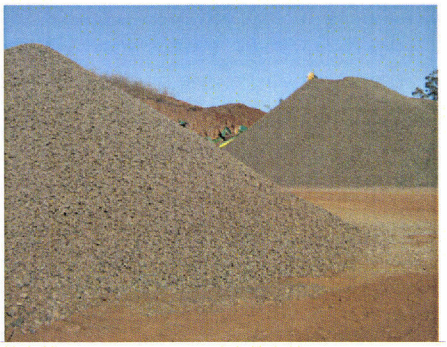
ENVIRONMENTAL IMPACT ASSESSMENT

MARY'S MOUNT
BLUE METAL QUARRY

BURLEITH

Prepared for:
Gunnedah Quarry Products Pty Ltd

Prepared by:
Stewart Surveys Pty Ltd



13th December 2012

EXECUTIVE SUMMARY

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Description of the proposal (Refer Section 2)

Gunnedah Quarry Products Pty Ltd is proposing to expand its existing quarry due to growing local demand for the product and predicted future growth in early 2013. The quarry is located on the property "Burleith" off Barker road at Mary's Mount, located approximately 33 kilometres west of Gunnedah, and 10 kilometres east of Mullaley in New South Wales. Gunnedah Quarry Products has a legal agreement that if the expansion is approved they will purchase the "Burleith" property. It is intended that the quarry will work on a demand basis, with a total production of up to 600,000tpa. The proposed method of quarrying will be to campaign mine and quarried products will be processed on site and delivered to the local markets in the Gunnedah, Mullaley, Boggabri, Emerald Hill and Maules Creek area.

The total quarry footprint is proposed to be 31 hectares quarried in stages over a 30 years program, with a total project boundary of 39 hectares plus the rehabilitation of 1.15 hectares which is currently used for material stockpile following processing. The estimated available resource within the proposed quarry design is 5 million tonnes and the annual rate of extraction proposed is 200,000 cubic metre or 600,000 tonnes.

In the plan of the proposed quarry (shown in figure EX1) the project site boundary has been determined based on a number of factors, primarily allowing enough room for machinery maneuverability around the proposed quarry. The project site boundary around the top of hill has been determined by the zoning boundary between RU1 Primary Production and E3 Environmental Management zones under the Gunnedah Local Environment Plan, 2012. The limit of extraction outlines the proposed quarry area, or limit of regrading of the land. At the top boundary a 10 metre minimum offset from the E3 zoning has been left as a safeguard for this area. The proposed quarry floor level has been set based on the existing fall of the land. In the north eastern section of the site (stages A2 & A3) this is set at 419 metres and in the southern section (stage B4) the floor level is set at 371.96 metres. The stages between these sections have been benched to suit the natural landform.

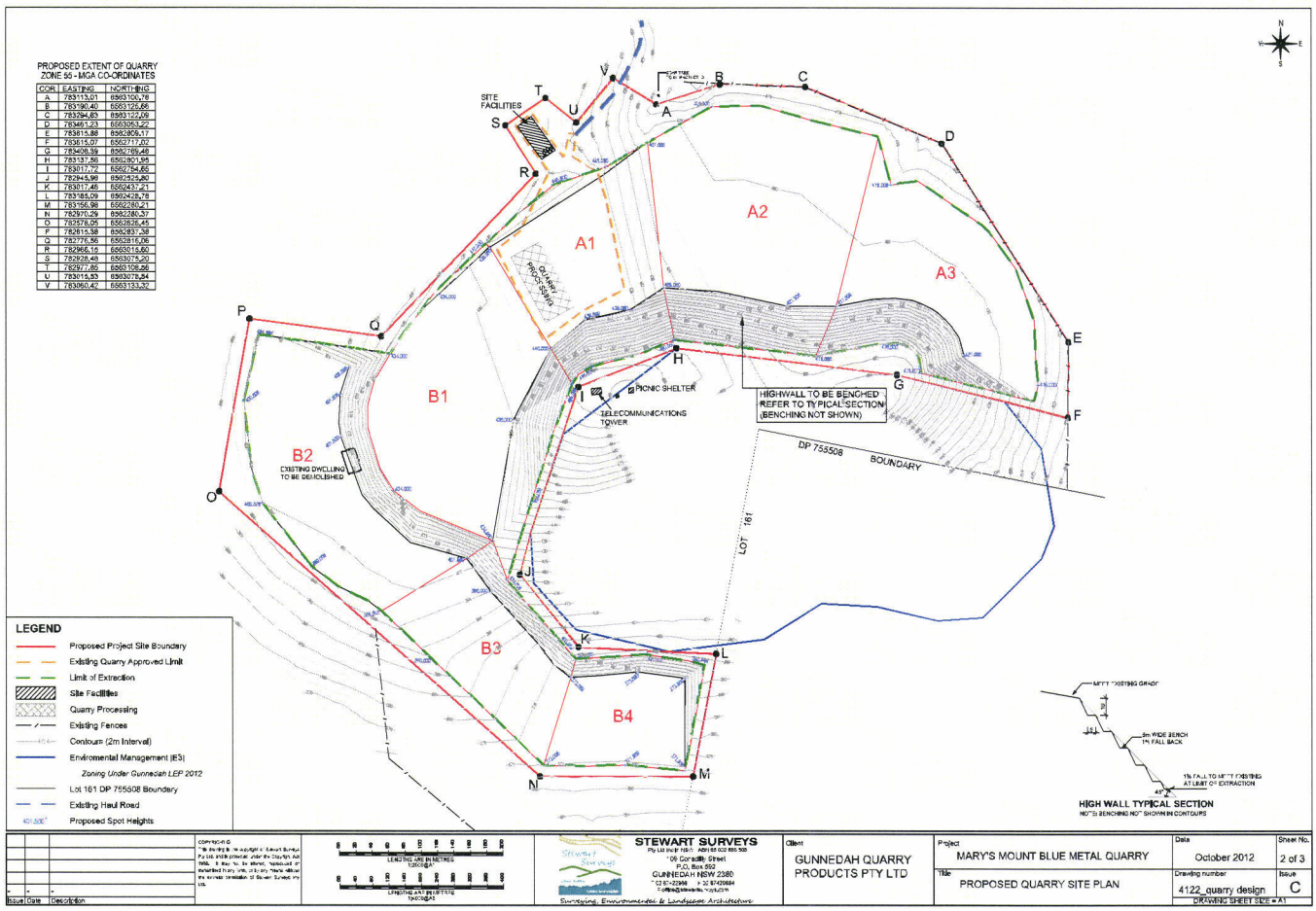

Figure EX1: Plan of proposed quarry (refer appendix for full sized plan)

The operations will be staged beginning in the current pit location (A1) and progressing east for 2 stages (A2-3) and then west of the current operation for 4 stages (B1-4). The staging of the works allows for a manageable pit size, and meets the environmental objectives of reducing the area cleared at any time. This proposed staging and rehabilitation is shown in figure EX2.

