.8	Divert surface water flow away from soil stockpile areas.	
	13.9	Monitor erosion from soil stockpiles or rehabilitated surfaces throughout the life of the Project with remedial works undertaken should erosion be observed.	Ongoing.
14. Bushfire Hazard			
Minimise potential for initiation of fire through combustion of fuel.	14.1	Undertake refuelling within designated fuel bays or within cleared area of the Project Site.	Ongoing.
	14.2	Turn vehicles off during refuelling.	Ongoing.
	14.3	Enforce no smoking policy in designated areas of the Project Site.	Ongoing.
	14.4	Maintain fire extinguishers within site vehicles.	Ongoing.
Manage potential and actual bushfire occurrences in accordance with local bushfire control plans.	14.5	Prepare a Bushfire Management Plan for the Project.	Within 6 months of the Project commencing.
	14.6	Regularly liaise with Goulburn Mulwaree Council personnel in relation to bushfire hazard.	Ongoing.



Table 7.2
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Desired Outcome	Action	Timing
1. Area of Activities		
All approved activities are undertaken in the area(s) nominated on the approved plans and figures (unless moved slightly to avoid individual trees).	1.1 Peg the centre line of the Bungonia By-pass section of the transport route, specifically where a meander is to be created to avoid any mature native trees.	Prior to construction of the transport route.
	1.2 Survey and mark the boundaries of the areas of disturbance on the ground.	Prior to any vegetation clearing.
2. Operating Hours		
Management of transport operations in accordance with the approved operating hours.	2.1 Undertake road upgrade and construction operations within the hours of: 7.00am to 6.00pm / Monday to Friday and 7.00am to 1.00pm / Saturday.	During Construction of the Transport Route.
	2.2 Ensure no truck exits the site before 7.00am Monday to Saturday or enters the site after 6.00pm Monday to Friday and 1.00pm Saturday.	Ongoing
3. Waste Management		
Minimisation of general waste creation and maximisation of recycling, wherever possible.	3.1 Collect all waste materials in temporary skip bin(s) at the construction / upgrade site and transfer to local landfill as required.	During Construction of the Transport Route.
Minimisation of the potential risk of environmental impact due to waste creation, storage and/or disposal.	3.2 Undertake all vehicle refuelling on a bunded area of the Project Site.	During Construction of the Transport Route.
	3.3 Install temporary toilet and ablution facilities away from natural drainage lines.	As required.
4. Rehabilitation		
The creation of a stable landform, available for the proposed future use(s) of agriculture and/or nature conservation.	4.1 Stabilise earthworks, drainage lines and disturbed areas no longer required for project-related activities.	Ongoing.
	4.2 Maintain aquatic and terrestrial habitat corridors along Bungonia Creek.	During Construction of the Transport Route.
	4.3 Avoid unnecessary disturbance to vegetation along the alignment of the Bungonia By-pass through the Crown land.	During Construction of the Transport Route.
5. Product Transportation		
All activities are undertaken in such a manner as to minimise impacts on the local road network or surrounding landholders and/or residents.	5.1 Restrict the number of truckloads exiting the Project Site to 10 per day until the proposed road upgrade works are complete.	Ongoing throughout Stage 2 transport operations.
	5.2 Restrict the number of truckloads exiting the Project Site to 28 per day until the proposed watercourse crossing upgrades are complete.	Ongoing throughout Stage 3 transport operations.



Table 7.2 (Cont'd)
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Desired Outcome	Action	Timing
5. Product Transportation (Cont'd)		
All activities are undertaken in such a manner as to minimise impacts on the local road network or surrounding landholders and/or residents.	5.3. Restrict the number of truckloads exiting the Project Site to 44 per day.	Ongoing throughout Stage 4 transport operations.
	5.4. Adhere to the nominated hours of operation, ie. no vehicles would arrive at the Project Site before 7:00am or leave the Project Site after 6:00pm.	Ongoing
	5.5. Enforce driver adherence to all speed limits	Ongoing.
	5.6. Erect "Trucks Entering" signs on Oallen Ford Road on both the southbound and northbound approaches to the Project Site entrance and on Lumley Road 200m from the Project Site entrance.	Prior to the commencement of transport operations.
	5.7. Ensure each exiting truck uses an on-site weighbridge to ensure all weight restrictions (GCM < 50t) are adhered to.	Ongoing.
	5.8. Use only vehicles which employ the most up-to-date noise/emission reducing technology as part of transport fleet.	Ongoing.
	5.9. Cover all loads to minimise dust and particulate matter and debris emissions	Ongoing.
	5.10. Instruct all truck drivers to avoid the use of engine brakes when approaching the Project Site entrance.	Ongoing.
	5.11. Regularly service all trucks to ensure the power sound levels remain at or below the levels specified in the noise assessment for the EA.	Ongoing.
	5.12. Prepare and implement a transport Code of Conduct developed for the project. The Code of Conduct would require drivers to obey all traffic signs, speed zones and to operate in a safe and courteous manner at all times.	Ongoing.
	5.13. Enter into an agreement with Goulburn Mulwaree Council to repair any damage associated with the transport of quarry products.	Prior to commencement of transport operations.
	5.14. Establish a complaints register, advertised in the local telephone directory, to allow concerned residents to report any traffic related incidents, unsafe operation or general concern. Multiquip would investigate all complaints.	Prior to commencement of transport operations.



Table 7.2 (Cont'd)
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Desired Outcome	Action	Timing
6. Surface Water		
Construction of appropriate roadside drainage.	6.1. Complete specific roadside drainage upgrades as identified in Table 6.9 .	During Stages 2 and 3 road upgrading activities.
	6.2. Complete standard drainage upgrades on all drainage line crossings including: <ul style="list-style-type: none"> • extension of the pipes, culverts or bridges to facilitate the wider road; • raising of the pipe headwalls to accommodate higher batters; and/or • steepening batter slopes between the road pavement and the pipe headwall. 	During Stage 2 transport operations.
	6.3. Implement a standard suite of design measures on all piped and box culvert drainage line crossings, as follows. <ul style="list-style-type: none"> • All pipes and culverts would be provided with inlet protection (in accordance with Chapter 5.4.3 of Landcom (2004)) made from locally-sourced rock cobbles. • All pipes and culverts would be provided with outlet protection, ie. energy dissipators (in accordance with Standard Drawing 5-8 of Landcom (2004)), made from locally-sourced rock cobbles. • Excess accumulations of sediment or leaf litter would be removed from pipes and culverts as works progress. • Where table drains discharge into watercourses or drainage depressions, the outlet point will be provided with scour protection in the form of riprap (or equivalent). • Where drainage lines show evidence of gulying deeper than 1.0m within 20m of the road crossing, batters would be graded back to 6H:1V and stabilised using appropriate erosion control measures and native vegetation would be planted in and around energy dissipation structures. 	During Stage 2 transport operations.



Table 7.2 (Cont'd)
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Desired Outcome	Action	Timing
6. Surface Water (Cont'd)		
Construction of appropriate roadside drainage.	6.4. (Where the general crossing design works would require the construction of, or remedial work to, fill batters), undertake the works as follows. <ul style="list-style-type: none"> Prevent stormwater runoff from drain down the fill batters. Where unavoidable, direct the water as sheet flow over sections of the fill batter vegetated using a hydromulch or equivalent erosion control measures. Direct any concentrated flows via flumes constructed from suitably robust material, including flow arresting measures, and discharging onto an energy dissipater. Fill batters would not exceed 2H:1V gradients. Stabilise fill batters by compaction and use a hydromulch (or equivalent) to aid the establishment of grasses. Install sediment fencing 1m from the toe of any batters. 	During Stage 2 transport operations.
	6.5. Install table drains to manage stormwater runoff from the road pavement as specified by SMM (2008).	During Stage 2 transport operations.
Manage erosion and sediment control during the road upgrading and construction works.	6.6. Minimise clearing of groundcover in advance of upgrading / construction activities.	During Stage 1 and 2 transport operations.
	6.7. Install sediment fencing, in accordance with Standard Drawing SD 6-8 of Landcom (2004) down-slope of any construction area until works are complete.	During Stage 1 and 2 transport operations.
	6.8. Strip and stockpile topsoil, in accordance with Standard Drawing SD 4-1 of Landcom (2004), for later re-use.	During Stage 1 and 2 transport operations.
	6.9. Maintain upslope catchment length of exposed soil areas below 80m. Any slope length exceeding 80m should have a diversion bank, constructed in accordance with Standard Drawing SD 5-5 of Landcom (2004), to direct overland flows onto well-protected, vegetated lands.	During Stage 1 and 2 transport operations.



Table 7.2 (Cont'd)
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Desired Outcome	Action	Timing
6. Surface Water (Cont'd)		
Manage erosion and sediment control during the road upgrading and construction works.	6.10. Restrict construction traffic access to the minimum required for efficient operation of activities.	During Stage 1 and 2 transport operations.
	6.11. Construct diversion banks to divert "clean" runoff from upslope of any construction areas. Discharges would be onto a stabilised, well-vegetated area, preferably using a level spreader or sill.	During Stage 1 and 2 transport operations.
	6.12. Protect areas of concentrated flow, eg. drainage pathways, table drains etc., using appropriate erosion control measures such as a biodegradable Rolled Erosion Control Product (RECP), eg. coconut fibre matting or jute matting.	As part of road upgrading and construction.
	6.13. Stabilise batters following construction or reshaping with vegetation.	As part of road upgrading and construction.
Maintain a Vegetation Offset Area	6.14. Progressively establish a Vegetation Offset Area (VOA) as part of Project Site rehabilitation activities. The VOA would: <ul style="list-style-type: none"> • cover an area of 14.7ha; • be established through a combination of hand seeding and tube stock planting; • focus plantings on the reinstated drainage lines and topographically lower areas of the Project Site; • involve a mix of native <i>Acacia</i>, <i>Eucalyptus</i> and <i>Casuarina</i> species, specifically targeting the re-establishment of the White Box Yellow Box Blakely's Red Gum woodland community in some areas; • be planted at a density of between 1 000 and 2 000 trees per hectare. • be protected from stock by fencing for at least two years; • be watered regularly to promote survival; and • have signage erected identifying the area as a vegetation offset planting area for the management of water quality within the Sydney Drinking Water Catchment. 	Ongoing as part of rehabilitation activities.



Table 7.2 (Cont'd)
Draft Statement of Commitments for Transport Operations and Management

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Desired Outcome	Action	Timing
7. Noise		
All transport operations are undertaken in such a manner as to reduce the noise level generated and minimise impacts on surrounding landholders and/or residents.	7.1. Prevent product deliveries until construction of the Bungonia By-pass is complete.	During Stage 1 transport operations.
	7.2. Restrict product delivery truck movements to 20 per day until the road upgrading works are completed.	During Stage 2 transport operations.
	7.3. Adhere to the nominated hours of operation, ie. no vehicles would arrive at the Project Site before 7:00am or leave the Project Site after 6:00pm.	Ongoing.
	7.4. Enforce driver adherence to all speed limits.	Ongoing.
	7.5. Use only vehicles which employ the most up-to-date noise/emission reducing technology as part of transport fleet.	Ongoing.
	7.6. Instruct all truck drivers to avoid the use of engine brakes when approaching the Project Site entrance.	Ongoing.
	7.7. Regularly service all trucks to ensure the power sound levels remain at or below the levels specified in the noise assessment for the EA.	Ongoing.
	7.8. Ensure noise levels attributable to the construction and operation of the transport route, ie. product transportation, complies with the nominated noise criteria at residences fronting the transport route, within Bungonia village and within audible range of the Bungonia By-pass.	Ongoing.
8. Air Quality		
Transport Route construction and road upgrading activities are undertaken without exceeding DECC air quality criteria or goals.	8.1. Minimise clearing ahead of construction.	During Stage 1 and 2 transport operations.
	8.2. Minimise the number of stockpiles and restrict access to a single working face.	During Stage 1 and 2 transport operations.
	8.3. Compact stockpiles as material is removed or added to stockpiles.	During Stage 1 and 2 transport operations.
	8.4. Restrict all vehicles to designated routes within the Bungonia By-pass construction area with a speed limit of 20km/h.	During Stage 1 transport operations.
	8.5. Clean dirt tracked onto the public road network.	During Stage 1 transport operations.



Table 7.2 (Cont'd)
Draft Statement of Commitments for Transport Operations and Management

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Desired Outcome	Action	Timing
8. Air Quality (Cont'd)		
Site activities are undertaken without exceeding DECC air quality criteria or goals.	8.6. Stand down vehicles with smoky exhausts (more than 10 seconds) for maintenance.	Ongoing.
	8.7. (During hot, dry and/or windy conditions) limit topsoil stripping activities to that required for the ensuing days construction.	During Stage 1, 2 and 3 transport operations.
	8.8. Avoid stripping soil in periods of high wind.	Ongoing.
	8.9. Apply water using a water cart to exposed surfaces.	During Stage 1 transport operations.
9. Flora and Fauna		
Minimisation of long term impact on flora and fauna on and around the Project Site.	9.1. Minimise clearing and consistent with operational requirements.	During clearing.
	9.2. Inspect trees to be cleared prior to clearing to ensure no native fauna is in residence at the time	Prior to clearing
	9.3. Undertake vegetation clearing on a campaign basis to provide for construction operations.	Ongoing.
	9.4. Clearly define all areas to be cleared.	Prior to clearing.
	9.5. Retain felled trees for use in rehabilitation of the final landform.	Ongoing.
	9.6. Construct appropriate drainage and erosion and sediment control features and implement procedures to prevent water containing high sediment levels from discharging from the transport route.	During construction.
	9.7. Control noxious weeds at all times.	Ongoing.
10. Aboriginal Heritage		
Provide appropriate protection to identified Aboriginal artefacts.	10.1. Ensure the in-situ protection of the identified artefacts through workforce education.	Complete.
Provide appropriate protection to identified Aboriginal artefacts.	10.2. Align the Bungonia By-pass to avoid the identified sites containing Aboriginal artefacts.	Prior to commencement of construction activities.
	10.3. Apply for the relevant permit to undertake test pitting over BPAD1 (in accordance with the recommendations of AASC (2008)).	Prior to commencement of construction activities.
Minimise potential to impact upon unidentified Aboriginal artefacts.	10.4. Invite Aboriginal monitors to site to review results of test pitting activities.	Ongoing.
	10.5. Cease work at any area if further Aboriginal objects are uncovered during the course of the project, and contact the DECC (NPWS) for advice.	Ongoing.



