

Section 6

Project Evaluation and Conclusions

P R E A M B L E

This section of the Environmental Assessment concludes the document with an evaluation of the proposed continuation and expansion of extractive operations at the Nowra Brickworks Quarry. Alternative development options are considered and the residual environmental risks assessed. This section also includes an assessment of the Project against the principles of Ecologically Sustainable Development and concludes with a justification of the Project.

This page has intentionally been left blank



6.1 DEVELOPMENT ALTERNATIVES

6.1.1 Introduction

The Director-General's Requirements issued on 20 September 2007 require that the *Environmental Assessment* include a detailed description of the development alternatives considered.

The considerations of feasible alternatives to the proposed activities are discussed in this section and relate principally to:

- reduced depth of extraction;
- no expansion of extraction area;
- fixed processing plant;
- no VENM placement; and
- two extraction areas.

The alternative of not developing Nowra Brickworks Quarry is also considered in this section.

6.1.2 Reduced Depth of Extraction

The Project, as proposed, would result in the base of the extraction area with an elevation of approximately 19m AHD. Consideration was given to limiting the elevation of the base of the proposed extraction area to the elevation of the current base of the extraction area, namely approximately 29m AHD.

As indicated in Martens (2009), the estimated piezometric surface within the proposed extraction area occurs at an elevation of between approximately 30m AHD and 39m AHD. Limiting the base of the elevation of the base of the extraction area to approximately 29m AHD would have the effect of reducing the groundwater inflows into the extraction area. However, this approach was rejected for the following reasons.

- Limiting the elevation of the extraction area to approximately 29m AHD would, following placement of VENM into the extraction area, result in sterilisation of approximately 1.7 million m³, or 4 million tonnes, of shale resource.
- The sterilisation of approximately 4 million tonnes of material would result in a shorter Project life, necessitating the requirement to locate and develop an alternative source of quarry products and an alternative location to place VENM soon than would otherwise be the case.

- Limiting the elevation of the extraction area to approximately 29m AHD would result in less material being extracted and less volume for placement of VENM for the same level of surface disturbance, including removal of native vegetation, when compared with the proposed development. As a result, the same biodiversity impacts would be incurred for less material recovered.
- Limiting the level of extraction operations to 29m AHD would reduce the amount of groundwater that would flow into the extraction area. However, the anticipated groundwater inflows would not result in significant environmental impacts because, with the construction of the irrigation area and the grassed buffer areas, discharge of groundwater would not be required.
- Water that would be permitted to flow from the Project Site to Nowra Creek would have a concentration of dissolved solids of approximately 220mg/L, or approximately the same concentration as the concentration of Nowra Creek.

As a result, limiting the depth of extraction would not result in any significant benefit to the environment and would sterilise a significant shale resource.

6.1.3 No Expansion of Extraction Area

The Project, as proposed, would result in disturbance of approximately 7.4ha of native vegetation. The Proponent considered limiting development of the Nowra Brickworks Quarry to those areas already disturbed, namely limiting development to Stage 1 of the Project. This would have the advantage of not disturbing additional native vegetation. However, this approach was rejected for the following reasons.

- Limiting extraction to the areas of current disturbance would significantly reduce the amount of quarry products that would be extracted. This would result in alternative sources of quarry products having to be developed much sooner than would otherwise be the case.
- Section 2.11.5 indicates that the Proponent anticipates that during Stages 2 to 5, the vast majority of material that would be imported to the Project Site, including VENM, would be imported as backloads, providing significant environmental and economic benefits. Limiting extraction operations to Stage 1 of the proposed development would result in VENM placement operations occurring after the completion of the extraction operations, removing the opportunity to using backloads to transport VENM to the Project Site and the chance to realise the environmental and economic benefits that would flow from such a synergy.



As a result, on balance, the Proponent contends that the additional environmental impacts associated with the proposal, namely removal of approximately 7.4ha of native vegetation, are justified based on the additional material that would be recovered and environmental and economic benefits that would flow from transporting VENM to the Project Site using backloads.

6.1.4 Fixed Processing Plant

The Project, as proposed, would utilise mobile crushing and screening equipment. The Proponent considered incorporating a fixed processing plant into the Project. This would have the advantage of allowing fixed dust and noise-mitigation equipment to be installed. However, this approach was rejected for the following reasons.