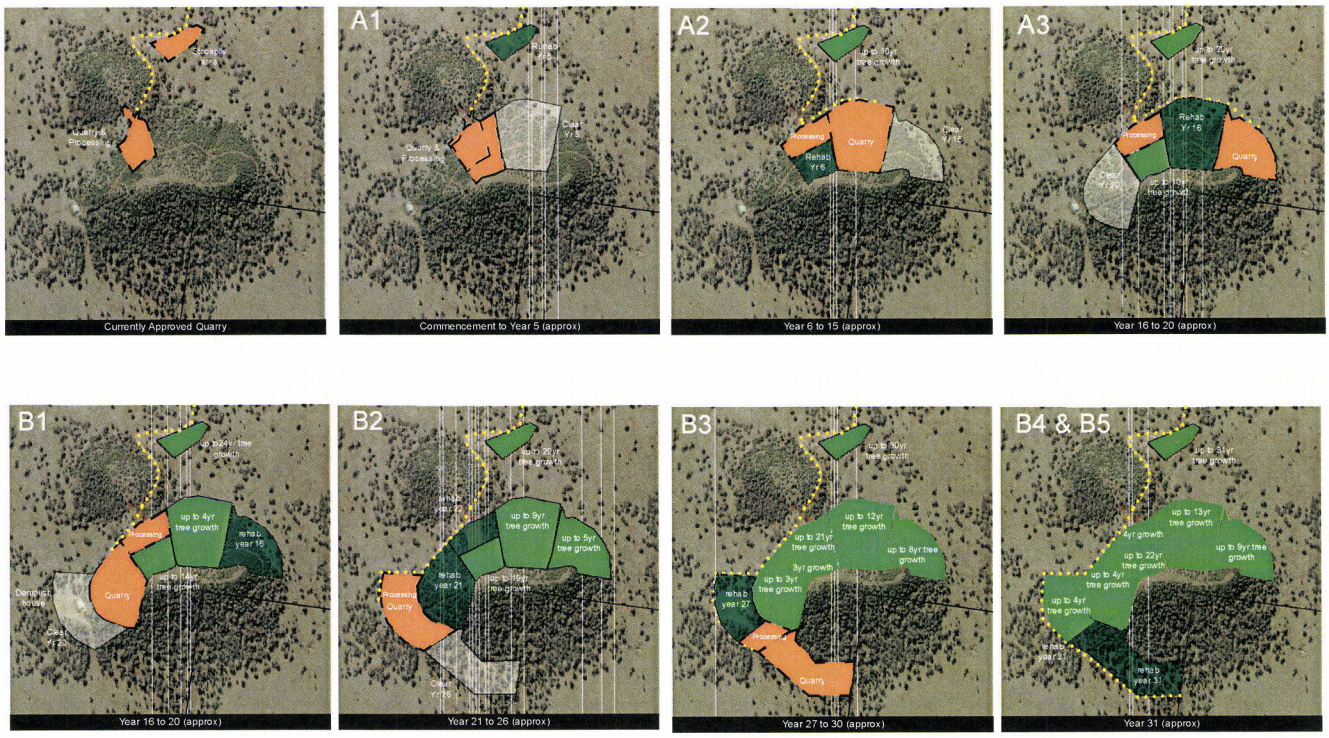

Figure EX2: Proposed Staging diagram (refer section 2 of the EA for full sized plans)

Clearing of existing vegetation will only occur in the 12 months prior to operations moving into each stage. For stages A1 to 3 and B1 the proposed processing, stockpile and loading area will remain in the vicinity of the current processing location. This location is central to both the proposed operations and the haul route out of the quarry to Barker Road. There is a 33 metre high benched wall proposed between stages B1 and B2 to 4. When operations move to this lower level the processing facilities will be relocated into this area.

Final landform and final use

The quarry will be mined from the higher sections towards the lower sections. As the sections are quarried they will take their final shape. The existing grade of the hill where the quarry is proposed, has an existing slope ranging from 11 degrees to 18 degrees. The final landform has been based on the precedent developed by Hannan, 1995 in Managing Urban Stormwater – Soils and Construction: Volume 2E Mines and Quarries (DECC, 2008) and is shown in Figure EX3 and 4 sections through the proposed quarry.

The proposed benching at the quarry will be 5 metres wide at 10 metre vertical intervals.The overall height of the high wall varies and in the worst case is 65 metres from the pit floor to the existing hill scape grade. There is a smaller bench located between stages 4 and 5 or areas B1 and B2 This bench has a maximum overall height of 32.5 metres and allows the pit to step down the hill to meet the natural grades with a pit floor grade of 1 percent. The overall quarry design contours in figure EX1 do not show this proposed benching.