Table 7.2 (Cont'd)
Draft Statement of Commitments for Transport Operations and Management

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Desired Outcome	Action	Timing
10. Aboriginal Heritage (Cont'd)		
Employees who are sensitive and respectful of possible identified Aboriginal sites and artefacts.	10.6. Conduct a Cultural Heritage Awareness Induction Course for staff, contractors and any heritage monitors working on the Project Site.	Ongoing.
Notification of Aboriginal Sites under Part 6 s91 NPWS Act.	10.7. Supply formal site cards for all identified Aboriginal artefacts to the DECC Aboriginal Heritage Information Management System (AHIMS) Registrar.	Following identification of an Aboriginal artefact or site.



Section 8 Project Evaluation and Conclusions

*This section concludes the assessment of the modified "Ardmore Park" Project. The identified potential environmental impacts (see **Table 4.5**) are reassessed based on the implementation of the proposed safeguards, controls and mitigation measures and a residual risk level determined. The Project is then evaluated based on the residual risk posed and in consideration of ecologically sustainable development (ESD) principles.*

A justification for the Project is then provided based on the residual impacts of the Project, the likely economic and social benefits that would be generated and the consequences of the Project not going ahead.



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8.1 INTRODUCTION

As a conclusion to the *Environmental Assessment*, the development and operation of the modified “Ardmore Park” Quarry Project is evaluated and justified through consideration of both the potential impacts on the environment and benefits to the local and wider community.

Project evaluation (Section 8.2) has been undertaken by firstly reassessing of the risks posed to the local environment by project activities, following consideration of the controls, safeguards and/or mitigation measures proposed by the Proponent and summarised in Section 7 (see Section 8.2.1). The Project has also been evaluated against the principles of Ecologically Sustainable Development (ESD) in order to provide further guidance as to the acceptability of the Project, as presented in the *Environmental Assessment* (see Section 8.2.2).

Section 8.3, which presents the justification of the Project, revisits the predicted residual impacts on the biophysical environment, considers the socio-economic benefits which would be provided and assesses the consequences of not proceeding with the Project. The Project is also justified in relation to the potential impact on local amenity. It is acknowledged that amenity is a subjective issue, ie. what is considered an acceptable impact on lifestyle, local aesthetics, and the ability to enjoy the local environment, by one person or party may be deemed to be unacceptable by another. However, in an attempt to evaluate the impact of the Project on local amenity, Section 8.3.5 considers the identified impacts on the tangible and intangible elements contributing to local amenity discussed throughout Sections 5 and 6 (and summarised in Section 8.3.2 and 8.3.3) and makes an assessment of the acceptability of any change to amenity to a reasonable member of the local or wider community.

8.2 EVALUATION OF THE PROJECT

8.2.1 Residual Environmental Risk and Impacts

Following consideration of the proposed operational safeguards, controls and mitigation that would be implemented by Multiquip as part of the project design, **Table 8.1** reassesses the risk associated with each of the potential environmental impacts identified in **Table 4.5**. It is noted that in some cases no residual risk rating has been allocated as the assessment recorded in Section 5 or 6 has determined that the impact would not occur.

Table 8.1
Analysis of Risk

Page 1 of 5

Potential Environmental Impacts (see Table 3.5)	Level / Scale of Impact (if applicable)	Unmitigated Risk Rating	Consequence of Occurrence if Mitigated	Likelihood of Occurrence if Mitigated	Residual Risk Rating
Traffic and Transport					
Increased traffic congestion		M	2	C	M
Road pavement deterioration		H	1	C	L
Elevated risk of accident/incident on local roads	Minor accident – no injury	M	2	D	L
	Minor accident – minor injury	M	3	E	M
	Major accident – moderate injuries requiring hospitalisation	H	4	E	H
	Severe accident – severe injuries or death injury	H	5	E	H



Table 8.1 (Cont'd)
Analysis of Risk

Potential Environmental Impacts (see Table 3.5)	Level / Scale of Impact (if applicable)	Unmitigated Risk Rating	Consequence of Occurrence if Mitigated	Likelihood of Occurrence if Mitigated	Residual Risk Rating
Groundwater					
Groundwater Pollution by leaking/spilt pollutant	Contamination requiring minor recovery works	M	2	E	L
	Contamination requiring major recovery works	H	2	E	L
Reduction in groundwater bore yields	Impacts restricted to groundwater bores on the Project Site, or Multiquip-owned land	M	1	B	M
	Reduction in yield of <15% of non-project related bores	M	2	D	L
	Reduction in yield of >15% of non-project related bores	M	2	E	L
	Reduced yield of local springs on neighbouring properties	M	2	E	L
Impacts on Groundwater Dependent Ecosystems		M			
Surface Water/Flooding and Drainage					
Reduced natural surface water flows	Reduced productivity of downstream grazing lands	L	1	E	L
	Stressing of downstream native vegetation due to restricted flows	L	1	E	L
Reduced quality of downstream waters	Isolated and minor event resulting in temporary degradation of water quality in local creeks and tributaries, eg. Minor and one-off discharge of hydrocarbon	M	3	E	M
	Continuing discharge of contaminated water resulting in ongoing degradation of water quality in local creeks and tributaries, eg. frequent/periodic discharge of dirty water	H	3	E	M
	Isolated and major event resulting in temporary but wider spread degradation of water quality, eg. large discharge of hydrocarbons	M	4	-	
	Repeated major event resulting in long-term and wide spread degradation of water quality, eg. continued discharge of dirty or contaminated water	H	4	-	
Changes to local flooding patterns and indirect impacts on native vegetation communities and ecosystems.		M	2	E	L
Erosion and Sedimentation					
Soil erosion	Minor gully erosion of drainage lines, stockpiles or created slopes	H	2	D	L
	Minor sheet or gully erosion of rehabilitated landform	M	2	D	L
	Major gully or sheet erosion formation	H	3	E	M
Sediment Load and Turbidity	One-off discharge of dirty water from the Project Site	H	2	D	L
	Regular discharge of dirty water from the Project Site	H	3	E	M



**Table 8.1 (Cont'd)
Analysis of Risk**

Potential Environmental Impacts (see Table 3.5)	Level / Scale of Impact (if applicable)	Unmitigated Risk Rating	Consequence of Occurrence if Mitigated	Likelihood of Occurrence if Mitigated	Residual Risk Rating
Noise and Vibration					
Increased noise levels associated with construction activities on the Project Site causing annoyance, distractions, ie. amenity impacts.	Occasional minor exceedance of noise criteria (1-2dB(A))	M	2	D	L
	Regular minor exceedance of noise criteria (1-2dB(A))	M	2	E	L
	Occasional marginal exceedance of noise criteria (3-5dB(A))	M	2	D	L
	Regular marginal exceedance of noise criteria (3-5dB(A))	H	2	D	L
	Occasional major exceedance of noise criteria (>5dB(A))	H	2	E	L
	Regular major exceedance of noise criteria (>5dB(A))	H	2	E	L
Increased noise levels associated with operational activities on the Project Site causing annoyance, distractions, ie. amenity impacts.	Occasional minor exceedance of noise criteria (1-2dB(A))	M	2	E	L
	Regular minor exceedance of noise criteria (1-2dB(A))	M	2	E	L
	Occasional marginal exceedance of noise criteria (3-5dB(A))	M	2	E	L
	Regular marginal exceedance of noise criteria (3-5dB(A))	H	2	E	L
	Occasional major exceedance of noise criteria (>5dB(A))	H	2	E	L
	Regular major exceedance of noise criteria (>5dB(A))	H	2	E	L
Increased noise / vibration levels associated with project traffic activities causing annoyance, distractions, ie. amenity impacts.	Occasional minor exceedance of noise criteria (1-2dB(A))	M	2	D	L
	Regular minor exceedance of noise criteria (1-2dB(A))	M	2	E	L
	Occasional marginal exceedance of noise criteria (3-5dB(A))	M	2	D	L
	Regular marginal exceedance of noise criteria (3-5dB(A))	M	2	D	L
	Occasional major exceedance of noise criteria (>5dB(A))	M	2	E	L
	Regular major exceedance of noise criteria (>5dB(A))	M	2	E	L
Increased noise levels associated with the Project leading to reduced production, ie. impacts on livestock.		M	2	E	L
Vibration from traffic resulting in damage to buildings and structures		M	2	E	L
Air Quality					
Nuisance – deposited dust	Deposited dust levels attributable to the Project occasionally (for one or two months every year) above DECC guideline, affects only adjacent landholders.	M	2	D	L
	Deposited dust levels attributable to the Project regularly (exceedances greater than DECC guideline for >5 months per year) affects landholders some distance from the Project Site.	H	3	E	M



Table 8.1 (Cont'd)
Analysis of Risk

Potential Environmental Impacts (see Table 3.5)	Level / Scale of Impact (if applicable)	Unmitigated Risk Rating	Consequence of Occurrence if Mitigated	Likelihood of Occurrence if Mitigated	Residual Risk Rating
Air Quality (cont'd)					
Health – PM ₁₀	PM ₁₀ levels attributable to the Project occasionally (once every 1 to 2 years) above the Project goal, affects only adjacent landholders.	M	2	D	L
	PM ₁₀ levels attributable to the Project occasionally (>5 times per year) above the Project goal, affects landholders some distance from Project Site.	H	3	E	M
Greenhouse Gas Emissions		M	1	B	L
Flora and Fauna					
Loss of, or alteration to, existing habitats.	Disturbance to native vegetation / habitat within nominated areas	H	1	B	L
	Disturbance to native vegetation / habitat outside nominated areas	M	2	D	L
	Obstruction, disturbance or removal of wildlife corridors	H	3	D	H
Direct adverse impacts on threatened species.	Disturbance to Threatened flora / fauna and endangered communities	H	2	E	L
	Disturbance leading to local population reduction	H	4	-	-
	Disturbance leading to local extinction(s)	H	3	-	-
Reduced biodiversity	Local biodiversity	M	4	-	-
	Regional biodiversity	H	1	B	L
Visual Amenity					
Reduced amenity of altered Project Site landform	Temporary disturbance to landform	H	1	A	H
	Marginally identifiable change to landscape	H	1	C	L
	Highly identifiable change to landscape	H	2	C	L
Aboriginal Heritage					
	Impact on identified sites and/or artefacts of Aboriginal cultural heritage as a result of the proposed construction and extraction activities and without the permission of LALC or DECC	E	-	E	L
	Impact on unidentified sites and/or artefacts of Aboriginal cultural heritage as a result of subsidence and without the permission of LALC or DECC	H	4	D	H
European Heritage					
	Impact on identified sites of European cultural heritage	L	-	-	-
Rehabilitation, Final Landform & Biodiversity Offsets					
	Reduced access to agricultural lands	M	2	D	L
	Increased spread of weed and/or pest species	M	2	D	L
	Final landform incompatible with final land use objectives	M	2	D	L
Soil and Land Capability					
Insufficient soil quantities for rehabilitation.	Insufficient soil quantities for rehabilitation.	H	1	D	L
Reduced soil quality	Reduced soil quality	M	1	D	L
	Degradation of soil quality	M	2	D	L
Elevated erosion or erosion potential.	Elevated erosion or erosion potential.	M	2	D	L
Decreased land and agricultural capability of the final landform	Decreased land and agricultural capability of the final landform	H	2	E	L



Table 8.1 (Cont'd)
Analysis of Risk

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Potential Environmental Impacts (see Table 3.5)	Level / Scale of Impact (if applicable)	Unmitigated Risk Rating	Consequence of Occurrence if Mitigated	Likelihood of Occurrence if Mitigated	Residual Risk Rating
Bushfire					
Initiation of fire leading to impacts on the Project Site	Minor disturbance to Project Site lands and equipment resulting in temporary suspension of operations	L	2	E	L
	Major damage to Project Site lands and equipment resulting in long-term or complete suspension of operations	H	3	E	M
	Impacts on health and safety of project personnel	H	4	D	H
Initiation of fire leading to impacts outside the Project Site	Minor disturbance to lands and property external to the Project Site	L	2	E	L
	Major disturbance to lands and property external to the Project Site, eg. Entry into Vickery State Forest	H	3	E	M
	Impacts on health and safety of local landowners, residents and the general public	H	5	E	H
Socio-Economic Impacts and Property Values					
Reduced quality of life (actual or perceived)		M	2	E	L
Reduced property values	Temporary decrease in property values	M	2	E	L
	Moderate term decrease in property values	H	2	E	L
	Long term decrease in property values	H	3	E	M
Consequence of Occurrence: 1 = Insignificant; 2 = Minor; 3 = Moderate; 4 = Major; 5 = Catastrophic Likelihood of Occurrence: A = Almost Certain; B = Likely; C = Possible; D = Unlikely; E = Rare Risk Rating: E = Extreme; H = High; M = Moderate; L = Low					

Through the implementation of the proposed controls, safeguards and mitigation measures summarised in Section 7, the risk rating for the majority of potential environmental impacts has been reduced to either a moderate or low risk rating.

In some cases, a rating is no longer provided as the relevant assessment recorded in Section 5 or 6 determined the likelihood to be so low, or consequence so insignificant, as to be virtually non-existent. This approach was generally taken when the risk rating could not be considered any lower than "high" (due to a likelihood classification as "almost certain" or consequence classification as "catastrophic") so as not to suggest a significance that does not exist.

Further consideration is given to the potential impacts which retain a "high" risk rating as follows.