- A fixed processing plant would need to be constructed at the natural surface. This would result in additional dust, noise and visual impacts. The dust and noise impacts of a fixed plant at the natural surface would be likely to be greater than the dust and noise impacts of a mobile plant in the base of the quarry, even if dust and noise-mitigation equipment were fitted to the fixed plant.
- The resource beneath the fixed plant would be sterilised.
- A fixed plant at surface would require stockpile areas surrounding the plant, further increasing the amount of the shale resource that would be sterilised and potentially increasing dust impacts of the Project.
- A fixed plant would not be as flexible as a mobile plant which can be combined in varying combinations depending on the quarry products required.
- A fixed plant would require two processing trains to enable the processing of recycling materials. Alternatively, if a single processing train were installed, processing of quarry products would have to cease to allow processing of recycling materials, significantly impacting on the ability of the quarry to provide a constant supply of quarry products.
- A fixed plant would require the installation of an electrical supply sufficient to operate the plant. This would impose a significant up-front economic cost on the Project.

As a result, on balance, the Proponent contends that the additional environmental impacts associated with the proposal, namely an inability to fit fixed dust and noise-mitigation equipment to the crushing and screening equipment, are outweighed by the environmental and economic costs of doing so.

6.1.5 No VENM Placement

The Project, as proposed, would include the placement of VENM within the extraction area to recreate the pre-extraction landform. The Proponent considered not importing such material. This would have the advantage of removing the small risk of importing inappropriate or contaminated material to the Project Site. However, this approach was rejected for the following reasons.

- No importation of VENM would result in the loss of the opportunity to backfill the extraction area and to create a landform that mimics the pre-extraction landform. This would pose ongoing safety and environmental risks that were considered by the Proponent to be unacceptable.
- If VENM were not imported and placed within the Project Site, a portion of this material may be placed in unlicensed facilities elsewhere, dumped illegally or placed into landfill.
- No importation of VENM would result in a lost opportunity to process and recycle a portion of the imported material for to form quarry products. This would be inconsistent with the principles of ecologically sustainable development and would not maximise the efficiency of resource utilisation.
- The Proponent would implement management measures that would minimise the risk of inappropriate material being imported to or placed within the Project Site.

As a result, the Proponent contends that the minor to very minor additional risk or importation of inappropriate material to the Project Site is outweighed by the environmental and safety benefits of doing so.

6.1.6 Two Extraction Areas

The draft Nowra Bomaderry Structure Plan (the ‘structure plan’) identifies a conceptual road network in the vicinity of the Project Site (see Section 3.3.3.7). **Figure 6.1** presents a plan showing the proposed road network. The Plan identifies a conceptual local road extending west from the intersection of Warra Warra Road and the Princes Highway, through the Project Site, before turning to the northwest and intersecting the Nowra Hill Road reserve in the vicinity of the proposed South Coast Correctional Facility. The Proponent considered an extraction operation that resulted in two extraction areas, leaving a corridor for the future construction of the conceptual Warra Warra Road extension. However, this approach was rejected for the following reasons.

- To enable safe operation of both the conceptual road and the quarry, a corridor approximately 50m wide would be required. This would result in the potential sterilisation of approximately 1 million tonnes of shale resource.



- The location, width and timing of construction of the conceptual road have not been determined. As a result, the Proponent is unable to accurately determine the location and width of any potential ‘road corridor’ that would be required.
- ML 6322 was granted in 1971, while the structure plan was published in 2006. As a result, the Proponent’s rights to the shale resources predate the publication of the draft structure plan.
- The proposed road network also passes across the proposed site of the South Coast Correctional Facility and would be likely to be incompatible with it (**Figure 6.1**). The Shoalhaven City Council has, in a Media Release dated 29 June 2005, indicated that it ‘strongly supported’ the proposed Correctional Facility. As a result of the incompatibility of the conceptual Warra Warra Road extension proposed local road and the proposed Correctional Facility, and in light of Council’s strong support for the Correctional Facility, it is likely that any future development of this road would have an alignment that would be different from the alignment indicated within the structure plan.
- The separation of the proposed extraction area into two extraction areas would provide a number of significant logistical issues for the operation of the Project. These would include transporting equipment that would not be registered for use on public roads from one extraction area to the other and separation of the water management systems for the Project.
- The Project as proposed includes a proposal to backfill the extraction area with VENM to enable the formation of a final landform that would mimic the pre-extraction landform. As a result, extraction of shale resource within the area of the proposed local road would not permanently sterilise the area for development of the proposed road. As a result, the proposed road could be constructed following completion of VENM placement operations.

