

6.1.2 Groundwater

Issue

The proposal could lower groundwater levels in the area, and affect groundwater flows, quality, and recharge rates, which could in turn affect nearby groundwater users and the environment.

Consideration

The EIS includes a specialist hydrological impact assessment undertaken by Gilbert and Sutherland Pty Ltd, which draws on experience and data gathered during operation of the existing quarry (Phases 1 and 2).

The assessment indicates that the groundwater level at the site is shallow at less than 2.5 metres below the ground surface, and that lateral groundwater movement is low. Groundwater quality is generally within applicable guidelines, and has been stable over time (during the operation of the existing quarry).

The assessment indicates that the proposal would not result in any significant drawdown (ie. lowering) of the groundwater table, as the area enjoys an excess of precipitation relative to evaporation for the majority of the year. The report notes that no drawdown outside of natural background variations has been recorded associated with the existing quarry operations.

The assessment further contends that the proposal would not adversely affect groundwater quality, given the historical data which indicates that quarrying has not affected groundwater quality.

The DNR requested additional data on groundwater levels and quality within the area of the proposed expansion. Upon provision of this information by the Applicant, the DNR was satisfied that it would licence the development under the *Water Act 1912*, and has forwarded its General Terms of Approval for the proposal.

A small number of public submissions also raised concerns about the groundwater impacts of the proposal, including claims that the existing quarry has affected yields and groundwater quality in surrounding groundwater user's bores. However, the Department is satisfied that monitoring data presented in the EIS indicates that the existing quarry has not been responsible for any significant impacts to regional groundwater levels or quality.

Conclusion

The Department is satisfied that the development, excluding the Phase 5 component, is able to be managed in a manner that would not result in any significant groundwater related impacts. However, the Department believes the Applicant should be required to:

- comply with water quality objectives that are consistent with the NSW Government's interim environmental objectives for lakes in the Tweed;
- establish a comprehensive groundwater monitoring program that includes measurement of groundwater elevations, flows and quality; and
- sequence the extraction of Phase 4 such that dredging at the closest point to off-site residences (and groundwater users) occurs towards the end of the phase, so that any impacts can be identified well before the quarry expansion nears the surrounding residences (to be managed through the Applicant's management plans).

6.1.3 Surface Water

Issue

The proposal has the potential to impact on surface water features, water quality and water flows.

Consideration

The site is relatively flat and is located in the Chinderah Drainage Trust District. There are no natural water courses in the immediate vicinity of the site. Most of the surface runoff infiltrates through the sandy soils or is directed towards the existing extraction areas or into agricultural drains. These drains convey runoff through floodgates to the Tweed River, located approximately 3 km to the north of the site (see Figure 2).

Given the lack of significant natural waterbodies in proximity to the site, the Department is satisfied that the proposal is unlikely to have any significant impact on surface water features of the area, or flows in these waterbodies.

Surface water within the existing dredge ponds is managed on a nil discharge basis, with excess water from rainfall percolating to groundwater. The proposed quarry extension would be managed in a similar manner.

Historical surface water quality within the existing dredge ponds, as indicated by monitoring data included in the EIS, is generally within applicable guidelines and has been stable over time.

However, the EIS does not include any monitoring data or impact assessment regarding other potential pollutants including blue-green algae and nutrients. Given that the ponds do not have a significant source of flushing, and that the ponds are surrounded by agricultural landuses, the Department has some concern that the dredge ponds could present a long term risk of pollution through nutrient enrichment, algal blooms or other bacterial contamination.

In response to these concerns the Applicant provided additional monitoring data which confirmed that the existing dredge ponds do have elevated blue-green algae and nutrients levels. Levels are shown in the following tables.