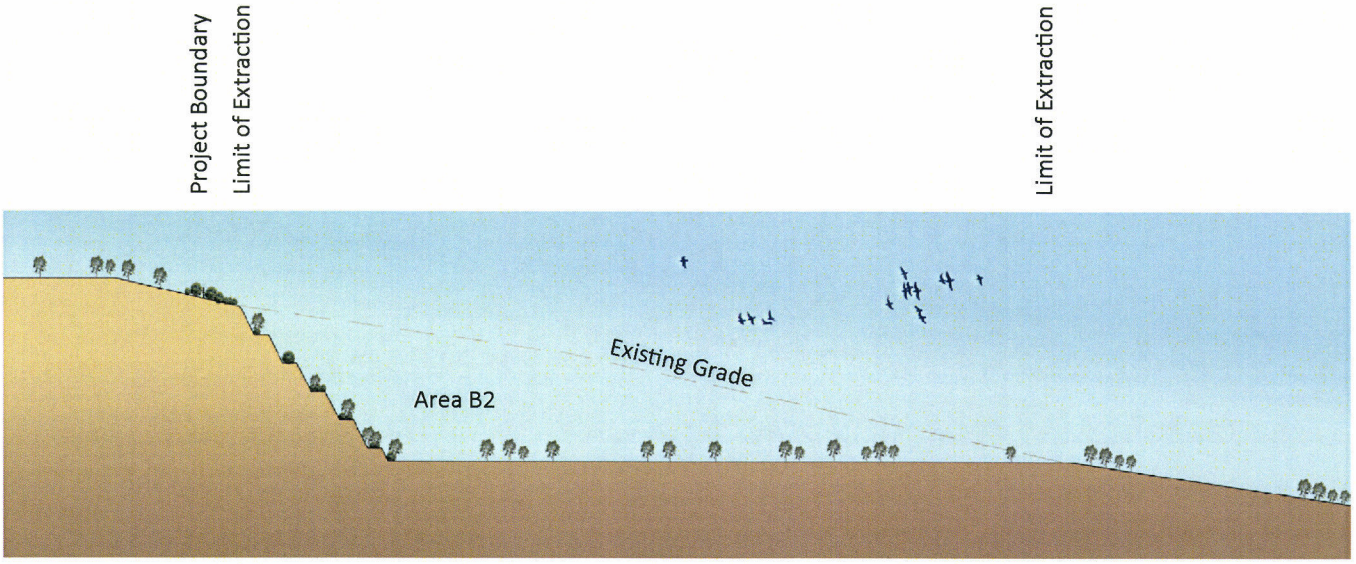

Figure 4.142: Typical Section through area A2

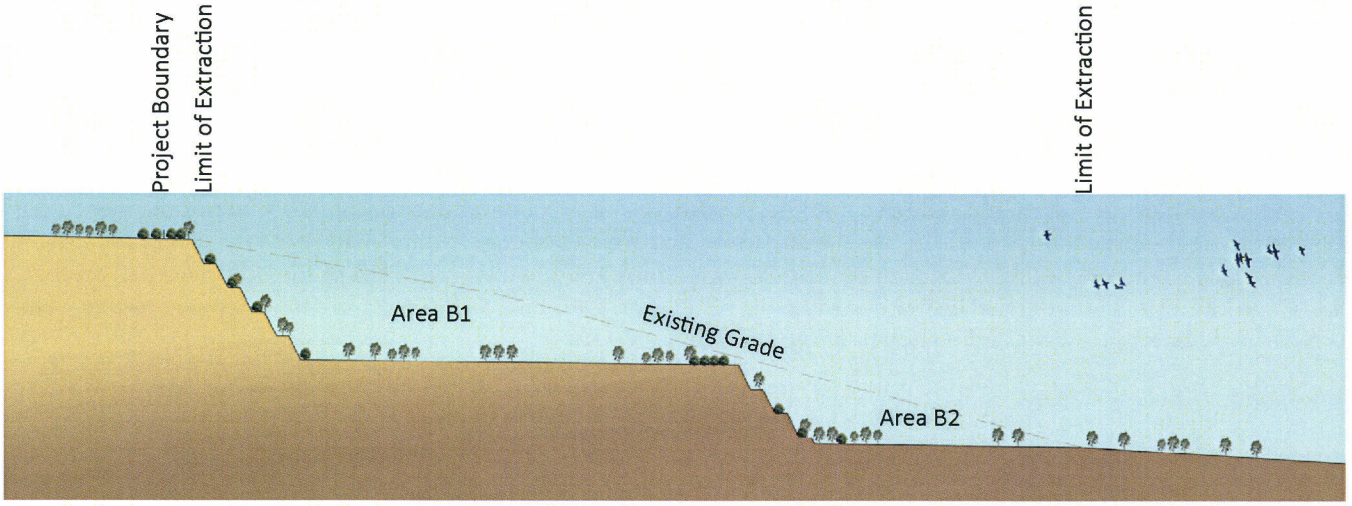

Figure 4.143: Typical section through area B1 and B2

Duration and Intensity of excavation operations

The duration of the quarry is predicted to have a lifespan of between 26 and 35 years. Approval is sought for 30 years. It is difficult to predict the exact volume of material within the proposed quarry as there is insufficient geotechnical investigations over the entire area. It is also difficult to predict the actual annual extraction at any one time as this will be based on demand.

Stewart Surveys have undertaken some volume calculations from the natural surface surveys to the proposed design pit floor. These figures are an estimation of the total volume and have not been based on any geotechnical reports or testing. Estimated years of operation are assuming that close to full extraction of 200,000m^3 is undertaken each year.

Estimate of quarry volume

Stage	Surface Area (m2)	Estimated Volume (m3)	Estimated years of operation (Approx.)
A1	39,997	816,710	4-5 years
A2	66,816	1,638,860	8-9 years
A3	46,119	730,790	3-4 years
B1	58,578	1,085,640	5-6 years
B2	51,208	525,030	2-3 years
B3	29,393	272,030	1-2 Years
B4	21,862	178,020	1 Year
TOTAL	314,024	5,247,080	Min. 26+ years

Legislative Framework (Refer Section 3)

This environmental assessment has been undertaken by Stewart Surveys Pty Ltd with the assistance of Northwest Projects Pty Ltd, Patrick Gaynor Archeologist and Pacific Environmental Limited in their specialist areas to assess the significance of the potential environmental impacts associated with the construction and operation of the Mary's Mount Blue Metal Gravel Quarry. This environmental assessment has been undertaken in accordance with the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the Environmental Planning and Assessment Regulation, 2000.

The Mary's Mount Blue Metal Quarry has been identified as designated development under the EP&A regulation schedule 3 clause 19 extractive industries. The project is designated development because the proposed extraction rate is 200,000 cubic metres per annam and the total land to be disturbed is 39 hectares. The project is not considered to be of state significance and the consent authority is Gunnedah Shire Council.

The environmental assessment has been prepared in accordance with the requirements of the Director General of the Department of Planning dated 14th September 2012 and requirements and issues raised by the other relevant government agencies including the Roads and Maritime Service, the Office of Environment and Heritage, the Environmental Protection Authority and Gunnedah Shire Council.

There are two items on the site which come under the Threatened Species Conservation Act 1995, the Koala which is listed as vulnerable and the White Box, Yellow Box, Blakely's Red Gum Woodland, which is listed as an endangered ecological community. These two items also come under the Commonwealth *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act) and State Planning Policy 44 - Koala habitat protection, also applies to this development. These planning instruments have been addressed in the planning assessment. The EPBC Act has been dealt with separately to this assessment.