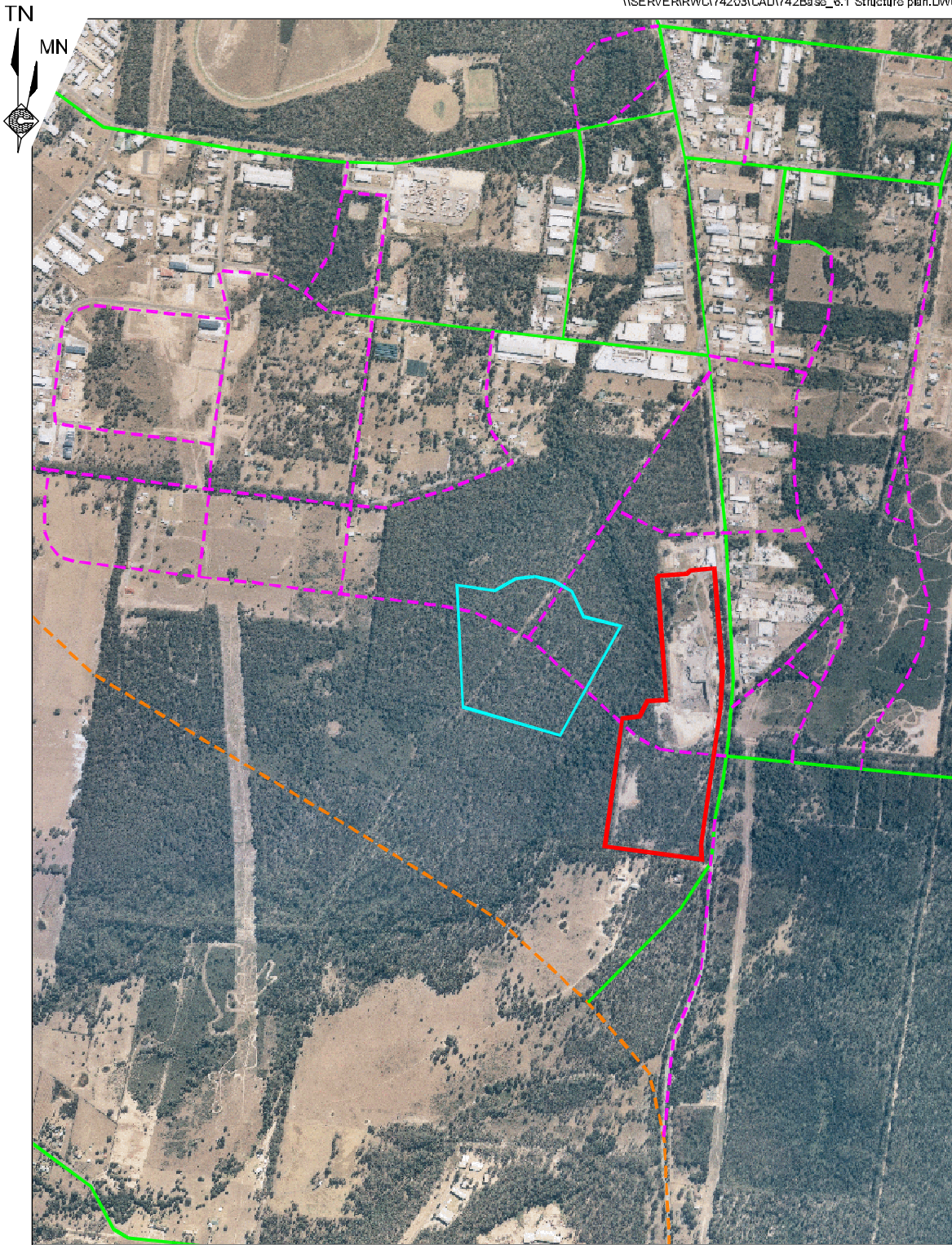
The Proponent contends that in light of the above, the provision of a ‘road corridor’ would impose an unreasonable burden on the Proponent.

6.1.7 Not Proceeding with the Development

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

- The recoverable shale would not be mined by the Proponent. Such an outcome would be contrary to the objective of the Department of Primary Industries - Mineral Resources and the Proponent's obligations under the terms of its mining leases to maximise resource utilisation.
- The Proponent’s customers would be required to source the quarry products currently supplied by the Proponent from other sources. This may increase the cost of such material and the distance it has to be transported, resulting in higher construction costs and additional heavy vehicle traffic and greenhouse gas emissions.

\\SERVER\RRWC\74203\CAD\742Base_6.1 Structure plan.DWG



- REFERENCE**
- Project Site Boundary
 - Proposed Location of South Coast Correctional Facility
 - - - Future Western Bypass
 - Local Road Network
 - - - Conceptual Road Network

SCALE 1:20 000

200 0 200 400 600 800 1000 m

Base Photo Source: NSW Dept. of Lands
Draft Structure Plan Source: Shoalhaven City Council (2005)

Figure 6.1
**CONCEPTUAL STRUCTURE
PLAN ROAD NETWORK**



- The opportunity to create up to 37 full-time equivalent positions would be foregone.
- The disposable wages associated with the above positions would be foregone, a substantial portion of which would be spent within the Shoalhaven City Council Local Government Area
- The benefits flowing to the Shoalhaven City Council and the NSW and Commonwealth Governments through additional rates, royalties, taxes and contributions would be foregone.
- The opportunity to permanently preserve and protect the native vegetation within the proposed biodiversity offset area(s) and Project Site may be foregone.
- A number of relatively minor impacts on the biophysical environment would not eventuate.