- Impact on unidentified sites and/or artefacts of Aboriginal cultural heritage as a result of the proposed Project Site or transport operations and without the permission of LALC or DEC.

The accidental disturbance to an Aboriginal artefact or site cannot be categorically ruled out and therefore, even though the potential likelihood is considered unlikely, as the potential consequence is major, a high risk rating is retained.



- Temporary disturbance to the existing landform and marginally identifiable change to the landscape.

While the potential consequence of the impact is considered insignificant, because it is considered almost certain to occur, the high risk rating applies.

- Major or severe accident resultant from road transport from the Project Site.

While every precaution has been and would be taken by the Proponent in relation to the design of traffic management and education of its workforce, the potential consequence of a major or severe accident is such that a high risk rating applies.

- Impacts of bushfire impacting on native vegetation, private lands and possibly human safety and health on or beyond the limits of the Project Site.

While considered a potentially rare occurrence, the consequence could be major and as such a high risk rating applies despite the incorporation of project safeguards which would minimise the potential for fire on the Project Site.

The risks associated with the majority of possible environmental impacts are considered moderate or less and therefore, while these may result in impacts deemed unacceptable to some stakeholders, the development and operation of the Project, with the implementation of appropriate management plans, are generally considered acceptable.

8.2.2 Ecological Sustainable Development

8.2.1.1 Introduction

Sustainable practices by industry, all levels of government and the community are recognised to be important for the future prosperity and well-being of the world. The principles of Ecologically Sustainable Development (ESD) that have been recognised for over a decade were based upon meeting the needs of the current generation while conserving our ecosystems for the benefit of future generations. In order to achieve sustainable development, recognition needs to be placed upon the integration of both short-term and long-term environmental, economic, social and equitable objectives.

Throughout the design of the Project, the Proponent has endeavoured to address each of the sustainable development principles. The following sub-sections draw together the features of the Project that reflect the four principles of sustainable development, namely:

- the precautionary principle;
- the principle of social equity;
- the principle of the conservation of biodiversity and ecological integrity; and
- the principle for the improved valuation and pricing of environmental resources.

8.2.1.2 The Precautionary Principle

To satisfy this principle of ESD, emphasis must be placed on anticipation and prevention of environmental damage, rather than reacting to it. During the planning phase for the Project and throughout the preparation of the *Environmental Assessment*, Multiquip engaged specialist consultants to examine the existing environment, predict possible impacts and recommend



controls, safeguards and/or mitigation measures in order to ensure that the level of impact satisfies statutory requirements or reasonable community expectations. Throughout the development of the modified Project, Multiquip and its consultants have adopted an anticipatory approach to impacts, particularly that of irreversible ecological damage, by undertaking an analysis of the risks posed by activities of the Project, an appropriate level of research and baseline investigations and environmental evaluation. The controls, safeguards and/or mitigation measures have therefore been planned with a comprehensive knowledge of the existing environment and the potential risk of environmental degradation posed by Project activities.

The implementation of the environmental safeguards, controls and mitigation measures has been formalised by the Proponent as the draft statement of commitments presented as Section 7.

Examples of matters relating to the precautionary principle that were considered during the various stages of the Project are listed below.

Objectives of the Project

The Project has been designed with the principal objective being to develop and operate the mine in a safe and environmentally responsible manner, and which meets the requirements of local and State government agencies, accepted industry standards and wherever possible, reasonable community expectations. Multiquip recognises that only through comprehensive environmental assessment and an environmentally responsible approach to the design and operation of the Project can the risk of harm to the environment be minimised.

Design of Project Components

Several design aspects of the Project were modified following the upholding of the refusal of the original "Ardmore Park" Quarry proposal to ensure the requirements of local and State government agencies, accepted industry standards and wherever possible, reasonable community expectations were met. These included the following.

- The proposal to construct a private by-pass road of Bungonia Village to minimise the impacts of traffic and on local noise, amenity and heritage value. The alignment of the Bungonia By-pass itself was also modified during the planning phase to minimise impacts on the native vegetation of the land over which the road would be located.
- A vegetation offset was developed to compensate for the 0.4ha of native vegetation that would be disturbed by the construction of the proposed Bungonia By-pass.
- The locations of soil stockpile areas were chosen within the impact footprint of the extraction area. This would minimise the area of land disturbed by Project Site operations.
- An acoustic bund wall was designed to the west of the Project Site processing and internal transport operations to ensure noise received at the closest residence to the west and south is minimised and remains below the nominated INP criteria.



- The final landform was designed to provide for the re-establishment of land suitable for agriculture whilst integrating the conservation of significant areas of native vegetation, which would ultimately link with remnant native vegetation to the south.

Integration of Safeguards and Procedures

The framework for ongoing environmental management, operational performance and rehabilitation of the Project Site would be provided through the project approval and which would involve the input from relevant State and local government agencies.

The Dust Management Plan included in the *Environmental Assessment* as Section 6.5.2 would be implemented to ensure nuisance impact associated with the construction activities on the proposed Bungonia By-pass. Multiquip would also prepare a series of specific management plans and monitoring programs to manage the various environmental issues identified in the Environmental Assessment. It is anticipated that at least the following would be required.

- Environmental Management Strategy.
- Soil and Water Management Plan.
- Landscape and Rehabilitation Management Plan.
- Noise Monitoring Program.
- Air Quality Monitoring Program.

The various plans and programs, along with a range of site specific environmental procedures to achieve consistency with specified outcomes and to control identified risks, would be consolidated into an Environmental Management Plan for the project.

In addition:

- all on-site procedures would be regularly reviewed, particularly in light of monitoring results;
- surface water, groundwater, noise, deposited dust levels, and rehabilitation would be monitored at locations potentially most affected by the Project in order to ensure the continued compliance of the operation with goals outlined in this document;
- the principles outlined in the surface water management plan would be adopted to minimise any impact on water quality or quantity exiting the Project Site. Wherever possible, areas not required for Project Site activities would remain grassed to assist in minimising erosion and reducing the suspended sediment load in surface water flowing through the Project Site; and
- topsoil and subsoil would be stripped, stockpiled and re-spread on the basis of the quality of the soil (as indicated by the soil mapping unit), and planned final land use of different areas of the final landform.



Rehabilitation and Subsequent Land Use

Long term adverse impacts on the local environment would be avoided through the design and rehabilitation of a landform suitable for the establishment / maintenance of 14.7ha of native vegetation over the southern area of the proposed final landform. The remainder of the final landform would be returned to sustainably managed agricultural land.

Conclusion

The precautionary principle has been considered during all stages of the design and assessment of the modified “Ardmore Park” Quarry Project. The approach adopted, ie. initial assessment, consultation, specialist investigations and safeguard design, provides a high degree of certainty that the project would not result in any major unforeseen impacts.

8.2.1.3 Social Equity

Social equity embraces value concepts of justice and fairness so that the basic needs of all sectors of society are met and there is a fair distribution of costs and benefits to the community. Social equity includes for both inter-generational (between generations) and intra-generational (within generations) equity considerations.

Equity within generations requires that the economic and social benefits of the development be distributed appropriately among all members of the community. Equity between generations requires that the non-material well-being or “quality of life” of existing and future residents of the local community would be maintained throughout and beyond the life of the Project.

Both elements of social equity are addressed through the design of the Project itself, the implementation of operational safeguards to mitigate any short-term or long-term environmental impacts, and the proposed rehabilitation of the areas directly disturbed. Examples of matters relating to social equity that are relevant to the various stages of the proposed development are listed below.

Identification of Project Objectives

The project has been designed with the objective of providing sand, aggregate and other hard rock products to the Sydney, South Coast, Canberra and local construction markets at a reasonable price and in an efficient, environmentally responsible manner. Notably, the modified project was designed with an objective to minimise impacts on the residents of Bungonia and property owners adjacent to the proposed transport route through the construction of a private by-pass road of Bungonia and progressive upgrading of the public sections of road.

The Project has also been designed with the objective to ensure the continued viability of surrounding land uses throughout and beyond the life of the project.



Design of Project Components

The project has been designed to maintain inter-generational equity, ie. in recognition that the project is a relatively short term land use, and to ensure components of the existing biological, social and economic environment are available to existing generations would also be available to future generations.

- A by-pass of Bungonia would be constructed to minimise potential impacts on the amenity and heritage value of the village.
- The public roads of the transport route would be upgraded, thereby providing a benefit to all local road users.
- The availability of groundwater to surrounding landholders, although not predicted to be affected, would be monitored throughout the life of the project and compensatory measures taken should a short term restriction in the availability of groundwater to local landholders occur.
- The rehabilitation of the Project Site has been designed to re-establish comparable areas of agricultural land while integrating the establishment and conservation of native vegetation.
- The proposed Project Site operations and transport route have been designed to ensure that disturbance to Aboriginal heritage sites would be restricted to a single potential archaeological deposit, which would be further surveyed prior to construction of the Bungonia By-pass.

Integration of Safeguards and Procedures

An Environmental Management Plan would be prepared (and updated) for the project together with the required site-specific procedures and protocol providing a level of protection to the local community. Multiquip would continue to consult with the local community in order to continually improve the environmental performance of the project. This consultation would include a system to record, manage and respond to complaints relating to the operation.

Progressive Rehabilitation and Subsequent Land Use

The final landform would be constructed in a manner that would maximise its potential for its intended agricultural land use, thereby providing the basis for continuing economic activity within the local community.

Conclusion

The principle of social equity has been addressed as part of the design of the modified "Ardmore Park" Quarry Project. The project would provide an economic contribution to the local economy and continued economic activity in the local community at the cessation of extraction activities. The project was also designed such that elements of the existing environment available to this generation, including agricultural land, water and local biodiversity would continue to be available to future generations. The Proponent would adopt a pro-active approach in identifying and addressing any concerns identified by the local community.



8.2.1.4 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological processes and systems are central goals of sustainability. It is important that developments do not threaten the integrity of the ecological system as a whole or the conservation of threatened species in the short- or long-term. Details of how the project has been designed to achieve compliance with these principles are set out below.

Identification of Project Objectives

Multiquip is committed to undertake all activities in an environmentally responsible manner and recognises the need to fully understand the ecological components and inter-relationships that exist on the Project Site and transport route, and ensure that changes to other natural components of the environment (e.g. soils, surface water and groundwater) do not adversely affect the biological diversity or ecological integrity of the Project Site.

Multiquip is committed to undertake all activities in an environmentally responsible manner, and recognises the need to ensure that changes to natural components of the environment do not adversely affect biological diversity or ecological integrity. As such, the Project has been designed to incorporate measures that would:

- minimise impacts on the flora and fauna of the Project Site, whilst allowing the extraction of an economically viable resource;
- through progressive rehabilitation, ultimately result in improvements in the extent and viability of native vegetation habitat available; and
- implementation of a biodiversity offset strategy which compensates for the clearing of approximately 0.4ha of an endangered ecological community on the Crown land section of the proposed Bungonia By-pass.

Design of Project Components

Multiquip, on advice from the specialist consultancy's commissioned to assess the impact of the project, has provided for the conservation of biological diversity and ecological integrity through the following design elements.

- Water management structures have been designed and would be constructed to ensure that the proposed Project Site operations have a neutral or beneficial impact on the water quality of the Sydney drinking water catchment.
- A vegetation offset, incorporated into the progressive rehabilitation program, would be implemented to ensure a net beneficial impact on the quality of the Sydney drinking water catchment results, to compensate for the minor impacts resultant from the proposed transport operations.
- Overburden produced would be returned to the extraction area as a fill material reducing the area required to be disturbed.



- Soil stockpiles would initially be constructed over the areas targeted for extraction, further reducing the required area of disturbance, and progressively used in the rehabilitation of the Project Site. After the initial 2-5 years, all topsoil and subsoil stripped would be transferred directly to active rehabilitation areas thereby maximising the biological activity within the soil and viability of the contained seed bank.
- Progressive rehabilitation of the Project Site would include the establishment of a 14.7ha area of native vegetation, which would be linked with remnant native vegetation to the south of the Project Site.

Integration of Safeguards and Procedures

Multiquip would implement the following safeguards and procedures to maximise the conservation of biological diversity and ecological integrity on and surrounding the Project Site.

- Pre-clearing surveys of native tree species would be undertaken and any threatened species encountered would be relocated prior to clearing.
- Cleared vegetation <300mm in diameter or containing hollows would be retained and used in the rehabilitation of areas designated for native vegetation re-establishment.
- Progressive rehabilitation of the Project Site would include the establishment of native vegetation.
- Weed eradication programs would be developed and implemented, as required.

Rehabilitation and Subsequent Land Use

The final landform has been designed to achieve a balance between agricultural activity and the reinstatement of native vegetation/bushland and would increase areas of viable habitat for native fauna. The areas designated for native vegetation re-establishment have been selected to enable the development of linkages between remnant areas of native vegetation and hence increase the conductivity and connectivity of wildlife corridors for native fauna.

Conclusion

The Project would address the principle of conservation of biological diversity and ecological integrity through the minimisation of disturbance to areas of native vegetation, and re-establishment of greater areas of native vegetation than are disturbed. Should threatened species be identified within those areas of the Project Site to be disturbed, these would be relocated or managed appropriately in consultation with DECC or a suitably qualified professional. Weed eradication programs would be implemented as appropriate and would further assist in addressing the principle of sustainable development.



8.2.1.5 Improved Valuation and Pricing of Environmental Resources

The issues that form the basis of this principle relate to the acceptance that the polluter pays, all resources are appropriately valued, cost-effective environmental stewardship is adopted and the adoption of user-pays principle based upon the full life cycle of the costs. A reflection of these issues on the project is set out below.

Identification of Project Objectives

The principal objective of Multiquip is to operate a sand and hard rock quarry in a safe and environmentally responsible manner, which illustrates that an appropriate value has been placed on elements of the existing environment. In addition, by identifying the objective of re-establishing a final landform with slopes similar to the pre-extraction landform, including additional areas of native vegetation establishment and conservation, Multiquip has indicated the value placed on these elements of the environment.