A consultation strategy for the site identified key stakeholders for the development as the local community, the local Aboriginal community and government agencies. These three key stateholders were consulted during the environmental assessment with key issues raised addressed in the environmental assessment.

Land Resource (Refer Section 4.1)

The underlying geology of the site is a basalt plug derived from the Garrawilla Volcanics. It is likely that this Basalt plug was snap frozen during the ice age, resulting in the rock being fractured and easily breaking into small fragments naturally when exposed or with the use of a scraper and dozer. The unique characteristics of this resource means there is no requirement for explosives as part of the extraction process.

Soils on the site are mapped as Mullaley and Mount Milbulla (OEH). These soil groups are generally shallow, well-drained soils with limitations including poor moisture availability, variable soil fertility, localized rock outcrop, foundation hazard and widespread recharge zone. The topsoil on the site is generally 1 metre deep, containing 30% recoverable basalt material within this top 1 metres. There are areas of exposed rock present on the site and some localized minor erosion likely to be caused by feral pig tracks.

The landform of the area is steep, with the site flattening as it moves away from Melville Hill where the quarry is

proposed. The existing landform on the proposed quarry site can be described as steeply assending hillscape which is generally evenly graded at a slope of 17-41%. Melville Hill has a top elevation of 502 metres AHD, with the hill falling to 410 metres AHD. The proposed quarry will be located between 419 and 495 metres AHD.

The impact of the quarry on the landform is that the overall profile of the Melville Hill where the quarry is proposed will be altered. Soils will be stockpiled on site for re-use in the rehabilitation of the site and there is expected to be very little impact on the quality of the soils or overall drainage of the site following extraction of the basalt resource.

Water Resource (Refer Section 4.2)

This section of the report was prepared by Northwest Project Pty Ltd. The site has traditionally been known to drain freely with water being absorbed quickly into the fractured rock with little runoff from the proposed quarry site. The site has been identified as an aquifer recharge area.

The water runoff from the quarry is proposed to be directed via existing and proposed contour banks to an existing and proposed 4 ML dam on the "Burleith" Property. This section of the report outlines water calculations to determine the capacity of the storage dams. While the risk of declined water quality is considered to be low the catching of this water on the site and monitoring will avoid detrimental impacts on downstream storage dams, or waterways including Quia Creek and Cox's Creek.

Flora and Fauna (Refer Section 4.3)

The flora and fauna study covers an area of 200 hectares surrounding the proposed 39 hectare quarry. These studies were undertaken with a review of desktop studies carried out and field investigations on the 23rd of May 2012 and the 11th October 20123. Field studies used the random meander method to map species distribution.

The Flora Impact assessment identified 4 zones of vegetation, which have been described in greater detail in section 4.3 of this report. An area of 2 hectares which is currently being quarried was previously cleared under approval by Gunnedah Shire Council.

The fauna assessment uncovered a potential 29 species residing on the site. These species included the Koala which is listed as vulnerable under the Threatened Species Conservation Act 1995. Three Koala's were recorded on the site, all just outside the project area. This has led to the site being classified as core koala habitat under SEPP 44. The impact of the proposed development on the fauna on the site will be through the direct removal of habitat.

The proposed development will necessitate the removal of 13 hectares of White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community. It will also have direct impacts on the Koala population on the site with the removal of habitat. To abate potential impacts on flora and fauna a number of actions are proposed, the main mitigation measures are;

- Supplementry Planting of species in the White box Yellow Box Blakely Red Gum ECC in areas below the proposed quarry (15 hectares minimium)
- Planting of a vegetated corridor 1.5 kilometres long and 100metres wide to provide a vegetated connection between the remaining hillscape vegetation and the eastern boundary which meets other areas of remnant vegetation.
- Staged rehabilitation of the site to enable efficient establishment of plants and limiting the cleared area size to each quarry stage. (note all measures are listed in section 4.3 of this report)

A Koala Plan of Management has been prepared for the site in accordance with the requirements of SEPP 44. A species impact statement for the Koala and White Box Yellow Box Blakely's Red Gum woodland ECC has also been prepared in accordance with the Threatened Species Conservation Act 1995. It is concluded that the impact of the proposed development will impact local Koala populations through habitat removal, however this impact is not expect to result in a decline in Koala populations in the Gunnedah area. It is acknowledged that the removal of 13 hectares of White Box Yellow Box Blakely's Red Gum Grassy Woodland ECC on the site will have an impact on this ECC which faces continued threats from loss of habitat within the region. However the mitigation measures to compensate for this impact including additional planting of species in this ECC within the site will provide long term benefits for the flora

and fauna of the area. In the long term White Box Yellow Box Blakely Red Gum species on the site is estimated to increase from 208 to 240 hectares on the "Burleith" Property.

Heritage (refer section 4.4)

A review of the European heritage around the site has uncovered the closest item as being more than 10 kilometers from the site known as the Goolhi Grave on Goolhi Road. There will be no impact on items of European heritage by the proposal.

A review of the Aboriginal Cultural Heritage for the site include a search of the OEH AHIMS database, which revealed no Aboriginal sites in the area of the proposed quarry. An Archaeological Survey of the site was then carried out by Patrick Gaynor Archaeologist and representatives of the Gunida Gunyah Aboriginal Corporation Inc and the Red Chief Local Aboriginal Council. These investigations included a site visit by these three groups on the 12th October 2012, where a scarred white box tree was uncovered. This tree has been identified as being of Aboriginal Cultural significance. The tree is located 20 metres north of the subject site, 43 metres minimum from the limit of extraction. It is proposed to fence and signpost the tree so it remains protected. The consultant team discussed the area generally in relation to Aboriginal site and agreed that the site would not have been significant. They commented that the rock is too soft to be used for making tools.

The proposed development will not have an impact on any items of European or Aboriginal Cultural Heritage.

Traffic (Refer Section 4.5)

The current haul route is along unsealed Barker Road from the "Beulah" entrance to Goolhi Road, under this application the proponent proposes to alter this haul route to along Barker Road West from the entrance of "Beulah" to the entrance of "Tara" then intersecting with Grain Valley Road, and proceeding to Boggabri or Mullaley along Grain Valley Road. The developer has committed to bitumen seal this haul route to mitigate dust, noise and safety issues associated with the development. The proposed upgrade is estimated to cost $2.7 million dollars, and the proponent intends to stage the works over a two year period. During this period there will be times when the currently approved haul route will need to be utilized due to construction works along the new route. It is requested that Council allow the use of this current haul route for a 2 year period to facilitate construction and waive the section 94 contribution outlined below during this 2 years given the improvements to Council assets along Barker Road and Grain Valley Road are estimated to cost the developer $860,000.