It is considered therefore that the public interest of proceeding with the Project exceed the residual negative impacts associated with it.

6.2 EVALUATION OF THE BIOPHYSICAL, ECONOMIC AND SOCIAL ASPECTS

6.2.1 Introduction

This sub-section justifies the proposed continuation and expansion of extractive operations at the Nowra Brickworks Quarry by drawing together and reviewing the full range of positive and negative predicted residual impacts, including cumulative impacts previously discussed in Section 4 of this document. The residual impacts are those that remain after the proposed design and operational management, mitigation and offset measures have been taken considered. This part also presents and reviews the design and operational management, mitigation and offset measures proposed by the Proponent and recorded in the draft Statement of Conditions.

6.2.2 Biophysical Considerations

6.2.2.1 Introduction

Sections 4.2 to 4.13 discuss the range of anticipated residual impacts on the biophysical and socio-economic environment attributable to the Project, including cumulative impacts. Those impacts considered to be of greatest significance, and the proposed management of these, are summarised below.

6.2.2.2 Hydrology

Potential Project-related impacts include adverse impacts on the quality and quantity of water within Nowra Creek and aquifers within and in the vicinity of the Project Site.

The hydrology assessment concluded that the following.

- The concentration of dissolved solids in water that would be allowed to flow to Nowra Creek from undisturbed, rehabilitated and impervious sections of the Project Site would be approximately 220mg/L, or approximately the same as the concentration within Nowra Creek.
- The Project would have negligible impact on the flooding regime within Nowra Creek and the Project Site would not be impacted by flood events within the creek.
- The Project would result in a draw down of the piezometric surface in the vicinity of the Project Site of a maximum of 18m. The 1m drawdown contour is anticipated to occur approximately 1 425m from the boundary of the extraction area.
- Groundwater within the vicinity of the Project Site is moderately to highly saline, with an average conductivity of 8 729 μ S/cm.
- As the existing piezometric surface is 9m below the invert of Nowra Creek, the anticipated drawdown of the surface would be unlikely to have an impact of Nowra Creek.
- As the closest registered bore to the Project Site is 3.9km to the northeast, the anticipated drawdown of the piezometric surface would not impact on registered bores in the vicinity of the Project Site. In addition, the economic value of groundwater is likely to be low due to its saline nature.
- With the construction of an irrigation area of approximately 4ha, no discharge of water from within the extraction area or the water storage facility would be required.

As a result, the Project is not anticipated to be likely to have a significant adverse impact on the quality and quantity of water within Nowra Creek or the aquifer within and in the vicinity of the Project Site.

6.2.2.3 Ecology

Eleven species and three flora species listed on the schedules of the *Threatened Species Conservation Act 1995* (TSC Act) were recorded as occurring within 5km of the Project Site.

Approximately 7.4ha of the Project Site comprises previously logged Spotted Gum forest. The remainder of the Project Site comprises disturbed land. Eighty one species of plants were identified within the Project Site, including thirty species of exotic weeds. Approximately 48



hollow-bearing trees have been identified within the Project Site, of which approximately 37 would be disturbed by the Project. No Endangered Ecological Communities or species listed under the *Threatened Species Conservation Act 1995* were observed within the Project Site.

Sixty two species of fauna were observed within or surrounding the Project Site. One, the Square-tailed Kite, was observed adjacent to the Project Site.

The Ecology assessment concluded that no threatened species listed under the TSC Act or under the *Environment Protection and Biodiversity Conservation Act 1999* would be significantly impacted by the Project.

6.2.2.4 Traffic and Transportation

Potential Project-related impacts include increasing traffic levels on the Princes Highway and poor performance of the intersection between the site access road and highway.

The anticipated additional Project-related traffic would increase traffic levels on the Princes Highway by 0.1% or less. The operation of the existing site entrance would be good to satisfactory.

6.2.2.5 Air Quality

Potential air quality impacts primarily include the dispersion of particulate material in the atmosphere.