Table 2: Existing Blue-Green Algae Levels in the Dredge Pond

Cyanobacterial species sampled	Cyanobacteria cell count (cells/mL)							
	Apr 05	Jul 05	Oct 05	Dec 05	Jan 06	Apr 06	May 06	May 06
Cylindrospermopsis raciborskii	61,000	31,000	280,000	410,000	17,000	62,000	7,020	6,520
Microcystis aeruginosa	*	*	23,000	*	540	*	*	*
Pseudanabaena spp.	*	*	*	*	*	200,000	39,440	26,680
Planktolyngbya spp.	*	*	*	*	*	*	36,000	44,400
Geitlerinema spp.	*	*	*	*	*	*	14,200	9,000
Myxobaktron spp.	*	*	*	*	*	*	2,560	2,980
LPP-B	*	*	*	*	16,000	*	*	*
Guideline Limit	50,000 cells/mL M.aeruginosa or total biovolume <4 mm³/L*							

* Cyanobacteria cell count below the limit of reporting

+ Guideline limits as per the National Health & Medical Research Council's (NHMRC's) *Guidelines for Managing Risks in Recreational Water* (2005), as adopted by the DNR as the default blue-green algae guidelines.

Table 3: Existing Nutrient Levels in Dredge Pond

Location	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)
Lake North – surface	0.91	0.07
Lake North – 4m depth	1.02	0.06
Lake North – 16m depth	1.01	0.07
Lake South – surface	0.92	0.07
Lake South – 4m depth	0.96	0.06
Lake South – 16m depth	0.93	0.06
Guideline Limit*	0.5	0.05

+ Guideline limits based on NSW Government's interim environmental objectives for lakes in the Tweed.

Given these existing elevated levels, the Department required the Applicant to engage a blue-green algae expert to provide additional information on the potential blue-green algae impacts associated with the existing and proposed development, including investigation into methods to remediate the ponds and prevent such risks associated with the proposed expansion.

The Applicant engaged the CSIRO to undertake this assessment (report attached in Appendix D). The CSIRO considers that the dredge ponds can be successfully rehabilitated through creating a healthy, diverse, functioning ecosystem, and that this would greatly reduce the risk of bacterial and algal problems in the future. The rehabilitation program would involve an integrated approach including restricting the supply of nutrients entering

the ponds, improving the physical habitat of the ponds, establishing aquatic plants and animals (fish) that graze on cyanobacteria, as well as other possible measures such as managing light penetration and stratification. The CSIRO cites scientific studies that demonstrate the feasibility of such remediation programs and considers that the approach 'provides an entirely feasible long term process for managing blooms within established guidelines'.

The Department also sought expert advice from the DNR, which in turn sought the advice of a blue-green algae expert, Ms Maree Smith. Ms Smith confirmed that the dominant blue-green algae present in the dredge pond, *Cylindrospermopsis raciborskii*, is a potentially toxic species and would need to be carefully managed to avoid potential impact to human health and the environment. The DNR and Ms Smith believe that the proposed approach suggested by the CSIRO was generally suitable (along with appropriate OH&S measures), and Ms Smith reported that some success has been achieved in reducing *Cylindrospermopsis spp.* using other bacteria.

In consideration of this additional information, the Department is satisfied that the dredge pond/s are able to be remediated to reduce blue-green algae levels to within established guidelines, and the Department supports a holistic, integrated approach to algae management. The proposed expansion of the dredge ponds should not significantly increase the risk of algal blooms in the future, on the contrary the increased size of the waterbody could help to reduce blue-green algae levels through enabling the establishment of a larger and more diverse ecosystem.

The Department believes that the existing elevated blue-green algae levels are likely to be related to a historical paucity of algal management in the ponds, including restricting nutrient supply, targeted algae management through rehabilitation, and blue-green algae monitoring. As such, the Department believes the Applicant should be required to engage a suitably qualified expert to develop a Blue-Green Algae Management Plan, which includes:

- a detailed recovery plan to reduce algae levels to comply with applicable guidelines ;
- measures to prevent and control the sources of algal blooms over the short, medium and long term;
- procedures for the management and notification of identified algal blooms.

The Department also believes that the Applicant should be required to lodge a substantial rehabilitation bond for the development, with the bond to be released only upon satisfactory rehabilitation of the development (including consideration of water quality and blue-green algae).

As detailed above in Section 6.1.1 the Department also believes, as a precautionary measure, that the proposal should be limited to Phases 3 and 4 only.