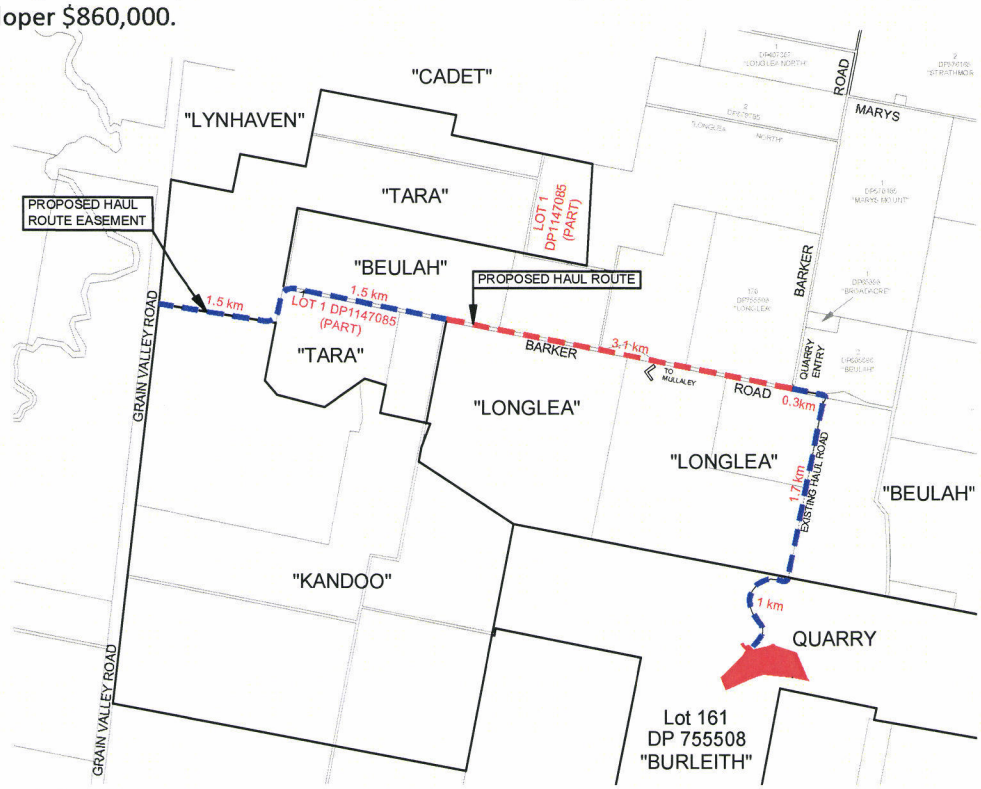

Figure E5: Proposed Haul Route.

Northwest Projects Pty Ltd have carried out a traffic study for the development has concluding that the proposed quarry expansion would result in increased traffic volumes to a varying extent along the 2 main haul routes to Gunnedah and Boggabri. At peak production of 600,000 tonnes per annum it is anticipated that there would be an average of 28 additional truck movements from the site. Light vehicle access to and from the site would have a negligible impact on the road network. The haulage route has been assessed based on the suitability to cater for increased heavy vehicle movements with regards to pavement strength, safety, maneuvering and intersection design. The key recommendations are to control speed, loading and spillage from trucks along the entire length of the haul route. An intersection to RMS BAL standard with full left turn deceleration lane, into the site will be constructed at Grain Valley Road 200 metres north and south of the entrance to Tara. Along Barker Road west the road will be constructed to rural standard with sealed pavement 50 metres each side of the entrance approach to the internal quarry entrance on private road.

Stewart Surveys has prepared a contributions plan which was issued to Council on the 12th November 2012. This plan outlined a proposal by Gunnedah Quarry Products to contribute $0.20 per tonne under the section 94 contribtion. This plan notes that material extraction rates will be based on demand and therefore a lump sum payment may not be appropriate. It is expected that truck movements are likely to be between 2,813 and 18,750 movements a year. This equates to a contribution of up to $120,000 per year by the proponent, in addition to proposed road improvement works outlined above.

Noise (refer section 4.6)

The site is located within a rural agricultural area and the existing noise environment is typical of a rural setting. A review of sensitive receivers has identified 12 residences with a 4 kilometre radius of the quarry site. The project activities of extraction and hauling will increase noise emissions from the quarry. The equipment at the quarry is fitted with a number of noise reducing devices and the proposed operation will use best practice operating techniques to minimize noise impacts.

A review of the expected noise emissions along with meteological data and close by sensitive receivers has concluded that;

- Noise generated from the quarry is unlikely to impact on nearby residence which are 1.49 to 3.3 kilometres from the site.
- Noise generated from the hauling will have a moderate impact on 5 nearby residents which are located between 0.2 and 0.95 kilometres from the site.

It is not expected that any noise impacts will exceed the acceptable EPA industrial noise level for agricultural area of 50dB. Ongoing monitoring and assessment of noise emissions will ensure that impacts are reasonable and less than the maximum 55dB (A) at any sensitive receiver location. If impacts are considered to be unreasonable additional noise control devices such as rubber or synthetic shields will be implemented and full noise modeling is recommended.

There is not expected to be any vibration impacts at the quarry given that there is no blasting proposed.

Air Quality (Refer Section 4.7)

The Project activities of aggregate extraction, hauling and stockpiling have the potential to generate fugitive dust emissions. Fugitive dust emissions can also be expected during construction, from vegetation stripping, earthworks and material handling.

Meteorological data from the Bureau of Meteorology's Automatic Weather station at Gunnedah Airport has been used in this assessment. The winds for this region are predominantly from a southeasterly direction and to a lesser extent the south-southeast.

No onsite air quality data is available for the Project site. Data from nearby mines and Tamworth have been used for background ambient air quality in the cumulative assessment.

Emissions and Modelling Assessment

Dispersion modelling has been used to predict ground level concentrations (glcs) of key pollutants associated with the project. Dust emissions from the A2 operational stage have been estimated by analysing the activities taking place for the Project. Emission estimates are presented for a maximum production scenario of 600 Ktpa of product.