At a maximum rate of product dispatch of 500 000t per year, the anticipated rate of dust deposition from the Project alone would marginally exceed the assessment criteria of 2g/m²/month at two sites, namely at the Nowra Brickworks site adjacent to the northern boundary of the Project Site (2.2g/m²/month) and at the conceptual roundabout at the intersection of Warra Warra Road and the Princes Highway (2.7g/m²/month). In addition, the maximum cumulative daily PM_{2.5} concentration would exceed the assessment criteria of 25µg/m³ at one receptor, namely Residence A to the south of the Project Site (26.25µg/m³).

6.2.2.6 Noise

Existing noise levels in the vicinity of the Nowra Brickworks Quarry are influenced by a range of sources, including traffic on the Princes Highway, industrial noise from industrial and commercial operations to the east and north of the Project Site, noise from the Nowra Brickworks Quarry and naturally occurring noise, including noise from wind in trees, insects and birds. Project-specific noise assessment criteria were determined for four representative residences, namely Residences A to D.

Project-related noise emissions would be less than the Project-specific assessment criteria at all assessment locations, with the exception of Residence A during Stage 5 of the Project where the Project-specific assessment criteria (51dB(A)) would be exceeded by 5dB(A).

6.2.2.7 Blasting

Potential blasting impacts primarily include ground vibration and airblast overpressure.

The blasting assessment indicates that the existing blasting parameters would result in exceedances of the blasting assessment criteria at Residence A and B and Commercial Premises A. However, the blasting parameters would be modified based on the site blasting laws to ensure that blasting emissions at non-Project related residences would comply with the blasting assessment criteria. In addition, the Proponent would negotiate a suitable arrangement with the owners of Residence A prior to the completion of Stage 1 of the Project.

6.2.2.8 Aboriginal Cultural Heritage

No sites of Aboriginal heritage significance were identified within the Project Site. As a result, the Project would have no impact on matters of Aboriginal heritage significance.

6.2.2.9 Visual Amenity

The existing perimeter amenity bunds, vegetated buffer within the Nowra Creek riparian zone and line of mature trees adjacent to the eastern Project Site boundary would ensure that the Project would have no significant impact on the visual amenity of the area in the vicinity of the Project Site.

6.2.2.10 Bushfire

The Project Site is identified as bushfire prone land on the *Bushfire Prone Lands Map* published by the NSW Rural Fire Service. As a result, the Project is considered to be compliant with the requirements of Clause 46 of *Rural Fires Regulation 2002* and the document *Planning for Bushfire Protection* published by the NSW Rural Fire Service in 2006.

6.2.2.11 European Heritage

No items of European Heritage significance were identified within the Project Site or within 4.5km of the Project Site. As a result, the Project would have no impact on matters of European heritage significance.



6.2.3 Social and Economic Considerations

The Project is predicted to have the following social and economic benefits.

- Creation of 27 fulltime equivalent positions at an annual rate of product dispatch of 300 000t, increasing to 37 fulltime equivalent positions at an annual product dispatch rate of 500 000t.
- Injection of approximately \$11.3 million per year into the local and regional economy, with an additional approximately \$4.1 million into the State and national economy at an annual product dispatch rate of 500 000t. This expenditure is likely to generate additional economic activity and flow on effects, providing further employment opportunities.
- Provision of a range of competitively priced, high quality specialist and general quarry products.
- Provision of a competitively priced service to accept and recycle construction material.
- Provision of a well managed facility to receive, process and place VENM at competitive prices.
- Ongoing availability of easily accessible water supplies, including pumps, for rapidly filling tankers, for use during emergencies.

6.2.4 Conclusion

The Proponent contends that any adverse socio-economic or environmental impacts, both actual and perceived, would be more than adequately countered by the positive effect that the Project would have on employment in the vicinity of the Project Site and contribution of the Project to the local and regional economy and community.

6.3 EVALUATION OF ECOLOGICAL SUSTAINABILITY

6.3.1 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. Schedule 2(6) of the *Environmental Planning and Assessment Regulation 2000*, requires an environmental impact assessment process to evaluate projects in terms of the principles of Ecologically Sustainable Development (ESD). The principles of ESD 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.

6.3.2 The Precautionary Principle

The precautionary principle holds that 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 impacts. In the application of this principle, decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and an assessment of the risk-weighted consequences of various options should be made. Emphasis must be placed on anticipation and prevention of environmental damage, rather than remediation after the damage has occurred.

For the proposed continuation and expansion of extraction operations at the of the Nowra Brickworks Quarry, the Proponent has engaged six specialist consultancies to conduct detailed assessments of a number of environmental issues identified during the consultation and issue identification stage of the preparation of this document. These assessments ensure that there is a sufficient scientific understanding of the Project and the surrounding environment to enable the Minister to make a decision consistent with this principle.