Design of Project Components and Integration of Safeguards and Procedures

The extent of research, planning and design of environmental safeguards, mitigation measures and offset strategies to prevent irreversible damage to environmental resources, other than the coal to be mined, is evidence of the value placed by the Proponent on these resources.

Multiquip’s commitment to improving the local road network used by trucks transporting quarry products and continuing to contribute to funding of road maintenance also reflects the Multiquip’s commitment to this principle.

Rehabilitation and Subsequent Land Use

The design of the final landform to replicate, as far as practical, the pre-extraction environment exemplifies the value placed by Multiquip on the existing environment of the Project Site.

Conclusion

Improved valuation, pricing and incentive mechanisms have been addressed in the proposed “Ardmore Park” Quarry and the provision of a suitable landform for long term use of the Project Site. It is planned that the price of the products despatched are sufficient to enable Multiquip to undertake all environmentally-related tasks and meet commitments to the local community.

8.2.1.6 Conclusion

The approach taken in planning the modified “Ardmore Park” Quarry Project has been multi-disciplinary, involved consultation with potentially affected local residents and various government agencies with emphasis on the application of safeguards to minimise potential environmental, social and economic impacts. The design of the project has addressed each of the sustainable development principles, and on balance, it is concluded that the project achieves a positive sustainable outcome for the local and wider environment.



8.2.3 Local Amenity Considerations

8.2.3.1 Introduction

One of the principal issues identified by Justice Jagot J when forming her opinion to refuse the previous application for development consent for the proposed "Ardmore Park" Quarry was the detrimental impact the proposed transport route through Bungonia village would have on local amenity. Justice Jagot J referred to amenity as follows:

"... a wide and flexible concept embracing such matter as the character of a place and the attributes of a place which a community values as important contributors to its character..."

On the basis of this description, issues influencing the 'amenity' of a place may include both tangible impacts on the local setting, ie. those impacts on the biophysical environment which can be measured, as well as more intangible elements, ie. impacts on aspects of the local setting which are not easily quantified or directly measured. A town planning expert who provided evidence to Hearing 10245 of the Land & Environment Court referenced the intangible nature of the amenity of a place when he emphasizes the importance of the "*strong village character, with a sense of arrival, place and community*" of Bungonia.

In arriving at the conclusion to refuse the original development application, Justice Jagot J placed particular emphasis on the amenity related impacts of the original proposal on Bungonia. Paragraph 66 of her judgment states.

"People living within such a village (zoned 2(v)) or having recourse to it for various purposes are entitled to have different expectation about amenity from those living in the 1(a) zone ... In particular, land zoned 2(v) is intended to perform an urban function. Land zoned 1(a) is not. The reasonableness of the expectation of people living within designated urban and rural areas is to be assessed within the context set by the planning scheme."

It is noteworthy that in presenting her judgment on local amenity impacts, Justice Jagot J made particular reference to the distinction between impacts on amenity within zones 2(v) and 1(a) of Mulwara LEP 1995, specifically referencing the objective of Zone 2(v) which is to:

"promote development in existing towns and villages and to allow future development in them in a manner which is compatible with their urban function by:

- (a) ensuring the orderly and efficient use of land and infrastructure within each town and village,*
- (b) improving the amenity of residential, commercial, civic and community uses within the towns and villages, and*
- (c) conserving the buildings, landscape features and streetscape features that contribute to the character and identity of the villages."*



In contrast, the objectives of zone 1(a) under the Mulwaree LEP 1995 are "to promote the proper management and utilisation of resources by:

(a) *promoting, enhancing and conserving:*

- (i) *agricultural land, particularly prime crop and pasture land, in a manner which sustains its efficient and effective agricultural production potential;*
- (ii) *soil stability by controlling and locating development in accordance with soil capability, as identified by the Department of Conservation and Land Management;*
- (iii) *forests of existing and potential commercial value for timber production;*
- (iv) *valuable deposits of minerals, coal, petroleum, and extractive materials by controlling the location of development for other purposes in order to ensure the efficient extraction of those deposits;*
- (v) *trees and other vegetation in sensitive areas and in any place where the conservation of the vegetation is significant to the protection of scenic amenity or natural wildlife habitat or is likely to control or contribute to the control of land degradation;*
- (vi) *water resources and water catchment areas for use in the public interest;*
- (vii) *localities of significance for nature conservation, including localities with rare plants, wetlands, permanent watercourses and significant wildlife habitat; and*
- (viii) *places and buildings of archaeological or heritage significance, including aboriginal relics and places;*

(b) *minimising the costs to the community of:*

- (i) *fragmented and isolated development of rural land; and*
- (ii) *providing, extending and maintaining public amenities and services; and*
- (iii) *providing land for future urban development, for rural residential development and for development for other non-agricultural purposes, in accordance with the need for that development, and subject to the capability of the land and its importance in terms of the other objectives of this zone."*

It is clear from the judgment of Hearing 10245 of the Land and Environment Court that impacts on local amenity must be considered and need to give due consideration to the objectives of the zone within which any impacts may occur. In order to evaluate and justify the Project in relation to impacts on local amenity, this section of the *Environmental Assessment* provides:

- a summary of amenity related issues previously raised by members of the local community; and



- an evaluation of the Project impacts on the tangible and intangible elements of the local environment that combined contribute to the amenity of the location.

A conclusion as to how a reasonable member of the local or wider community might perceive the proposed changes to these tangible and intangible elements in relation to local amenity is presented in Section 8.3.6. The conclusion is presented in the context of justifying the potential impact on local amenity of the Project and in particular considers the impacts in relation to the zoning objectives of the Mulwara LEP 1995.

8.2.3.2 Amenity Related Issues

As noted in Section 8.1, amenity related issues are subjective and may vary from person to person. This notwithstanding, an indication of the issues considered important to the local amenity of the Bungonia and Goulburn Communities is provided by submissions made by various individuals and community groups to the impacting on local amenity Land and Environment Court during a hearing over the previous application for the "Ardmore Park" Quarry.

The following is a summary of the issues raised in these submissions as they relate to amenity¹.

- Village/community life of Bungonia will be adversely affected by the proposed transport operations.
 - The transport operations may compromise community events held in Bungonia due to increased traffic and noise.
 - There would be an altered local culture with influx of personnel to staff the Project sourced from outside the local community.
- The peace and quiet of the local environment valued by those who choose to live in the area will be destroyed.
- The viability of surrounding landowner operations (especially olive farmers, sheep and cattle producers, pine plantation growers, vineyards and floral suppliers) may be compromised, leading to a change in the nature of activities undertaken locally.
 - The proposed Project Site operations may sterilize any opportunity for other activities on local lands which may be more conducive to rural setting.
 - The Project may lead to more industry or intensive farming in the area, compounding other impacts on amenity.
- The safety of the local area may be reduced due to an increase in the numbers of trucks using the local roads.
- The heritage value of Bungonia may be reduced as a result of noise, vibration or dust resultant from transport operations.
- Considerations of social equity associated with the Project leading poor esteem in the local area.

¹ Issues contained within submissions relating solely to impacts on the biophysical environment have not been included.



Each of these amenity related issues is considered as relevant in light of the evaluation of tangible and intangible influences on local amenity presented in Section 8.3.5.3.

8.2.3.3 Impacts on Issues Influencing Local Amenity

8.2.3.3.1 Introduction

Throughout Sections 5 and 6, the impact of the Project Site and transport operations on the biophysical and socio-economic setting of the Project were considered. Sections 8.3.5.3.2 and 8.3.5.3.3 provide a summary of the tangible, ie. measurable, and intangible, ie. unmeasurable, impacts as they relate to the amenity related issues identified in Section 8.3.5.2.

Section 8.3.5.3.4 presents a conclusion as to the likely impact on the amenity on a reasonable member of the local community.

8.2.3.3.2 Tangible Impacts

Noise

A common theme to submissions from the local community at Land and Environment Court hearing No. 10245 was the perceived impact that increased noise levels may have on the peace and quiet of the local setting. In relation to this claim the following is noted.

- The assessment of predicted noise impacts has determined that the maximum worst-case noise level predicted at a nearby residential receiver was 32dB(A). The noise modeling demonstrates that even under worst-case meteorological conditions, the level of noise generated by the Project Site operations would reduce to <30dB(A) within several hundred meters of the Project Site. Notably, 30dB(A) has been established in the INP (EPA, 2000) as the background noise level representing a rural setting where there is no major noise generating activities. The proposed Project Site operations would therefore not result in noise levels greater than those established as background for rural environments.
- The noise assessment also predicts that the noise level received at those residences located along the proposed transport route would not exceed the relevant traffic noise criteria nor increase by more than 4dB(A). It is noted that when considering noise levels subjectively, an increase of between 3dB(A) and 5dB(A) is considered a moderate increase, noticeable by some people but may be noticeable by others (Heggies, 2008a).
- Finally, noise associated with the construction and use of the Bungonia by-pass would remain at least 6dB(A) and 9dB(A) below the respective criterion at residences surrounding the proposed road. Notably, the noise levels predicted during the construction phase would occur for less than 4 weeks with construction and operational noise for the remainder of the proposed transport operations well below the nominated criteria. Also of note is that the predicted operational noise contribution of the Bungonia by-pass would be less than that of the measured background noise levels and therefore, any change to noise levels would be negligible and imperceptible to most residents of the village or nearby rural residences.



Vibration

The predicted peak component vibration levels resultant from the proposed transport operations would be well below the most stringent damage criterion of 5mm/s applicable to residences (dwellings) and imperceptible to these residents.

Traffic

Importantly, *heavy vehicle traffic would not travel through the village of Bungonia*, nor along all but 250m of Mountain Ash Road, the main road between Bungonia and Goulburn. As such, the residents of Bungonia would only come into contact with the trucks of the quarry intermittently if using Jerrara Road to the Hume Highway or Oallen Ford Road to access properties to the south.

While it is acknowledged that the proposed transport operations would result in an increase in the number of heavy vehicles using Oallen Ford Road and Jerrara Road, traffic levels would still remain below 500vpd, which is identified in the RTA's *Road Design Guide* as the threshold value, beyond which wider lanes and shoulders are recommended to accommodate the level of traffic. Notably, the Proponent has provided for the widening of the road to a standard sufficient for in excess of 2 000vpd. The widened roads would provide ample room for passing and *improve* both the safety and function of these roads for all road users.

A conclusion of Hallam (2008), that there is nothing inherently unsafe about articulated trucks such as those to be operated by the Proponent, is reiterated. Further, the movement of articulated and rigid trucks is an existing feature of the local road network (see **Table 6.3**). While noticeable, the change to the level of heavy vehicles using the local roads would be gradual, with traffic levels commencing at 20 movements per day, before increasing to 56 after approximately 12 to 18 months and ultimately 88, and mitigated by the quality of vehicle used, ie. new Scania Mack or Kenworth vehicles (the manufacturers of which are noted leaders in the manufacture of environmentally friendly vehicles).

Air Quality

Dust deposition attributable to the Project Site operations would be minimal (<0.5g/m²/month) and effectively imperceptible to local landowners.

The concentration of particulate matter which could potentially impact on human health, ie. PM₁₀ and crystalline silica, would also be well below the threshold concentration considered likely to result in adverse affects on the health of residents of the local area.

In addition, the short-term dust generating activities associated with the construction of the Bungonia by-pass would be managed in accordance with a Dust Management Plan to ensure no local residents receive elevated dust levels at their residence or property.



Water Resources

Impacts on water resources may impact on local amenity in two ways.

- (i) Any reduction in the availability of either ground or surface water may impact on the viability of local land uses which rely on this water and which contribute to the rural setting of the Bungonia area.
- (ii) The quality of local creeks and streams has also been identified as an influence on the amenity of the local area.

The assessments of SMM (2008) and LCA (2008b) indicate that the proposed Project Site operations would be unlikely to have any significant impact on the availability of surface or groundwater resources to neighbouring land owners.

In addition, the proposed the construction and maintenance of various water diversion, retention, settlement and storage structures on the Project Site and along the transport route would ensure that the water quality is improved, based on the MUSIC modelling completed by SMM (2008).

Local Vegetation

Neither the Project Site nor transport operations would require clearing of any substantial areas of native vegetation, which have aesthetic appeal to the local community. In fact, the Proponent has committed to rehabilitating large areas of the proposed extraction area to re-establish of native grassy woodland vegetation. In addition, areas of the "Ardmore Park" property would remain fenced and segregated from ongoing grazing, which would ultimately result in the ecological value of the property increasing.

Identified Heritage

Identified sites of Aboriginal non-Aboriginal heritage value would not be disturbed by the either the Project Site or transport operations. Notably, the proposed Bungonia by-pass would ensure that the historic values of Bungonia village would be protected (given there would be no change to the number of type of traffic passing through the village) and the revised entrance location to the Project Site would avoid any possible impact on the "Larbert Tree" (identified as being of historic importance by the Bungonia Historic Society).

While it is noted that the "Ardmore Park" property may have historic associations with the early development of the locality, ie. some early maps identify the Old Argyle Road as traversing the property, no evidence of this road was identified (GSA Planning, 2007). This notwithstanding, Multiquip has committed to the preparation of a Cultural Heritage Management Plan (CHMP) which would:

- be prepared in consultation with the NSW Heritage Office;
- include an inventory of all listed heritage items locally;
- provide opportunity for further research as to any physical evidence of the Old Argyle Road;
- include a protocol for surface disturbing activities in the vicinity of the recorded location of the Old Argyle Road; and
- include a protocol to be followed in the event that archaeological material is exposed as a result of surface disturbing activities.



Therefore, the Project would not be to the detriment of local heritage values, rather the preparation and implementation of the CHMP would actually provide an opportunity for improved historic understanding of the early development and occupation of the local area.