The results of the dispersion modelling indicate that the predicted incremental glcs for PM10, PM2.5, TSP and dust deposition at the closest residential receptors from the Project alone are all below the impact assessment criteria. The highest predicted glcs occur at the closest residence located within the proposed Project boundary.

A cumulative assessment, incorporating background levels, indicates that the project is unlikely to result in any additional exceedances of relevant impact assessment criteria at the neighbouring receivers.

Visual Amenity (Refer Section 4.8)

In order to assess the visual impact of the proposed quarry footprint on the surrounding area the footprint has been superimposed onto 15 photos taken around the road network surrounding the site. These images show the full quarry and have not been separated into quarry stages. The quarry is visible for an estimated 9 kilometres in a north, northwest, west and southwest direction and for approximately 3.5 kilometres is an easterly and north east direction.

The visual impact assessment concludes that the landscape surrounding the quarry generally has a moderate to high visual absorption capacity due to the existing terrain and the distance of the quarry from surrounding roads. The proposed staging of the quarry operations, vegetation removal and rehabilitation will lower the impact to the visual amenity of the area and visual impacts are expected to be short term being restored following the full rehabilitation of all stages of the quarry.

Impact on surrounding Agricultural Land (refer section 4.9)

The predominate land use surrounding the quarry is agricultural, primary production. In the short history 2-3 years of the quarry operation there have been no major impacts on the surrounding agricultural land.

There is not expected to be any impact on the water resource in the area. Dust generation is noted to have some physical and chemical effects on vegetation and crops however given the dust modeling this is unlikely to impact on surrounding cropping land. There will be cumulative impacts on air quality generated during harvest time when the quarry is operating. Given the low readings at sensitive receivers identified in the dust modeling this is not expected to exceed acceptable health levels.

Following rehabilitation of the quarry site it is anticipated that the site will be maintained as native vegetation. Some marginal grazing may occur on the site's lower slopes. The site is not considered to be of high agricultural value and it is not anticipated that this final landuse will reduce the agricultural capacity of the region.

The proposed expansion will have a positive impact on surrounding infrastructure with benefits from the improved road network being shared by the agricultural sector.

Waste Management (Refer section 4.10)

Waste management is an essential component to the running of a successful operation. It is also essential to meet the Work Health Safety requirements on the site and protect the site from environmental pollution and fire risk.

Non-productive wastes identified as being associated with the project include; domestic waste, fencing materials, oils and grease and sewerage. Domestic waste will be collected on site and transferred to the Gunnedah Waste Management Facility when required. Fencing materials would be either set aside for re-use or recycled. Oils and Grease required for maintenance will be stored and replaced within the compound area. Machinery will be regularly maintained to minimize potential for leaks and spills. Toilet facilities will consist of a port-a-loo system with sewerage emptied by a licensed waste collector.

Production waste on the site is expected to be minimal. All topsoil will be scraped and stockpiled for re-use in the rehabilitation stage of the project. Organic waste in the form of vegetation removal will be chipped and stored on site for spreading as mulch, logs and hollows will be retained for placement as habitat in the rehabilitation stage.

Risk of pollution from poor management of wastes on the site is low.

Hazards (refer section 4.11)

Bushfire

The site has been identified as bush fire prone land in the Gunnedah LGA. A number of management techniques have been outlined in the report to reduce fuel loads and limit the risk of fire on the site. In the case that there is a fire on the site there are two alternative access to the property, one to Pownall Road and the other to Barker Road, and a number of maintenance tracks are proposed to be established around the quarry. Water storage would be available for fire fighting purposes and staff would be trained in basic fire fighting skills.

Climate

Climatic conditions include extreme tempretures, rainfall, high winds, drought and flooding have the potential to impact on quarry operations. It is recommended in this section that daily operations be planning around predicted climatic conditions and during extreme climate events quarry operations are modified to reduce potential environmental risk.

Part of the Haul Route through the property "Tara" has been identified in the Draft Floodplain Management Plan: Lower Cox's Creek as having a flood issue with a block in the flow of Quia Creek. As part of the proposed works a causeway will be constructed in this location to break the block and allow unimpeded flow of Quia Creek.

Erosion and Sediment Control

Erosion and Sediment Control is essential to the successful operation and management of any extractive industries project. It is recommened that an Erosion and Sediment Control plan be developed for each stage of the project, with regular monitoring to evaluate the effictiveness of devices and allow improvements where required.

There will be no inward fall as part of the quarry design except along the high wall benching which will have stable down drains located at approximately 150 metre intervals to control the runoff from this steep area.

Pest and Weed Management

There are two pest species the feral pig and European Red Fox recorded on the site. It is proposed to humanely manage these pests through baiting or shooting to protect native fauna in the area and prohibit continued erosion which is being caued on the site.

The presence of weed species on the site currently is low, however there are a number of potential weed sources associated with the project. A number of strategies will be undertaken to ensure that weeds do not become an issue on the site.

Utilities and Services (Refer section 4.12)

Bore water is used at the quarry for dust suppression. This water is supplied by an underground bore located on the "Burleith" property. The proposed works will necessitate the upgrade of pump infrastructure to provide the required head pressure for filling of current storage tanks. There will be an increased demand for water used in machinery dust suppression but this will be offset by the reduced water quantity required for water cart along the gravel roads which are to be sealed.

There is an overhead power supply coming from the south through the project areas B1 and B2. This power line feeds the existing "Burleith" residence which is proposed to be demolished and a Optus telecommunications tower at the summit of the hill. When works approach this stage the proponent will liaise with Essential Energy to have this electrical supply relocated beyond the project boundary, with no interruption to the Optus telecommunication tower.

There is no impact to sewer or telecommunications services on the site. These service connections to the existing house will be decommissioned prior to the house being demolished.

Social and Economic (Refer section 4.13)

The project would have a largely positive social and economic impact considering the increase in employment opportunities and the ready availability of material leading to increase capacity for civil and industrial development in the region.

This project is driven by the market demands for the blue metal products quarried at the Mary's Mount facility. Increasing demand over the past 12 months and predicted increased demand associated with ARTC expansion and mine expansion in the Boggabri and Maules Creek area has resulted in strong demand for the material. This is the only quarry within a 100km radius which can supply the blue metal to these client's needs.