Project Objectives

The principal objectives of the Project are the design and operation of the extraction and placement-related operations in a manner that avoids or minimises the impact(s) of these activities upon the environment within and surrounding the Project Site and upon residents in the vicinity of the Project Site and ensures compliance with relevant statutory requirements, environmental criteria and reasonable community expectations.

Design Safeguards

A number of design features of the Project were incorporated in recognition of the Precautionary Principle. These design features included the following.

- The floor of the extraction area was designed to an elevation of approximately 19m AHD. This compares with the elevation of the floor of the existing extraction area of approximately 29m AHD. This ensures that the area to be disturbed is minimised and that the recovery of the shale resources within the Project Site is maximised.



- The extraction area is designed to avoid high value vegetation within the riparian zone adjacent to Nowra Creek.
- The Project is to be staged such that extraction operations are to be completed within one section of the extraction area prior to commencing within the next section. In addition, backfilling operations are to be undertaken as soon as possible after completion of extraction-related operations in each section of the extraction area. This will ensure that the area disturbed at anyone time is minimised and that rehabilitation is undertaken progressively throughout the life of the Project.
- Processing and stockpiling operations are proposed to be undertaken within the deepest section of the extraction area. This will ensure that noise and dust-related impacts are minimised.
- The final landform would mimic the pre-extraction landform. In addition, the Proponent would, during creation of the final landform, re-establish the existing topsoil/subsoil/weathered substrate profile. This would assist the re-establishment of a vegetation community with a similar composition to the vegetation community that occurs within undisturbed sections of the Project Site at present.

Management and Operational Safeguards

The framework for ongoing environmental management, operational performance and rehabilitation of the Project Site would be provided through the project approval and would be managed in accordance with the DPI-MR Mining, Rehabilitation and Environmental Management Process, and would involve the input from relevant State and local government agencies. The Mining Operations Plan would contain a range of site specific environmental procedures to achieve consistency with planned outcomes and to control identified risks. The Annual Environmental Management Report would report on the progress of the operation and provide an opportunity to review the effectiveness of the environmental management strategies adopted. In addition, the following management and operational safeguards would be implemented.

- Air quality, blasting impacts and surface water quality would be routinely monitored to ensure compliance with the goals outlined in the relevant sub-sections of Section 4. In addition, noise monitoring would be undertaken when requested by surrounding residents or business operators.
- The proposed mitigation measures and management procedures would be regularly reviewed and modified where necessary in light of environmental monitoring results and feedback received from government agencies, surrounding residents, employees and other interested parties.
- Regular monitoring of the status of rehabilitation, regeneration and enhancement programs within the Project Site and the biodiversity offset areas, when identified, with particular attention paid to threatened and vulnerable species. Remediation actions would be undertaken when identified as necessary following monitoring.

- Topsoil and subsoil would be stripped, stockpiled and re-spread in accordance with the procedures outlined in Section 2.3.5. A record would be maintained of the location, volume and date of creation of all soil stockpiles.

Rehabilitation and Subsequent Land Use

Long term adverse impacts on the environment would be avoided through:

- creation of a stable, free-draining final landform which mimics the pre-extraction landform and blends with the surrounding landforms;
- progressive rehabilitation of the recreated landform and other disturbed areas within the Project Site, including shaping of the final landform, spreading of subsoil and topsoil and reseeded or replanting with endemic, locally sourced species as described in Sections 2.3.5, 2.9.5 and 2.16.5;
- creation and management of the biodiversity offset area(s) for native vegetation conservation; and
- a final land use of native conservation for the rehabilitated extraction area which would, in the longer term, provide significant habitat with enhanced biodiversity values.

Conclusion

The precautionary principle has been considered during all stages of the design and assessment of the Project. The approach adopted, including initial design, risk analysis, consultation, specialist environmental assessment, design modification and safeguard design, provides a high degree of certainty that the Project would not result in any major unforeseen impacts.

6.3.3 Social Equity

Social equity includes both intra- and inter-generational equity. Intra-generational equity requires that the economic and social benefits of the Project be shared equitably among all members of the community, ie. both groups and individuals. Inter-generational equity requires that the present generation pass onto the next generation an environment that does not limit the ability of future generations to attain a quality of life at least equal to that of current generation.

Both elements of social equity are addressed through the design of the Project, 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 Project are listed below.



Project Objectives

The objectives of the Project are to ensure continued long-term, economically viable access to shale resources within the Project Site for the production of a range of competitively priced, high quality general and specialised products for construction, road maintenance and agricultural purposes while minimising the Project-related impacts on the environment within and surrounding the Project Site. This would provide a benefit to the entire community through reduced construction and road maintained costs. In addition, the Proponent intends to maintain an open and honest relationship with the members of the surrounding community through ongoing consultation, and address issues of concern as they arise.