Visibility

Obscured and distant views of Project Site operations would be limited to those residences immediately surrounding the Project Site, namely:

- "Inverary" & "Inverary Park": Direct but distant views of the Project Site, predominantly extraction activities, would be available at different times over the life of the project.
- "Darmar Lodge": Limited obscured and distant views of the Project Site, predominantly the processing activities.
- "The Osiers" & "Lochmoor Lodge": Obscured local views of elevated parts of the basalt extraction area and sand washing plant would be afforded to these residences.

Notably, neither the Project Site nor transport operations would be visible from Bungonia village.

8.2.3.3.3 Intangible Impacts

Sense of Community / Village Life

A major concern held by those who previously submitted objections to the previous application for development consent for the "Ardmore Park" Quarry was the impact that the introduction of extractive industry would have on the make-up and function of the local Bungonia community. In particular, and as summarized in Section 8.3.5.2, objectors were concerned that:

- community events, such as festivals and other celebrations, would be compromised and eventually cease due to increased traffic and noise;
- an influx of people from Goulburn and other areas further afield would alter the local demographic and culture of Bungonia; and
- a perceived lack of social equity, ie. all benefits of the Project would go to the Proponent, with no benefit received to the local community.

Ultimately, while the Proponent has no control over the 'perceived' level of impact on those in the local community, it has been demonstrated that within the Bungonia Village itself, there would be minimal (if not no) change to local noise and traffic levels. As such, the viability of local community events within the village would not be compromised as proposed.

The Proponent has committed to employing from within the local community if suitably qualified and motivated individuals are available. In fact, following the initial application for development consent the Proponent fielded enquiries from residents of the local area as to the possibility of employment. However, should the Project work-force be drawn from outside the local community, it is considered unlikely that any of would choose to reside in or around Bungonia, thereby having no influence on local community make-up or function. This



notwithstanding, in the unlikely event that Project personnel choose to settle in Bungonia or the surrounding area, a greater sense of community may be generated through shared insights into the project objectives and operation and community feeling.

While the ultimate benefit of the Project would go to the Proponent, the local community would also benefit directly by the improvement to the local roads between the village of Bungonia and the Hume Highway. Indirectly, the region would benefit through the availability of construction materials within the local area (and the reduced cost associated with these). The Proponent has also committed, if allowed, to becoming an active participant in the local community and would consider requests from the local community to improving facilities and infrastructure within Bungonia.

Ultimately, the Proponent has no influence over how the local community in general will respond to the operation of the Project, and what impact this response may have on the local sense of community. However, as has been demonstrated throughout the assessment of the Project Site and transport operations, any adverse impacts would be generally limited to minor changes affecting a restricted number of people (generally immediately surrounding the Project Site) and therefore would not be reasonably expected to affect the community as a whole.

Land Use and Lifestyle

The areas surrounding the Project Site, incorporating the village of Bungonia, host a wide range of economic activities (see Section 5.1.4). There is a concern held by those in the local community that the viability of surrounding landowner operations (especially olive farmers, sheep and cattle producers, pine plantation growers, vineyards and floral suppliers) may be compromised, leading to a change in the nature of activities undertaken locally. There is concern that any change in the type and scale of local operations may adversely impact on the amenity of the local area due to an increase in local traffic, change in local demographics and reduction in opportunities for existing land uses to compete and continue.

In considering these concerns, the following points are made.

- The Project Site and transport operations would not impact on land availability, ie. no land would be sterilized by the proposed operations.
- The Project is not predicted to reduce the availability of water within the local or regional area.
- Noise and dust related impacts of the Project would remain well below relevant amenity related criteria and therefore have no influence on agricultural activities on surrounding properties, and minimal impact on the lifestyle value of properties not developed for financial return (including those of Bungonia).
- The Proponent has committed to improving local roads, thereby mitigating the impact associated with increased traffic and with potential benefits to other property owners of the local area.

There is no reason to believe that the development and operation of the Project would be a catalyst for further development locally. The proposed quarry would develop a particular resource available on the "Ardmore Park" property, with ancillary industries extremely unlikely to utilize surrounding lands due to the relative isolation of the Bungonia area from other industry.



Considering the above, the Project would be unlikely to have any major influence on existing uses of properties in the local area, nor would it encourage the development of other industries which might adversely impact on the viability of these land uses. That is, the Project may result in minor changes to the level of noise and traffic received at a small number of locations, however, this is unlikely to have any impact on the lifestyle value of these properties nor impact on the existing land use undertaken.

Local Aesthetics

As noted in Section 5.12.2, many of the residents of the local area choose to reside in and around Bungonia not because of the financial or business opportunities provided, but because of its setting within a semi-rural environment including significant areas of native vegetation.

It is acknowledged that a limited number of people in the local area may be exposed to small changes to local noise levels and an increase in the number of heavy vehicles using roads onto which their properties front. However, the changed noise levels would still remain below the DECC nominated criteria at all surrounding residences of the Project Site and transport route, there would be minimal change to local air quality, no detrimental impact on local water courses, minimal clearing of native flora and notably, the visibility of the proposed Project Site operations would be limited to distant or obscured views from five residences (none of which are in Bungonia village). The most noticeable impact of the Project in the local area would be an increase in the number of trucks traveling between the Project Site and Hume Highway, which would be appropriately mitigated through the proposed safeguards and operational controls to be implemented by the Proponent, by-passing of Bungonia and general upgrading of the roads to be used.

On the basis of the above, the Project would have minimal impact on the aesthetic value of the local setting, largely due to the fact that it would be unheard, unseen and unnoticed by the majority of the regional residents (including those of Bungonia).

Health and Safety

Impacts on the health and safety of members of the local community has the potential to adversely affect the amenity of the area. That is, should the Project lead to detrimental impacts on the health of local residents, or increase the exposure of these residents to safety hazards, the appeal, and therefore amenity, of the area could be reduced. Health and safety related issues are considered as follows.

- Exposure to elevated concentration of particulate matter. As previously discussed in Section 5.4.1, airborne dust has the potential to affect human health. Of particular concern are particles smaller than this are referred to as PM₁₀ (the human respiratory system has a built-in defensive system that prevents particles larger than about 10µm from reaching sensitive areas of the respiratory system). The assessment of the predicted impact of the Project on local PM₁₀ concentrations indicates that the local levels would remain well below the DECC and NEPM established criteria, ie. it is extremely unlikely that the Project would lead to health related impacts due to the generation of finer air-borne particulates.



- Exposure to elevated concentration of crystalline silica particles. The prolonged and repeated exposure to respirable crystalline silica particles represents an occupational health risk associated with sand extraction activities. In high concentrations (greater than $0.1\text{mg}/\text{m}^3$), respirable crystalline silica dust has been known to cause conditions such as silicosis, lung cancer, bronchitis, scleroderma and kidney disease. However, as for PM_{10} concentrations, the relevant National Occupational Health and Safety Commission (NOHSC) exposure standard for crystalline silica would be easily satisfied, ie. it is extremely unlikely that the Project would lead to health related impacts due to the generation of crystalline silica particles.
- Reduced pedestrian and vehicle safety of local roads. Firstly, the proposed Bungonia by-pass would remove all project related vehicles from the village of Bungonia where the location of parks and recreation areas may have resulted in an increased risk of pedestrian – vehicle incident. Secondly, the operation of articulated heavy vehicles is not an inherent safety risk. Correctly driven, these vehicles are just as safe, if not more so due to driver familiarity with the vehicle operation and roads, than other vehicles on the road. Thirdly, the Proponent has committed to upgrading the roads used such that safety on these roads would be improved for all road users.

Impacts on the psychological health of local residents is beyond the scope of this assessment, however, it is noted that on the basis of the restricted and limited nature of impacts on the local biophysical and social setting that impacts on a reasonable member of the local community are anticipated to be minimal.

8.3 JUSTIFICATION OF THE PROJECT

8.3.1 Introduction

In assessing whether the development and operation of the project is justified, consideration has been given both to the predicted residual impacts on the local and wider environment and the potential benefits the project would have for the Proponent, the local area, NSW and Australia. When considering the predicted residual impacts, a review of the proposed controls, safeguards and mitigation measures of Multiquip was also undertaken to determine the emphasis placed on impact minimisation and the incorporation of the principles of ESD.

This section also considers the consequences of the Project not proceeding.

8.3.2 Biophysical Considerations

8.3.2.1 Introduction

Sections 5 and 6 present a range of residual impacts on the biophysical environment predicted should the project proceed, ie. after the adoption of a number of design and operational procedures, mitigation measures and/or offset strategies.

Sections 8.3.2.2 and 8.3.2.3 present a summary of the residual impacts of the Project Site and transportation operations on the biophysical environment of the local environment.



8.3.2.2 Project Site Operations

Water Resources

Surface Water

Assuming the construction and maintenance of various water diversion, retention, settlement and storage structures nominated in the Environmental Assessment is completed, the results of water quality modelling undertaken by SMM (2008) conclude that the Project Site operations would provide for a beneficial impact on water quality of the local catchments.

The modelling of SMM (2008) also suggests that Multiquip could harvest between 20ML and 38.5ML of surface water on the Project Site (depending on the rainfall of a particular year) with minimal effect on flows to downstream water systems.

Groundwater Resources

To predict the likely impact of the proposed groundwater extraction from a production bore on the Project Site on the local aquifer systems and water users, LCA (2008b) completed a 46 hour pump test and measured the resultant drawdown in surrounding bores. On the basis of the measured drawdown and recovery of these bores, LCA (2008b) concluded that the proposed pumping schedule would have minimal impact given:

- no significant drawdown was observed in any of the surrounding monitoring bores despite continuous pumping over 46 hours from BHAP6;
- the groundwater would be drawn from an aquifer held within a significant geological discontinuity or discontinuities within the Silurian basement rocks and therefore isolated from the groundwater of the surrounding bores;
- no significant basalt aquifers were identified which might be influenced by pumping from the fracture aquifer of the basement rocks;
- the vertical permeability within the basalt aquifers present to the east or northeast of the Project Site would be significantly greater than horizontal permeability and as such would be unlikely to be influenced by the drawing of groundwater from the basement rocks; and
- the draw of groundwater from BHAP6 would not influence groundwater within the upper sand resource of the paleo-alluvial sequence due to a thick and relatively impermeable sand/clay sequence (or aquiclude) beneath these geological layers.

LCA (2008b) also considered the potential impact of the proposed extraction of groundwater from the production bore on the Project Site on the Bungonia and Inverary Creek groundwater catchments and inflows to the groundwater of the Bungonia State Conservation Area. The impact was predicted to be minimal given the significant catchments of Bungonia and Inverary Creeks (137km²) and therefore the minimal proportion of annual recharge to these catchment that would be removed by the proposed groundwater extraction (even during low rainfall [10th percentile] years). LCA (2008b) also notes that the karst structures of the groundwater catchments are highly conductive with enhanced storage capacity and have rapid recharge from rainfall and from surrounding interconnected networks of geological discontinuities

The impact of the proposed sand extraction on the groundwater contained within this layer in the stratigraphic sequence was predicted to be minimal by LCA (2008b) given the small proportion of the sand resource to be removed (7%) and the fact that the annual volume of



groundwater removed as a result of sand extraction equates to between about 8.1% and 42.0% of annual recharge, ie. the recharge volumes from rainfall significantly exceed the annual extraction of groundwater in the sand extraction process. Based on the above (LCA, 2008b) predicts no adverse impacts on the identified springs on properties to the east and south of the Project Site.

Water Availability

The assessments of SMM (2008) and LCA (2008b) indicate that the proposed Project Site operations would be unlikely to have any significant impact on the availability of surface or groundwater resources to neighbouring land owners. This notwithstanding, Multiquip would conduct monitoring of surface and groundwater quality and levels to confirm these predictions and has committed to compensatory measures in the event that the Project Site operations lead to any adverse impact on the quality or quantity of water received on neighbouring properties.

Noise

Assuming the implementation of the noise control and mitigation commitments of Section 7, noise modelling conducted by Heggies (2008a) concludes the noise impact of the Project Site operations on all non-project related residences would be minimal and within the nominated INP criteria. Notwithstanding the predicted compliance with the noise criteria, Multiquip would maintain dialogue with surrounding property and residence owners and address, where practicable, reasonable concerns or requests. Multiquip would also undertake noise monitoring to confirm compliance with the nominated INP criteria.

Air Quality

Modelling of potential impacts on air quality conducted by Heggies (2008b) suggests that dust deposition would not increase by more than 0.5g/m²/month, annual average PM₁₀ would not increase by more than 1.0mg/m³, and the maximum incremental increase in 24 hour PM₁₀ would not exceed 22.2mg/m³. All predicted increases would remain well within the relevant DECC criteria.

While resulting in an increase in greenhouse gas emitting activities, primarily as a result of the consumption of diesel fuel, the overall impact on NSW and Australia greenhouse gas levels would be minimal (of less than 0.003% and 0.0001% respectively).

Flora and Fauna

Two species of threatened fauna (Diamond Firetail and Speckled Warbler) and remnants of the TSC Act listed endangered White Box Yellow Box Blakely's Red Gum Woodland Community were recorded within the Project Site. However, an assessment of significance (seven part test of significance) completed by KMA (2008) in accordance with the requirements of Section 5A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) to consider the potential impact of the Project Site operations on these species / community determined the disturbance associated with the Project Site operations would be unlikely to have a significant impact. KMA (2008) suggests that the rehabilitation and revegetation of the Project Site and "Ardmore Park" property to be undertaken would, in the medium to long term, more than adequately compensate for the loss of the limited number of native trees, planted trees and native pasture.



Revegetating the drainage lines, and some of the hills and ridges would also have obvious benefits for general property management, including soil stabilisation and providing shelter for stock and crops

Heritage

Two Aboriginal sites were identified on the Project Site although both were outside the footprint of proposed disturbance. Identified items of non-Aboriginal heritage were all located in excess of 700m of the Project Site, with no evidence of the Old Argyle Road (suggested by some maps to traverse the Project Site) identified following a surface survey of the Project Site by GSA Planning (2007). Based on the results and conclusions of AASC (2008), it is considered unlikely that the proposed Project Site operations would have any impact on identified items or sites of Aboriginal or non-Aboriginal heritage significance.