There are some short term negative impacts identified such as potential impacts on property prices surrounding the quarry, however these impacts are expected to be short term and offset by the local improvements to the road network and in-kind works offered to surrounding residents by the proponent.

In reviewing the social and economic impacts of the project the benefit for the region far outweigh the short term negative impacts to surrounding residents. The increased availability of materials also drives the market price paid by consumers down, which can promote development in the area.

Rehabilitation (Refer Section 4.14)

The approach to rehabilitation and landscape management of the site will include the reshaping of the final void, topsoil replacement, installation of water management devices, establishing a cover crop, planting of tube stock and establishment and monitoring programs for these rehabilitated areas. As the site has been completely altered the rehabilitation will be by re-vegetation.

The progressive rehabilitation of the site will occur immediately following each stage of quarry operations. A rehabilitation plan has been developed for the site with plant species mixes to be planted being derived from the native vegetation on the site. Plant seed is to be collected from local provenance stock within a 5 kilometre radius of the site. The altered landform of the final void has resulted in a larger area than what naturally occurred on the site to be planted with the endangered ecological community the White Box, Yellow Box, Blakely Red Gum Woodland species. This equates to a total of 41.4 hectares (type 1), with an additional 1.9 hectares (type 2), containing species from this ECC. Rehabilitation vegetation type 3 and 4 are a mix of species which are present on the hillscape of the site and total an area of 5.14 hectares.

The successful rehabilitation and landscape management of the site will restore the habitat and biodiversity values of the site following the extraction of the resource. The staging of the rehabilitation will minimize the exposed area at any one time and limit the risk of erosion and sedimentation.

Conclusion and Justification (Refer section 5)

This environment impact statement prepared for the Mary's Mount Blue Metal Quarry has addressed the issues and concerns raised by the community and Government agencies in the form of the Director General Requirements for the development. The project provides for quarrying of blue metal, on site processing of the material, sale and despatch of the blue metal products which would generate employment opportunities and boost local economies in the Gunnedah area. The development would impact positively on the economic base of the Gunnedah Shire. The proposed rehabilitation of the site would re-establish the habitat and biodiversity values of the site restoring the land to its previous agricultural capacity of light grazing.

In concluding this report, should the application be approved the Mary's Mount Blue Metal Quarry would:

- Contribute to meeting the growing demands for blue metal, of the mining, transport and construction industries in the Gunnedah area

- Set in place a number of safeguards and mitigation measures to mitigate and abate identified environmental impacts to an acceptable level
- Satisfy the principles of ecologically sustainable development
- Restore the agricultural capacity of the site following closure of the quarry
- Provide new and enhanced Koala Habitat and corridors
- Promote the re-vegetation of the White Box, Yellow Box, Blakely's Red Gum Endangered Ecological Community;
- Provide training and employment opportunities for residents in the Gunnedah and Mullaley area.
- Contribute to the diversification of industry within the Gunnedah Shire and promote continued economic growth in the shire and
- Address the perceived social impacts

The following table summaries the risk sources, potential environmental impacts and proposed mitigation measures at the Mary's Mount Blue Metal Quarry.

Summary of Risk Sources, Potential Environmental Impacts and Proposed Mitigation Measures.

Environmental Issue	Risk Source	Potential consequences	Receptor	Potential Environmental Impact	Proposed Mitigation Measures
Soil and land capacity (Refer Section 4.1 of this report)	• Reduction in soil quality and availability through poor management practices • Increased potential for erosion • Decreased land capacity of final landform	• Structural damage to soils through poor soil management practices • Reduced biological activity of soils	• Property soils	• Insufficient soil quantity for rehabilitation • Reduced soil quality	• Erosion and sediment control mechanisms be implemented to protect topsoils including the planting of cover crops • Topsoil improvement in rehabilitation process (if required) • Import topsoil if 150mm minimum cover cannot be achieved across the site
Site water and Runoff (Refer Section 4.2 of this report)	• Property water storage dams • Quia Creek • Cox's Creek	• Reduced downstream water quality	• Surrounding land holders	• Reduced downstream water quality	• Use of existing and proposed contour banks to catch water in site dams, to prevent downstream impacts on water quality • Opening up block in Quia Creek with the installation of a causeway on the "Tara" haul route. This has been identified as an issue in the Cox's Ck Catchment.
Flora and Fauna (Refer section 4.3 of this report)	• Removal of habitat, through land clearing • Disturbance as a result of quarry operations – noise, dust etc. • Potential impact on Koala threatened species habitat • Vegetation and habitat fragmentation • Potential impacts of the White Box Yellow Box Blakely's Red Gum woodland ECC	• Disturbance to threatened species • Reduction in the local biodiversity • Displacement of species	• Vegetation with the project site • Local communities and ecosystems	• Reduced biodiversity • Habitat loss impacting on ecosystems, populations and communities	• Limit tree clearing to only necessary quarry limits and stage clearing to limit impacts on habitat • Progressive rehabilitation to restore habitats • Rehabilitate with native species to reinstate habitat values. • Supplementary Planting around the base of the Melville Hill within the property for a minimum area of 15 hectares • 1.5 kilometre vegetated corridor, 100 metres wide to provide fauna with connected link to other remnant vegetation in the Mary's Mount Area east of the site. • Implementation of a Koala Plan of Management for the site
Aboriginal heritage (Refer Section 4.4 of this report)	• Removal or destruction of unknown aboriginal sites due to quarry expansion • Impact on the one aboriginal site identified - a Scar tree north of area A2	• Loss of damage to Aboriginal artefacts	• Local Aboriginal community	• Impact on scar tree • Impacts on unidentified sites or artefacts of Aboriginal cultural heritage as a result quarry operations	• Fence Scar tree and signpost to highlight significance. • Should items of potential aboriginal value be suspected the local land council will be contacted. • Consultation with the local aboriginal community.
European Heritage (Refer Section 4.4 of this report)	• Removal or destruction of sites of heritage significance due to quarry expansion	• Loss or damage to heritage sites	• Heritage sites	• Loss of destruction to/of items of heritage significance	• Consultation with the local community
Traffic generation (Refer Section 4.5 of this report)	• Increased truck movements hauling material • Increased light vehicle moments due to employees • Construction of new haul road on	• Impacts associated with haul road construction including loss of agricultural land, noise, dust, ecology etc.	• Local road network • Existing road users	• Increased traffic congestion • Elevated risk of accident/incidents • Road pavement deterioration	• Haul route to be bitumen sealed to increase safety and reduce dust emissions. • Vehicles will stop hauling when school bus is operating in the area. • Vehicles will adhere to local speed limits and