The Proponent intends to ensure inter-generational equity by developing a final landform and vegetation community that mimics the pre-extraction landform and would be managed for native vegetation conservation purposes. In addition, the Proponent would secure a biodiversity offset area for the term of the anticipated impacts for the purposes of biodiversity conservation. These activities would ensure that habitat is available for threatened and venerable species for the term of the anticipated impacts. Furthermore, the Project would continue, and increase, the opportunities for economic activity in the local area both directly and indirectly.

Design Safeguards

The Project has been designed to maintain inter-generational equity by ensuring components of the existing biological, social and economic environment available to the present generation would also be available to future generations. Examples include the following.

- Creation of a final landform and vegetation community that would mimic the pre-extraction landform and the vegetation community in undisturbed sections of the Project Site. In addition, this would prevent excessively saline water accumulating within the final void.
- The extraction area has been designed to avoid disturbance to riparian vegetation adjacent to Nowra Creek and to ensure the least possible area of disturbance to native vegetation and sensitive fauna habitats.

Management and Operational Safeguards

The Proponent has, and would continue to ensure, inter- and intra-generational equity through the following management and operational safeguards.

- Management of the extraction, processing, placement and rehabilitation operations within the Project Site to ensure that Project-related impacts on residents and other members of the public in the vicinity of the Project Site are minimised.

- Consultation with local community stakeholders to ensure the Project does not have a significant negative impact on the facilities, services and amenity of the area surrounding the Project Site.
- Manage the Biodiversity Offset Areas for the purposes of biodiversity conservation for the term of anticipated impacts.

Rehabilitation and Subsequent Land Use

The final landform would be constructed to mimic the pre-extraction landform. In addition, the construction of the final landform, as described in Sections 2.9.5 and 2.16.5, would ensure that the soil/substrate profile is similar to the existing profile, and that re-establishment of the a vegetation community similar to the existing community in the undisturbed sections of the Project Site would not be compromised by an incompatible soil/substrate profile. In addition, the proposed final land use would be native vegetation conservation. Finally, the Proponent would identify, secure and manage a biodiversity offset area for the purposes of biodiversity conservation prior to the commencement of the Stage 2 of the Project. These actions would preserve and enhance the biodiversity values in the vicinity of the Project Site and the biodiversity offset area for future generations.

Conclusion

The principle of social equity has been and would be addressed throughout the design, operation and rehabilitation of the Project. The Project would contribute to the economic activity in the vicinity of the Project Site, provide competitively priced quarry products for public and private use and would result in the long-term preservation of the native vegetation in the vicinity of the Project Site. As a result, the benefits of the Project would be distributed throughout the local community. The Proponent would adopt a pro-active approach to identifying and addressing any concerns identified by the local community or its members.

The Project was also designed such that elements of the existing environment available to this generation, including land for native vegetation conservation purposes, would continue to be available to future generations.

6.3.4 Conservation of Biological Diversity and Ecological Integrity

The protection of biodiversity and maintenance of ecological integrity are central goals of sustainability. Biodiversity is usually considered at three levels: genetic diversity, species diversity and ecosystem diversity. 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.



Project Objectives

The Proponent 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 with an objective of minimising impacts on the flora and fauna within and in the vicinity of the Project Site, whilst allowing the extraction of an economically viable and needed resource.

Design Safeguards

The following design features were incorporated into the Project to ensure that the impact of the Proponent's activities on the biodiversity and ecological integrity of the Project Site and surrounding areas are minimised.

- The extraction area was designed to avoid vegetation within the riparian corridor adjacent to Nowra Creek.
- Extraction and placement operations have been staged to ensure that only the smallest area possible is disturbed at any particular time.

Management and Operational Safeguards

The following management and operational safeguards would be incorporated by the Proponent to ensure that the impact of its activities on the biodiversity and ecological integrity of the Project Site and surrounding areas is minimised.

- Clearing of native vegetation would preferentially occur in late spring to early autumn to avoid nesting or roosting fauna. In addition, trees with hollows would be inspected prior to any clearing commencing, and any threatened nesting or roosting animals would be relocated appropriately.
- Suitable cleared vegetation would be retained and used during rehabilitation of disturbed areas or relocated to the biodiversity offset areas.
- Weed eradication programs would continue to be implemented, as required.