CHMA (2008) did note however, that there remains potential for the identification of additional sub-surface items over the southern sand extraction areas and as such the potential impact of the Project Site operations may be greater. While it is anticipated that any item identified would be similar to the scattered artefacts already identified and therefore of low scientific value, further investigations in the form of test-pitting would be undertaken following the receipt of an appropriate approval.

Visibility

Despite the orientation of the various components of the Project Site operations and the visual controls to be implemented, a number of residences would have varying views of various activities of the project. The views have been minimised to the extent feasible and are not considered to be of a magnitude likely to impact significantly on the amenity of the local area or the affected property.

Soils and Land Capability

The soils of the Project Site, particularly those formed over the Tertiary basalt, are naturally fertile, with no dispersibility and offer favourable soil properties for use in rehabilitation activities. Whenever soil is stripped, stockpiled, transported and respread it is probable that there will be some decrease in biological activity and affect on the structure of the soils. However, given the favourable nature of the soil resources and features of the Project Site environment and assuming the adoption of the proposed soil management controls, these impacts would be minimal.

The soils themselves are appropriate for use in rehabilitation and would not provide any constraint on re-establishing areas of Class IV and V land for agriculture in the final land use.

Bushfire Hazard

The Project Site operations would undoubtedly increase the number and type of ignition sources in the local area. The proposed controls and safeguards, in conjunction with general clearing activities associated with the project would, however, ensure that a low bushfire hazard was maintained on the Project Site.



Rehabilitation and Land Use

In designing the final landform, Multiquip considered the issues of primary concern to local land owners and nominated the preferred final land use as a return to medium intensity grazing or specialist agricultural/horticultural activities. The water storage structures constructed on the Project Site would be retained to assist in future agricultural pursuits.

To maximise the ability of the final landform to sustain agricultural activities, Multiquip proposes to return the Project Site to a landform with constructed slopes similar to that of the pre-extraction environment. It should be noted that while Multiquip proposes to import and use VENM in backfilling and rehabilitating the proposed extraction area, it has no intention at this time of importing putrescible, domestic, hazardous or green waste to the Project Site.

8.3.2.3 Transport Operations

Traffic and Transport

A detailed assessment of the proposed transport operations was conducted considering the suitability and performance of the existing and proposed intersections, the adequacy of the proposed road and watercourse crossing upgrade works, the impacts on traffic levels and flow and impacts on road safety. The assessment conducted by Hallam (2008) made reference to all available RTA and other government agency guidelines and other documents, with an INTANAL analysis performed for each of the intersections, and it was concluded that on the basis that:

- the transportation of quarry products no longer requires the use of King Street, thereby eliminating the potential noise and amenity impacts on the village of Bungonia;
- the proposed intersections provide adequate deceleration and acceleration lanes, provide adequate sight distance for approaching and turning vehicles, and would not interfere with through traffic;
- the proposed transport route provides for the minimum and desired road carriageway standard of the RTA and Goulburn Mulwaree Council;
- bridge and culvert crossings would be upgraded to meet the recommended standard of the Road Design Guide and/or to the satisfaction of Goulburn Mulwaree Council;
- the geometry of the roads would allow for the safe operation of heavy vehicles;
- the existing speed limit could be maintained and traffic facilities improved;
- weather conditions would not adversely impact on the proposed transport operations; and
- product transportation could be undertaken without adverse impact on local school bus operations;

the proposed transport operations would not adversely impact on the local road network. In contrast, considering the major upgrade works proposed, the proposed transport operations could ultimately result in an improved local road network.



Drainage and Water Resources

SMM (2008) completed a quantitative assessment of the proposed road construction and upgrading works proposed for the transport operations of the project. It was determined that without offset, the proposed works would have a detrimental impact on the water quality of the Sydney drinking water catchment. However, assuming the implementation of the proposed vegetation offsets on the Project Site (as part of progressive rehabilitation), the impacts of the transport operations would ultimately be beneficial to water quality as a result of the increase filtering provided by the proposed revegetation of drainage lines on the Project Site.

SMM (2008) also concluded:

- the proposed suite of drainage crossing design measures, including those for fill batters and table drains, to be progressively implemented as part of the upgrading and construction works would reduce the prevalence of this uncontrolled sheet flow and thereby lead to an improvement in erosion and sediment control over the length of the transport route;
- the proposed watercourse crossing upgrades and construction would be undertaken in accordance with an ESCP, thereby minimising the potential for contamination of the downstream catchment; and
- the proposed Bungonia Creek Crossing would be constructed to minimise impacts on hydrological flow and maintain a dry corridor for native fauna.

Noise and Vibration

Assuming the implementation of the noise control and mitigation commitments of Section 7, noise modelling conducted by Heggies (2008a) predicts the noise level received at those residences located along the proposed transport route would not increase by more than 4dB(A) and would remain below the nominated traffic noise criterion of 55dB(A) ($L_{Aeq}(1hour)$).

The predicted peak component vibration levels resultant from the proposed transport operations would be well below the most stringent damage criterion of 5mm/s applicable to residences (dwellings).

Air Quality

Dust would be generated during the construction of the proposed Bungonia By-pass. However, assuming the implementation of a dust management plan (as presented in Section 6.5.2), the impact of these construction activities would be mitigated and unlikely to result in an adverse impact on surrounding property or residence owners.

While the proposed transport operations would result in an increase in greenhouse gas emitting activities, as a result of the consumption of diesel fuel, the overall impact on NSW and Australia greenhouse gas levels would be minimal (of less than 0.0002% and 0.00005% respectively).



Flora and Fauna

Two species of threatened microchiropteran bat (Eastern Bentwing Bat and Eastern False Pipistrelle) were identified (or probably identified) along the transport route. However, an assessment of significance (seven part test of significance) completed by KMA (2008) in accordance with the requirements of Section 5A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act) to consider the potential impact of the Project Site operations on these species determined the disturbance associated with the transport operations would be unlikely to have a significant impact.

Heritage

Six Aboriginal sites and one Potential Archaeological Deposit were identified on or adjacent to the alignment of the transport route (CHMA, 2008). Of the identified heritage items, the Parsonage (Lot 7002, DP 1025594) is located within 50m of the proposed Bungonia By-pass (CHMA, 2008).

The proposed construction and road upgrading works would not require that any of the identified heritage sites be disturbed. It is also recognised that the predicted vibration levels attributable to the transport operations would be significantly below the level considered necessary to result in structural damage to sensitive structures (2.5mm/s) (Heggies, 2008a). Assuming that the appropriate test pitting and artefact management is undertaken within BPAD1, the proposed transport operations would be unlikely to have a detrimental impact on heritage values of the local area.

8.3.3 Socio-economic Considerations

8.3.3.1 Economic Considerations

Economically, the Goulburn Mulwaree LGA, and to a lesser extent, Bungonia and the surrounding areas would be set to gain from the development and operation of the project. The economic benefits would also lead to social benefits as well. These benefits include the following.

- Direct full-time employment for up to 25 people, including all processing plant operations and product delivery, would be employed on a full-time basis. The project would also provide employment for local contractors and service companies providing mechanical, technical and cleaning type services. The site-based personnel would preferably be sourced from the local areas surrounding Bungonia but would be dependent on the requisite skill set being present. It is likely however, that the majority of the workforce would be sourced from Goulburn. Increased employment opportunities would have additional flow-on benefits including:
 - the provision of new and/or continued employment would provide an impetus to other local businesses;
 - quarry expenditure on fuel, parts and consumables; and
 - support of local community services and projects.



- The project would provide for locally produced sand and hard rock products which, due to the reduced travel distance, would be likely to be significantly less expensive than materials sourced from Sydney or Canberra.
- Diversification of development / industry in the LGA would lead to increased training opportunities for the residents of the LGA and appeal to people looking to move to the area.

A major source of concern has been over continued access and availability to groundwater resources which are critical to the economic viability of some properties and/or businesses. The *Environmental Assessment* has demonstrated, through reference to LCA (2008b), that the potential for adverse impacts on the existing groundwater environment is low and the mitigation and compensatory measures proposed more than adequate to address the unlikely event that the availability of groundwater to surrounding landholders is threatened.

It is considered unlikely the modified "Ardmore Park" Quarry project would adversely impact economically on the local community or members of it.

8.3.3.2 Social Considerations

A proportion of the landowners and residents in these areas either do not obtain a financial income from their landholding or any financial return supplementary to that obtained in the major centre of Goulburn or elsewhere. The area includes a number of people either retired or planning to retire. Concerns held by these residents of the local area revolve primarily around the maintenance of the rural amenity which they currently enjoy. The concerns held by local residents are considered as follows.

Aesthetic Value of the Rural/Bushland Landscape

Many residents have commented on their appreciation of the gently undulating hills and villages of the local area which is variously covered by grazing pasture and areas of remnant bushland. Concern has been raised as to how the development of a quarry might impact on the scenery of the existing environment.

The visibility of the Project Site operations would be managed by Multiquip through the targeted placement of equipment behind natural topographic features or below surface level, the vegetation of bund walls to be constructed and the progressive rehabilitation of the final landform (designed to be comparable to the pre-extraction environment).

The aesthetic, cultural and historic value of the village of Bungonia has been established within this Environmental Assessment. In recognition of this, Multiquip has proposed to construct a bypass of the village for all project related heavy vehicle movements. The construction of the Bungonia By-pass would not only limit the potential impact of the project on the residents of the village but would also provide some certainty for the long-term protection of the amenity and heritage values of the location. Presumably, should any other industry commence locally (in the short or long term), heavy vehicles would be able to use the by-pass route and avoid Bungonia.



Peace and Quiet of the Rural Setting

Many of those choosing to live in the village of Bungonia and surrounding areas do so because of the relative peace and quiet afforded by the setting. Increases in through traffic during the summer months, as a result of the nearby Bungonia State Recreation Area and Morton National Park, have little overall influence on the residents. Concerns have been raised as to the impact of the project on the general peace and quiet of the local area.

Impacts associated with the project have been demonstrated throughout this Environmental Assessment to be minor in nature and meeting nominated criteria. Multiquip has proposed to further reduce the potential impact of the project on the local amenity by proposing the construction of the Bungonia bypass for all project related heavy vehicle movements.

Community Amenity and Lifestyle

Associated with the relative peace and quiet offered by the existing setting, many landowners and residents have chosen the area to maintain a quiet lifestyle, away from major urban centres, and enjoy the small community amenity value provided in such settings. There is concern that this lifestyle would be negatively affected by the introduction of increased truck movements and new workforce likely to be sourced predominantly from Goulburn.

While Multiquip would source probably source the majority of its workforce from Goulburn, the 14 personnel required would be unlikely to have a major impact on the local community. In actual fact, should project personnel choose to settle in Bungonia or surrounding area, a greater sense of community may be generated through shared insights into the project objectives and operation and community feeling.

By providing for the upgrading of the main transport link between Bungonia and the Hume Highway, and potentially providing for the upgrading and maintenance of other local roads, eg. Mountain Ash Road through the injection of funds through Section 94 contributions, the project would also provide some social benefit to the local community.

8.3.4 Site Suitability Considerations

The "Ardmore Park" property is considered suitable for the proposed sand and hard rock quarry for a number of reasons.

- The Project Site is located over a well defined and described sand and hard rock resource, the physical and chemical properties of which are considered favourable for the intended products. The resource is recognised by GeosMining (2006) as a potential source of fine and coarse aggregates to supply Sydney construction market.
- The sand and hard rock resources are located near the surface and are therefore require minimal additional disturbance to access and are sufficiently friable as to not require blasting.
- The property is relatively isolated from high density urban or semi-rural developments, with only a limited number of direct neighbours. Therefore, the number of people potentially affected by changes to noise levels, air quality and visual amenity is restricted.



- The proposed location of the Project Site is over a largely cleared area of the property, minimising the need to disturb native vegetation. The cleared areas have only moderate value as agricultural land.
- The property has a large and secure groundwater supply which can be accessed without impacting on the availability of water on surrounding properties.
- The "Ardmore Park" property is ideally located close to the Hume Highway, roughly halfway between Sydney and Canberra, two large and growing markets for the sand and hard rock resources. The property is also ideally situated to provide materials to the smaller but growing markets in Goulburn, the Southern Highlands and South Coast.

Therefore, on the basis that the "Ardmore Park" property holds a well-defined and easily accessible sand and hard rock resource, which has favourable physical and chemical properties for its intended uses, is largely isolated from other land owners but ideally located close to the Hume Highway (which distributes traffic to the intended markets of the Project), and would result in only minor impacts to a restricted number of people, the Project Site provides a highly suitable site for the proposed activities.

8.3.5 Planning Considerations

This section reviews the compliance of the project with local, regional and State planning instruments. It is noted that whilst the relevance of these instruments may change in the future, the following represents the application of these in their current form to the project as described in Sections 2 and 3.

Mulwaree Local Environmental Plans 1995

The proposed activities would be undertaken within land zoned 1(a) Rural (General) Zone with extractive industry permissible within this zone with development consent.

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

The SEPP specifies matters requiring consideration in the assessment of any mining, petroleum production and extractive industry development, as defined in NSW legislation. **Table 8.2** presents a summary of each element requiring consideration and a reference to the section in the *Environmental Assessment* where this is addressed.

State Environmental Planning Policy No. 33 (SEPP 33) – Hazardous and Offensive Developments

Based on the risk screening method of DUAP (1997), neither the storage nor transport of the hazardous materials to be stored on the Project Site would result in the project being considered a hazardous, offensive or potentially hazardous under SEPP 33 (see **Appendix 3**).