	private property	• Increased heavy vehicle moments on local roads			traffic rules • Vehicles will maintain a 60km/hr speed on private haul roads • Vehicles will be equipped with two-way radios to communicate any potential traffic incidents.
Environmental Issue	**Risk Source**	**Potential consequences**	**Receptor**	**Potential Environmental Impact**	**Proposed Mitigation Measures**
Noise (Refer section 4.6 of this report)	• Increased noise from quarry operations including crushing and screening • Increased noise from truck movements along haul route	• Decreased Amenity • Health related issues • Physiological and behavioural impacts on wildlife and livestock • Decreases land values	• Surrounding residence	• Nuisance and amenity impacts from increased noise impacts associated with the operation and hauling • Sleep disturbance as a result of increased noise levels • Increased noise leading to stress for wildlife and livestock and potential changes in Auditory, physiological and behaviour characteristics of some species	• Quarry works will maintain reasonable work hours so to minimise disturbance to residence • Equipment is well maintained and fitted with low noise emission equipment where available • Haul route has been determined to minimise impact on surrounding residence • Mitigation/noise buffers will be installed if required
Vibration (Refer section 4.6 of this report)	• Increased levels of vibration from surface operations and haulage	• Structural damage to buildings and structures • Reduced amenity • Impacts on wildlife and livestock	• Nearby residence • Local livestock and wildlife	• Nuisance and amenity impacts on surrounding residence and landholders • Potentially reduced agricultural production	• Extraction procedure does not include blasting thus limiting vibration • Haul route has been determined to directly impact the least number of nearby residence
Air Pollution – Dust (Refer section 4.7 of this report)	• Dust and fine particle matter generation from hauling material • Dust and fine particle matter generated from quarry operations • Wind erosion on disturbed areas and stockpiles	• Increased deposition and suspended particles	• Nearby residence • Surround environment	• Nuisance and amenity impacts from dust deposition • Adverse health impacts (if PM_{10} levels are excessive) • Native vegetation - lowering photosynthesis potential • Native fauna may cause relocation of some species	• Crushing and Screening machinery are fitted with dust suppression misters • Haul road is to be bitumen sealed to minimise dust generation • Topsoil stockpiles are to be covered in a cover crop to minimise wind erosion • Quarrying and rehabilitation is to be staged to minimise open quarry footprint. • Haul route has been determined to minimise impact on surrounding residence
Greenhouse gas emissions (Refer section 4.7 of this report)	• On site vehicle and plant emissions • Haul road emissions • Reduced emissions by availability of local product for users	• Increased greenhouse and other gas emissions	• Local air shed	• Increased contribution to greenhouse gases • reduced overall greenhouse gases for some industries currently sourcing product from greater distances	• Tree planting as part of the rehabilitation process to store some gases • Increased access to local quarry products
Visual Amenity (Refer section 4.8 of this report)	• Decrease in visual amenity of landscape	• Vegetation removal on the hillscape reduces areas amenity	• Nearby residence and motorists	• Reduced amenity	• Works will be staged to minimise visual impact and rehabilitated progressively • Position of the quarry limits visual range with very little visibility from the much of the Oxley highway and nearby hills limiting visual range. • Impacts are expected to be short term and be restored when the site is fully rehabilitated.
Waste Management (Refer Section 4.10 of this report)	• Production of contaminating or polluting materials eg. Waste oils, saline water, general rubbish	• Contamination of soils • Reduced visual amenity	• Property • Nearby residence	• Impacts on future production on the land • Reduced amenity of the property due to poor rubbish and little management	• A waste management strategy will be implemented • Oils and other potential contaminates will be managed and disposed of in a safe manner.

Environmental Issue	Risk Source	Potential consequences	Receptor	Potential Environmental Impact	Proposed Mitigation Measures
Bushfire (Refer Section 4.11 of this report)	• Initiation of fire on the site and spread to adjoining agriculture lands	• Health and safety impacts of project personnel • Damage to site equipment • Damage to adjoining land and native vegetation	• Project personnel and equipment • Neighbouring residences and farming land	• Injury or health impacts on project personnel • Operational constraint posed by damaged equipment • Crop or pasture damage • Destruction or damage to native vegetation and fauna habitat	• Hazard reduction prior to bushfire season • Adequate water supply in the case of a fire • Adequate protection of plant and water supply equipment
Erosion and Sediment Control (Refer Section 4.2 and 4.11 of this report)	• Erosive action of wind and water • Elevated concentration of suspended sediment in runoff resulting from erosion of disturbed areas	• Loss of topsoil • Increased sedimentation on the plains	• Property soils	• Soil erosion • Increased sediment load in nearby areas	• Implement an erosion and sediment control plan for each stage of operations • Erosion and sediment control mechanisms implemented such as silt fences and hay bales • Monitor erosion and sediment control devices for failure
Socio Economic Impacts (Refer section 4.13 of this report)	• Increased employment opportunities at the quarry • Increased employment opportunities as a result of capital expenditure • Perceived or real impacts on local amenity of neighbouring properties	• Reduced unemployment • Increased local spending • Increased access to local quarry products	• Nearby Residence • Local community • Wider community	• Reduced property prices greenhouse gases regionally by reduction in material transport distances	• Positive contribution
Property Values (Refer section 4.13 of this report)	• Reduction in property values due to presence of quarry operation	• Changed property values	• Surrounding land holders	• Possible short-term reduction in land values versus increased economic growth	• These potential effects will be short term there should be no long term impact following rehabilitation except to property where quarry is situated • The Current land holder where quarry is situated is being paid a royalty for the product as compensation ($120,000 paid to date) • Land holders surrounding the quarry are being compensated and works are being carried out in kind by quarry operators as compensation.
Rehabilitation (Refer section 4.14 of this report)	• Modified landform at completion of the project • Modified land uses on the site	• Reduced amenity of the project site • Reduced agricultural capacity • Safety	• Property • Surrounding lands including neighbouring properties and roads	• Reduced amenity of project site landform • Reduced access to agricultural lands • Public safety from final batters	• Land will be progressively rehabilitated to minimise visual and habitat impacts • Final landform will be benched to allow vehicle movements and erosion and sediment control mechanisms • Top of void will be fenced to maintain safety of livestock and property owners.