Biodiversity Offset Strategy

The Biodiversity Offset Strategy would comprise protection and enhancement of two areas, namely the Northern and Southern Biodiversity Offset Areas, for a period of between 80 and 120 years. It is likely that the strategy would result in protection of a greater range and area of vegetation communities and habitat areas than would be disturbed by the proposed activities. As a result, the Project would preserve or enhance ecosystem diversity and would not threaten the integrity of the ecological systems in the short or long-term

Rehabilitation and Subsequent Land Use

Post-mining rehabilitation of the final landform would include natural regeneration or reseeded or planting of species consistent with the Spotted Gum forest in undisturbed sections of the Project Site.

The final land use would be used for native vegetation conservation, which would, in the medium to long term, increase the area and value of available habitat.

Conclusion

It is anticipated that the Project would have little impact on local or regional biodiversity. Notwithstanding this, disturbance to areas of native vegetation would be minimised, wherever possible. The post-mining use of the final landform for nature conservation purposes would increase the biodiversity value of the Project Site and surrounds in the medium to long term.

6.3.5 Improved Valuation, Pricing and Incentive Mechanisms

This principle is premised on the assumption that all resources should be appropriately valued and priced based upon the full life cycle of those resources, with appropriate and cost-effective environmental stewardship encouraged. A reflection on these issues with regards to the Project is set out below.

Project Objectives

The principal objectives of the Project are to operate the proposed open cut in a safe, environmentally responsible and cost-effective manner. This places environmental considerations at the forefront of the Proponent's decision-making process and demonstrates that an appropriate value has been placed on elements of the existing environment.

In addition, the Proponent proposes to import up to 50 000t per year of construction, concrete and bitumen waste to be recycled into high quality quarry products. In addition, the proponent proposes to import up to 200 000t of VENM per year for recycling and placement within the extraction area. The Proponent would charge an appropriate amount to accept this recycling material and VENM to ensure that it is financially attractive for the Proponent's customers to do so. This would result in reduced consumption of the finite shale resource, reduced requirement for landfill and would enable the Proponent to construct a useable final landform that would result in medium to long-term improvements in biodiversity values.

Design, Management and Operational Safeguards

The extent of research, planning and design of environmental safeguards and mitigation measures, as well as the Proponent's willingness to ensure that the Project Site and biodiversity offset area (when identified) are used for native vegetation conservation following the completion of extraction activities, is evidence of the value placed by the Proponent on the ecological resources within and in the vicinity of the Project Site.



Rehabilitation and Subsequent Land Use

The extent and anticipated cost of the proposed rehabilitation and weed control programs the Proponent intends to implement illustrates the value placed by the Proponent on the ecological resources within the Project Site and biodiversity offset areas.

Conclusion

The value placed by the Proponent on ecological resources is evident from the extent of site-specific investigations, planning and environmental safeguards and measures that have been undertaken and which would be implemented to prevent significant damage to the environment within, and in the vicinity of, the Project Site. It is anticipated that the income received from the sale of the quarry products would be sufficient to enable the Proponent to achieve an acceptable profit level whilst completing all environment-related tasks, commitments and conditions attached to all approvals, leases and licences.

6.3.6 Compatibility with the Principles of ESD

The approach taken in planning the Project has been multi-disciplinary, involving consultation with stakeholders and various government agencies, with emphasis placed on the application of design and operational management and mitigation measures to minimise potential environmental, social and economic impacts. The design of the Project has addressed each of the ESD principles and, on balance, it is concluded that the Project achieves a sustainable outcome for the local and wider environment.

6.4 CONCLUSIONS

The proposed continuation and expansion of extraction operations at the Nowra Brickworks Quarry has, to the extent feasible, been designed to address all environmental and other reasonable issues of concern to the community and all levels of government. This document, together with the range of specialist consultant studies undertaken, has identified that the Project should proceed for the following reasons.

- The Project would contribute towards satisfying demand for high quality, appropriately priced, specialist quarry products for construction, road maintenance and other purposes within the Shoalhaven City Council Local Government Area (LGA) and wider South Coast and southern Sydney area.
- The Project would allow for the recycling of up to 50 000t per year of construction, concrete and bitumen waste and up to 200 000t of VENM that would otherwise be likely to be placed within regional landfills.
- The Project would produce significant employment and economic benefits for the Shoalhaven LGA.
- The Project would satisfy sustainable development principles.

- The Project would result in construction of a final landform that would mimic the pre-extraction landform and would allow for a final land use that would result in medium to long-term improvement in the biodiversity value of the Project Site.
- The biodiversity offset strategy would result in an outcome that would maintain or improve biodiversity values.
- The Project would have a minimal and manageable impact on the biophysical environment.
- The Project would address impacts on the surrounding residents.
- The Project would reduce risk levels associated with possible incidents and impacts on the environment to an acceptable level.