Table 8.1
Application of SEPP (Mining, Petroleum Production and Extractive Industries) 2007

Relevant SEPP Clause	Description	EA Section
12: Compatibility with other land uses	<p>Consideration is given to:</p> <ul style="list-style-type: none"> - the existing uses and approved uses of land in the vicinity of the development; - the potential impact on the preferred land uses (as considered by the consent authority) in the vicinity of the development; and - any ways in which the development may be incompatible with any of those existing, approved or preferred land uses. <p>The respective public benefits of the development and the existing, approved or preferred land uses are evaluated and compared.</p> <p>Measures proposed to avoid or minimise any incompatibility are considered.</p>	<p>5.1.4</p> <p>5.11.3</p> <p>5.11.3</p> <p>8.3</p> <p>Throughout Section 5 & 6</p>
13: Compatibility with mining, petroleum production or extractive industry	<p>Consideration is given to whether the development is likely to have a significant impact on current or future mining, petroleum production or extractive industry and ways in which the development may be incompatible.</p> <p>Measures taken by the applicant to avoid or minimise any incompatibility are considered.</p> <p>The public benefits of the development and any existing or approved mining, petroleum production or extractive industry must be evaluated and compared.</p>	<p>N/A</p> <p>N/A</p> <p>N/A</p>
14: Natural resource and environmental management	<p>Consideration is given to ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure:</p> <ul style="list-style-type: none"> - impacts on significant water resources, including surface and groundwater resources, are avoided or minimised; - impacts on threatened species and biodiversity are avoided or minimised; and - greenhouse gas emissions are minimised and an assessment of the greenhouse gas emissions (including downstream emissions) of the development is provided. 	<p>5.2</p> <p>5.5.5, 6.6.3</p> <p>5.4.5.2, 6.5.4</p>
15: Resource recovery	The efficiency of resource recovery, including the reuse or recycling of material and minimisation of the creation of waste, is considered.	2.10
16: Transportation	<p>The following transport related issued are considered.</p> <ul style="list-style-type: none"> - The transport of some or all of the materials from the site by means other than public road. - Limitation of the number of truck movements that occur on roads within residential areas or roads near to schools. - The preparation of a code of conduct for the transport of materials on public roads. 	<p>2.13.4</p> <p>3.2.7</p> <p>3.3.1, 6.2.4.2</p>
17: Rehabilitation	<p>The rehabilitation of the land affected by the development is considered including:</p> <ul style="list-style-type: none"> - the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated; - the appropriate management of development generated waste; - remediation of any soil contaminated by the development; and - the steps to be taken to ensure that the state of the land does not jeopardize public safety, while being rehabilitated or at the completion of rehabilitation. 	<p>Figure 2.18</p> <p>2.10</p> <p>2.12</p> <p>2.12</p>



State Environmental Planning Policy No. 44 (SEPP 44) – Koala Habitat Protection

SEPP 44 has been addressed by the fauna consultant to the project (KMA, 2008 - see *Specialist Consultant Studies Compendium* - Part 6). The Project Site does not represent core or potential Koala habitat (see Section 5.5.3.4).

8.3.6 Local Amenity Considerations

Sections 8.3.5.3.2 and 8.5.3.2.3 presented a summary of the tangible and intangible impacts of the Project on the local biophysical and social environment. Considering these impacts in the context of the planning zones in which they are expected to occur, the following conclusions are made in relation to the impact of the Project on the amenity of the residents of, or those who have recourse to, Bungonia (zone 2(v)) and those of those residing within zone 1(a).

Amenity of Bungonia (Zone 2(v))

The Project in its entirety, including all transport operations, is located outside of Bungonia Village which is zoned 2(v) under the Mulwaree LEP 1995. Impacts attributable to the Project which may be noticeable within the village, or to those having recourse to the village, would include:

- a. occasional noise associated with the construction of the Bungonia by-pass;
- b. an increase in the number of heavy vehicles encountered on Jerrara, Mountain Ash or Oallen Ford Roads (although it is noted again that the total number of vehicles on these roads would remain below 500vpd – a rural road threshold level within the RTA's Road Design Guide);
- c. a marked improvement in the standard, function and therefore safety of these same roads; and (possibly)²; and
- d. ongoing contribution from the Proponent to community based activities or requirements.

Importantly, it has been demonstrated that the Project would not be expected to:

- a. reduce the viability of local community festivals or other events given the fact that no Project-related traffic would travel through the village;
- b. adversely affect or have a detrimental impact on the value of historic sites and places of Bungonia;
- c. result in any substantive change in the demographic of people residing in the village or surrounding area;
- d. result in any increase in the value of land in the local area to other industrial developments;
- e. reduce the viability of the land uses of properties surrounding the Project Site or transport route, who contribute to the local Bungonia community; nor
- f. have any detrimental impact on the health and/or safety of the residents of Bungonia, or those who have recourse to Bungonia.

² The Proponent has expressed a desire to become a contributing participant in the local community and would consider any reasonable requests to fund or otherwise assist community based activities.



The Project would therefore be highly likely to meet the objectives of zone 2(v) as it would not:

- change the use of land and infrastructure within Bungonia;
- impact on the residential, commercial, civic and/or community uses within Bungonia; and
- change the buildings, landscape features and streetscape features that contribute to the character and identity of the Bungonia.

For the above reasons, the Project is considered highly unlikely to have an adverse impact on the amenity of a reasonable person residing in, or having recourse to Bungonia.

Amenity of the Wider Region (Zone 1(a))

The Project would have only minor impacts on a limited number of land owners and residents located immediately surrounding the Project Site or fronting onto the proposed transport route. However, as discussed throughout Sections 8.3.5.3.2 and 8.3.5.3.3, these impacts would all be within the nominated environmental criteria (where available) with impacts either mitigated or offset by the commitments of the Proponent, eg. the increase in heavy vehicles on three local roads would be offset by the proposed upgrades to these roads to a standard equivalent to more highly trafficked roads.

Importantly, the Project would not adversely affect the viability of existing land users in the local area and wider region nor would it encourage the use of surrounding lands for industrial or higher intensity development. It is therefore considered complementary to existing rural activities.

The Project Site operations would only be visible from a limited number of residences in the local area, with noise and dust levels predicted to remain at low levels equivalent to rural background levels. In addition, the Proponent has committed to rehabilitating the Project Site to return it to landform similar to the pre-extraction setting and compatible with the topography and vegetation of the surrounding properties. It is therefore concluded that the Project would be sympathetic with the environmental characteristics of the land.

Finally, the Project Site operations would only impact on 61ha of agricultural land for the life of the Project. The land would ultimately be returned to a standard equivalent to that disturbed. In any event, the land to be disturbed is not classified as prime crop and pasture land and while the Project Site would be temporarily converted to non-agricultural uses, the property would eventually be returned to agricultural use.

The Project would therefore be compatible with the objectives of zone 1(a), as it would promote the efficient use of agricultural land. By reviewing the assessments of impact on the biophysical environment it is concluded that the Project would:

- have minimal impact on the availability of agricultural land (none of which is classified as prime crop and pasture land), on or surrounding the Project Site, with the capability of the land disturbed to be returned to its pre-disturbance classification at the cessation of the Project;
- not impact on any current or future forestry land;



- develop valuable extractive materials efficiently and without adverse impact on surrounding agricultural land;
- be developed without impact on native vegetation of significance, scenic amenity or natural wildlife habitat;
- not impact adversely on the quality or availability of water resources to surrounding land owners or other uses; and
- not impact on places and buildings of archaeological or heritage significance, including aboriginal relics and places.

The Project would also minimise the costs to the community as it would:

- not fragment or isolated rural land within the zone;
- not impact adversely on public amenities and services; and
- develop the land as an important extractive materials resource, which would supply a existing demand for sand and hard rock within eastern NSW.

Therefore, as the Project would have only minor impacts on a limited number of land owners and residents, and would remain consistent with the objectives of the 1(a) zone in which it is to operate, it is considered highly unlikely that the Project would have an adverse impact on the amenity of a reasonable person residing in the local area or region within the 1(a) zone.

The assessed minimal impact on local amenity notwithstanding, the Proponent is committed to addressing any amenity related issue raised by individual members of the local community to the extent considered reasonable. It is reiterated that the Proponent intends on being a responsible and active contributor to the local community once the Project has commenced.

8.3.7 Consequences of not Proceeding with the Project

The consequences of not proceeding with the project include the following.

- (i) The opportunity to establish a long term supply of sand and hard rock products would be foregone. This would place additional pressure on existing resources and ultimately lead to increased production at these sites and/or the development of other greenfield quarry sites.
- (ii) Small local markets would be especially affected, having to source more distant and therefore more expensive sources of fine to coarse sand.
- (iii) The opportunity to create employment in the local area would be foregone. This would also impact on the economic activity of the local community and the Shire of Goulburn Mulwaree generally.
- (iv) The re-establishment of stands of native vegetation on the Project Site would not be undertaken and the expansion and domination of exotic flora species and weeds would continue.



- (v) The proposed Bungonia bypass, which would benefit the maintenance of the heritage value of Bungonia, would not be constructed.
- (vi) The various impacts identified throughout Sections 5 and 6 of this document would not occur.

The benefits of proceeding with the modified “Ardmore Park” Quarry Project are considered to outweigh the predicted impacts on the environment that would result if the project is approved. The consequences of not proceeding with the project also weigh heavily in favour of proceeding with the modified “Ardmore Park” Quarry Project.

8.4 CONCLUSION

The modified “Ardmore Park” Quarry Project has been designed to, as much as possible, address the issues of concern to the community and all levels of government. The Project provides for the recovery of valuable sand and hard rock resources which are significant in the planning of resources available to the Sydney, South Coast, Canberra and local Goulburn markets. The subsequent landform, created by the deposition, consolidation and capping of silt materials with limited quantities of imported excavated natural materials, overburden, subsoil and topsoil, would be constructed to sustain long term agricultural or horticultural activity and manage all components of the local environment, particularly water management, air quality and soil issues.

This document and the range of specialist consultant studies undertaken have identified that the modified “Ardmore Park” Quarry Project should proceed because it would:

- (i) satisfy the demand for sand and hard rock products and introduce a level of certainty for supply;
- (ii) satisfy sustainable development principles;
- (iii) address the issue of impacts on the amenity of the village of Bungonia through the construction of a by-pas around the village;
- (iv) address the issue of public road suitability for the level of transport proposed through the progressive upgrading of the sections of road to be incorporated into the transport route;
- (v) have a minimal and manageable impact on the biophysical environment;
- (vi) have a minimal and manageable impact on local amenity;
- (vii) contribute to the continued economic activity of the Goulburn Mulwaree LGA; and
- (viii) provide a site suitable for future agricultural or horticultural activities compatible with surrounding land uses.



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Section 10 ***Glossary of Technical Terms, Symbols & Acronyms***



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GLOSSARY

A horizon – part of soil profile immediately below the topsoil.

Aboriginal heritage Site – discrete area or concentration of artefactual material, place of past Aboriginal activity, or place of significance to Aboriginal people

acid – substance with a pH less than 7.0; the lower the pH, the higher the corrosive ability of the substance.

Acid sulfate soil – soil containing iron sulfides deposited during either the Pleistocene or Holocene geological periods (Quaternary aged) as sea levels rose and fell

acoustic bund wall – a natural or artificial structure (e.g. a hill or a bund) that inhibits the transmission of sound.

aggregate – fragments of crushed rock with a defined size specified for use in the construction industry

air pollutant – a substance in ambient atmosphere, resulting from the activity of man or from natural processes, causing adverse effects to man and the environment (also called "air pollution")

alkaline – having a pH greater than 7.0.

alkalinity – in water analysis a measure of the carbonates, bicarbonates, hydroxides and occasionally the borates, silicates and phosphates in the water.

alluvial – pertaining to material, such as sand or silt, deposited by running water (e.g. a creek or river).

ambient – relating to conditions outside the active project site

amenity – the desirability of an area.

aquifer – rock or sediment capable of holding and transmitting groundwater

archaeology – the scientific study of human history, particularly the relics and cultural remains of the distant past

artefact – anything made by human workmanship, particularly by previous cultures (such as chipped and modified stones used as tools).

attenuation – reduction in sound pressure levels between two locations.

B horizon – subsoil material located below the A horizon material and above the parent rock.

backfill – material used to fill created void.

basalt – fine-grained, dark volcanic igneous rock.

batter – An engineered slope of soil or rock fill on either side upslope or downslope of a road, embankment or mine waste storage.

bedrock – a general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material e.g. sand

bench - a step in the face of a quarry or mine which could be up to 25 m high.

biodiversity – the full range of living things and the ecosystem in which they live

biophysical – relating to the biological and physical attributes of the environment

bore – a cylindrical drill hole, sunk into the ground and from which water is pumped for use or monitoring purposes

buffer – a physical barrier / structure or width of land that encloses, partially encloses, or defines a particular environment. A buffer serves to minimise the impacts of non-desirable external influences on the adjoining environment

bulldozer – an item of tracked mobile earth moving equipment fitted with a front blade and with rear rippers used for pushing and ripping soil and rock

catchment - the area determined by topographic features within which rainfall will contribute to runoff at a particular point.

cation – an ion having a positive charge and characteristically moving toward a negative electrode.

channel – river or irrigation channel, includes bed and bank.

clay – very fine-grained sediment or soil (often defined as having a particle size less than 0.002 mm (2 microns) in diameter)

community – a combination of plants that are dependant on their environment and influence one another and modify their own environment. They form together, with their common habitat and other associated organisms, an ecosystem, which is also related to neighbouring ecosystems and to the macroclimate of the region.

concentration – the amount of a substance, expressed as mass or volume, in a unit volume of air.

conservation – the management of resources in a way that will benefit both present and future generations



contaminant – Any physical, chemical, biological or radiological substance or matter in water or soil that is not of natural origin

contamination – The degradation of natural water quality as a result of man's activities. There is no implication of any specific limits, since the degree of permissible contamination depends upon the intended end use, or uses, of the water

contour bank - an earth bank constructed across a slope parallel to contours.

cross-section – a two-dimensional diagram of an object presented as if the object had been cut along its length.

crushing – the mechanical process of reducing rock size usually by pressure or impact.

culvert – large pipe or channel carrying water underneath a structure (e.g. a road or railway track) or underneath the ground.

cumulative – increasing by successive additions.

decibel - unit expressing difference in power between acoustic signals.

density – 1. The mass of a substance (e.g. sediment) divided by its volume; water has a density of exactly 1 kilogram per litre; gold has a density of 19.3 kilograms per cubic metre. 2. The coverage of vegetation (e.g. trees) per unit of distance (along a linear transect) or unit of area (in an area transect).

deposition – laying down of particulate material (e.g. sediment in a lake or tailings solids in a tailings storage).

dispersibility - a characteristic of soils relating to their structural breakdown in water into individual particles.

diversion bank – an earth bank constructed to divert water away from disturbed areas.

drainage line – a passage along which water concentrates and flows towards a stream, drainage plain or swamp intermittently during or following rain.

drawdown – the difference between the water level observed during pumping and the non-pumping water level (static water level or static head).

dust - particles of mostly mineral origin generated by erosion of surfaces and the mining and handling of materials

ecology – the relationship between living things and their environment

Ecologically Sustainable Development (ESD) – using, conserving and enhancing the

community's resources so that the ecological processes on which life depends, are maintained, and the total quality of life now and in the future, can be increased (Commonwealth of Australia 1992)

ecosystem – a functional unit of energy transfer and nutrient cycling in a given place. It includes all the relationships within the biotic community and between the biotic components of the system

Emerson Class No. – ranking given to a soil or clay according to the Emerson crumb test. **emission** – a discharge of a substance (e.g. dust) into the environment

environment – a general term for all the conditions (physical, chemical, biological and social) in which an organism or group of organisms (including human beings) exists

Environmental Assessment (EA) – a document that describes a project and an assessment of its likely impact on the physical, social and economic environment. It includes an evaluation of alternatives and an overall justification of the project. An EA is used as a vehicle to facilitate public comment and as the basis for assessing whether a project should proceed.

environmental policy – statement by the organisation of its intentions and principles, in relation to the overall environmental performance, which provides a framework for action and for the setting of its environmental objectives and targets (AS ISO 14050)

ephemeral - refers to stream which flows only intermittently throughout the year.

erosion – the wearing away of the land surface (whether natural or artificial) by the action of water, wind and ice

excavate – to dig into natural material or fill using an excavator or other machinery

excavator – item of earth-moving equipment fitted with a bucket on an articulated boom used for digging material from a face in front of, or below the machine

extraction – a term synonymous with quarrying and dredging

fauna – a general term for animals such as birds, reptiles, marsupials, fish etc

fill – material imported and emplaced to raise the general surface level of a site.

flora – a general term for plants



fractures – Any breakage of a rock mass along a direction or directions not associated with cleavage or fissility

front-end loader – machine used to lift and place soil, earth, rocks, etc within an extraction site or to load products into trucks

grader – an item of earthmoving equipment, rubber tyred and fitted with a centrally mounted blade and rippers used to shape and trim the ground surface.

gradient – rate of change of a given variable (such as temperature or elevation) with distance

grassland – an extensive area of largely treeless land covered mainly by natural grasses.

ground vibration – oscillatory motion of the ground caused by the passage of seismic waves originating from a blast.

groundwater – all waters occurring below the land surface; the upper surface of the soils saturated by groundwater in any particular area is called the water table.

habitat – the place where an organism normally lives; habitats can be described by their floristic and physical characteristics

heritage – the things of value which are inherited

hydraulic gradient – the direction of groundwater flow

hydrocarbon – any organic compound, gaseous, liquid, or solid, consisting solely of carbon and hydrogen. Crude oil is essentially a complex mixture of hydrocarbons

hydrogeology – the study of groundwater

impact – the effect of human induced action on the environment.

infrastructure – the supporting installations and services that supply the needs of a project e.g. roads

inter-generational equity – the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations

intra-generational equity – the present generation should ensure that improved well-being and welfare are accessible to all sectors of society within Australia and that improved welfare within Australia does not result in decreased welfare in other nations

inversion - generally used in meteorology with respect to an increase of temperature with height in contrast with the usual decrease of

temperature with height in the troposphere. An inversion layer is distinguished by its large stability, which limits the turbulence and therefore the dispersion of pollutants.

landform – a specific feature of a landscape (such as a hill) or the general shape of the land

loam - loose soil composed of clay and sand, especially a kind containing organic matter and of great fertility.

migratory – passing, usually predictably (based on aquatic species), from one region or climate to another, for purposes of feeding, breeding, or other biological purposes

mitigation measures – measures implemented to reduce (mitigate) an impact (such as the construction of a perimeter bund to reduce sound emissions)

monitoring – the regular measurement of components of the environment to understand a feature of the environment and/or establish that environmental standards are being met

native – said of an organism or group of organisms that is restricted to a particular region or environment. A local inhabitant of a place

offsets – to offset an activity means to compensate for the negative impacts of that activity, by taking a separate action with positive impacts

overburden (waste rock) – in the mining context refers to non-economic material to be removed to allow access to the resource.

particulate matter - small solid or liquid particles suspended in or falling through the atmosphere - sometimes expressed by the term particulates.

perennial - refers to stream which has flow throughout the year.

permeable – able to transmit fluids e.g. groundwater

permeability – a material property of a porous rock relating to the ability of the material to transmit water

pH – a measure of the degree of acidity or alkalinity of a solution; expressed numerically (logarithmically) on a scale of 1 to 14, on which 1 is most acid, 7 is neutral acid, and 14 is most basic (alkaline)

piezometer – a hole drilled specifically for the monitoring of groundwater levels and water quality.



population – a group of organisms all of the same species occupying a particular area.

potable - water suitable for human consumption.

precautionary principle – where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation

processing plant – a group of equipment used to clean and separate sands into various sizes

production bore – A small diameter hole from which groundwater is extracted. It usually relates to a cased and screened, adequately developed and efficient bore used for groundwater removal

progressive rehabilitation – rehabilitation of a disturbed area as soon as practicable after the final landform is achieved

Project Application - an application to the Department of Planning for approval of a major project.

pump test – the systematic pumping of water from a bore to test the response of an aquifer.

quadrat – a square survey area.

quartz – crystalline silica, an important rock-forming mineral SiO_2

recharge – the addition of water to an aquifer, directly from the surface, indirectly from the unsaturated zone, or by discharge from overlying or underlying aquifer systems

rehabilitation – the preparation of a final landform after quarrying and its stabilisation with grasses, trees and/or shrubs

resource – an estimate of potentially usable material in a defined area based on preliminary geological information

relief – the variation in landscape elevation over a region.

remnant woodland/vegetation – native woodland/vegetation remaining after widespread clearing has taken place.

revegetation – replacement of vegetation, principally grasses and legumes on areas disturbed by quarrying activities

sand washing plant – a plant designed to wash unwanted sized materials from product

scraper – irregularly shaped artefact that has been modified in a manner that suggests use in scraping activities, notably woodworking.

screening - a process which separates crushed rock into various size fractions – this usually involves a mechanical vibration of the rock over a series of decks fitted with steel mesh, steel plate or polyurethane or rubber mats with fixed sized apertures.

sediment basin – a small excavation designed to trap the coarse material washed from disturbed areas.

sequence (geological) – layers of (predominantly) sedimentary rocks sourced from a common geological environment or period.

silt-stop fencing – fine mesh fencing normally installed downslope of a sediment source, designed to trap silt and sediment and allow the water to pass through.

soil erosion hazard – the susceptibility of an area of land to erosion and includes rainfall erosivity, slope, soil erodibility and cover.

source – the place where pollutants are emitted into the atmosphere. Sources may be point, area or line sources. Often the term "source" is used for a whole plant or an installation. In air pollution modelling, the terms "continuous source" and "instantaneous source" are used:

continuous source: source which emits pollution continuously over a time period much larger than the travel time to a point where the concentration is considered. Usually it is assumed that during this time period the emission is constant.

instantaneous source: source which emits pollution over a time period much short than the travel time of the emission to a point where its concentration is considered.

stockpile – a pile or mound used to store material, typically products

storage capacity – the maximum volume of liquid able to be retained in a structure

stormwater – surface water runoff reaching stream channels immediately after rainfall

stripping – removal of vegetation and topsoil.

structure (soil) – the physical texture of the soil arising from the interrelationship between the grain size, composition, and organic nature of a soil.

subsoil – surface material comprising the B and C Horizons of soil with distinct profiles; often having brighter colours and higher clay contrasts



surface waters – all water flowing over, or contained on, a landscape (e.g. runoff, channels, ponds etc)

suspended solids - analytical term applicable to water samples referring to material recoverable from the sample by filtration.

sustainable development – development that meets the needs of the present without compromising the ability of future generations to meet their needs (World Commission on Environment and Development 1990)

texture (of soil) – variations in composition, grain size distribution, and structure.

terrestrial – of or relating to the land, as distinct from air or water

topography – the physical relief and contour of an area

topsoil – the surface layer of a soil profile containing the main percentage of organic material and viable life forms and seeds

total suspended solids – a common measure used to determine suspended solids concentrations in a waterbody and expressed in terms of mass per unit of volume (e.g. milligrams per litre).

tributary – a stream or river that flows into a larger river or lake.

water quality – degree or the lack of contamination of water

weathered rock – rock affected to any degree by the processes of chemical or physical weathering.

weed – any plant (in particular an herbaceous one) that survives in an area where it is harmful or troublesome to the desired land use

wind rose – diagrammatic representation of wind direction, strength, and frequency of occurrence over a specified period.

yield - Yield of a water bore can refer either to the capacity of the bore or to the amount of water actually withdrawn



SYMBOLS

%	percentage
<	less than
>	greater than
°C	degrees Celsius
dB	decibel, unit used to express sound intensity
dB(A)	the unit of measurement of sound pressure level typically heard by the human ear, expressed in "A" scale
EC	Electrical conductivity
g/m²/month	grams per metre squared per month
ha	hectare (100 m x 100 m).
hr	hour
kL	kilolitre
kL/hr	kilolitre per hour
km	kilometre (= 1 000 metres)
km/hr	kilometres per hour.
kV	thousand volts (unit of electrical potential).
kVA	thousand volts
L	litre (=1 000 mL).
L/m²	Litres per metres squared
L/sec	litres per second.
L/hr	litres per hour.
L_{A1}	sound level exceeded 1 per cent of the sampling time.
L_{A10}	sound level exceeded 10 per cent of the sampling time.
L_{A90}	sound level exceeded 90 per cent of the sampling time.
L_{Aeq}	the L _{Aeq} is the "equal energy" average noise levels.
L_{Aeq 1 hour}	the "equal energy" average noise level over 60 minutes – used for assessing impacts of motor vehicles

L_{A10(15min)}	the sound level exceeded 10 per cent of the sampling time (15min.)
m	metre
m AHD	metres of elevation relative to the Australian Height Datum
M	million
ML	megalitre.
m²	square metre
m³	cubic metre
mg	milligram
mL	millilitre = 0.001 litres
mm	millimetre (= 0.001 metres)
Mt	million tonnes
pH	a measure of the degree of acidity or alkalinity of a solution.
PM₁₀	particulate matter <2.5µm in diameter
PM_{2.5}	particulate matter <10µm in diameter
SWL	standing water level
t	tonnes
t/m³	tonnes per cubic metre
tpa	tonnes per annum
µg/L	micrograms per litre
µg/m³	micrograms per cubic metre
µm	micron, one millionth of a metre (one thousandth of a millimetre)
µS/m	micro seimens per metre



ACRONYMS

AADT	Annual Average Daily Traffic	EMP	Environmental Management Plan
ADR	Australian Design Rules	ENCM	Environmental Noise Control Manual
AEMR	Annual Environmental Management Report	EPBC Act	Environmental Planning and Assessment Act 1979
AHD	Australian Height Datum; generally equivalent to mean sea level	EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
AHIMS	Aboriginal Heritage Information Management System	ESD	Ecologically Sustainable Development
ANZECC	Australian and New Zealand Environment and Conservation Council	EnSD	Entering Sight Distance
AS	Australian Standard	FWD	Falling Weight Deflectometer
ASD	Approach Site Distance	GCM	Gross Carriage Mass
ASTM	American Society for Testing Materials	INP	Industrial Noise Policy
BOM	Bureau of Meteorology	JAMBA	Japan/Australia Migratory Bird Agreement
CAMBA	China/Australia Migratory Bird Agreement	LALC	Local Aboriginal Land Council
CD	Collection District	LEP	Local Environmental Plan
DA	Development Application	LGA	Local Government Area
DECC (EPA)	Department of Environment and Climate Change (Environment Protection Authority)	NEPC	National Environment Protection Council
DECC (NPWS)	Department of Environment and Conservation (National Parks and Wildlife Service)	NEPM	National Environment Protection Measure
DGR'S	Director-General's Requirements	NSESD	National Strategy for Ecologically Sustainable Development
DIPNR	Department of Infrastructure, Planning and Natural Resources	NHMRC	National Health and Medical Research Council
DWE	Department of Water and Energy	NOHSC	National Occupational Health and Safety Commission
DWC REP No. 1	Draft Drinking Water Catchments Regional Environmental Plan No. 1	OH&S	Occupational Health and Safety
EAT	Emersion Aggregate Test	PFM	Planning Focus Meeting
EC	Electrical conductivity	POEO Act	Protection of the Environment Operations Act 1997
ECTRN	Environmental Criteria for Road Traffic Noise Policy	RTA	Roads and Traffic Authority
EA	Environmental Assessment	SCA	Sydney Catchment Authority
		SEPP	State Environmental Planning Policy
		SISD	Safe Intersection Distance
		SWL	Standing Water Level
		TAPM	The Air Pollution Model



TSC Act Threatened Species Conservation Act
1995 (NSW)

TSP total suspended particulate matter

UCL Urban Centre or Locality

US EPA US Environmental Protection Authority

VPD Vehicles per day