To further ensure the maintenance of good water quality, the Department believes the Applicant should be required to maintain a comprehensive Soil and Water Management Plan for the development, including a comprehensive surface water monitoring program. This monitoring program should cover both the active dredge ponds and the non-active dredge ponds. The Applicant's proposal to cease ongoing water quality monitoring in the non-active dredge ponds after a time is not supported by the Department or Council.

Conclusion

The Department is satisfied that the development can be managed such that it would not have a significant impact on surface water resources. However, the Department believes the Applicant should be required to:

- comply with water quality objectives that are consistent with the NSW Government's interim environmental objectives for lakes in the Tweed, and the NHMRC's *Guidelines for Managing Risks in Recreational Water* (for blue-green algae);
- manage the quarry on a nil discharge basis;
- establish and implement a comprehensive Soil and Water Management Plan, which includes a Water Balance and a detailed Surface Water Monitoring Program; and
- establish and implement a comprehensive Blue-Green Algae Management Plan.

The integrated approval bodies (DNR and DEC) have determined that they are able to provide relevant approvals for the development under the *Water Act 1912* and the *Protection of the Environment Operations Act 1997*, and have provided their General Terms of Approval.

6.1.4 Flooding

Issue

The site is located within the Tweed River floodplain, and is subject to regular flooding. The proposal could affect local flood levels and flows in the surrounding area, and could affect water quality in times of flood.

Consideration

The area of the sand quarry expansion is considered to be a backwater storage area in the event of flooding of the Tweed River.

The EIS includes a flood assessment undertaken by WBM Oceanics Australia Pty Ltd. The assessment indicates that the site is subject to regular flooding, with floodwater depths during the 5 year flood event ranging from 0.3 to 1.0 metre across the site. Floodwater depths in the 100 year ARI flood event would range from 1.9 to 2.6 metres across the site. Floodwater velocities during flood events are low at less than 0.5 metres per second.

The flood assessment concludes that the proposal would not impact flood behaviour, particularly in the larger flood events.

The EIS infers that the active dredge ponds would be bunded to cater for the 3 month ARI flood event, that is, a bund of less than 0.5 metres. The Department and Council raised some concern that bunding at this level could result in pollution of water during flood events, notwithstanding that floodwater velocities are low. Council commented that the previous approved stages required bunding to cater for the 5 year ARI flood event.

The Department notes that the existing dredge ponds (Phase 1 and 2) are now relatively large (~18 hectares) and deep (>10 metres), and that the proposal involves expansion (and consolidation) of these existing ponds. The pond depth and size allows the fines to be returned at a lower depth below the water surface, and dredging to occur within a larger waterbody, thereby reducing turbidity issues. As such, the Department is generally satisfied that a larger bund is not necessarily required for the quarry expansion. The Department also notes that a lower bund would help reduce potential flood related impacts on surrounding landuses, by minimising changes to local flood behaviour.

Notwithstanding, the Department acknowledges that the proposal does have some residual potential for discharge of polluted water during flood events if not managed carefully. To prevent these impacts, the Department believes the Applicant should be required to cease all dredging, processing and fines deposition at least 24 hours prior to any flood event that could result in overflowing of the ponds, and to suspend operations until the floodwater has receded. The Department has also recommended conditions requiring the deepwater discharge of fines material, and the maintenance of a net increase in flood storage capacity for the site.

The Department, DNR, and some public submissions also raised some concern regarding the potential for erosion of the banks of the dredge ponds during flood events, associated with scouring caused by inflowing floodwaters. The Applicant subsequently advised that it would include defined inflow points over the bund, with the inflow points treated for erosion protection. These measures would need to be detailed in the Soil and Water Management Plan for the development. This issue is discussed further in Section 6.1.6 below.

Conclusion

The Department is satisfied that the proposal is unlikely to result in any significant impacts related to flooding, subject to requiring the Applicant to:

- maintain appropriate bunding to the dredge ponds at a minimum of the 3 month ARI flood level, and provide for engineered flood inflow points;
- maintain a net increase in flood storage capacity at all stages of the development;
- cease operations in times of flood; and
- ensure maintenance of good water quality in the ponds at all times.

6.1.5 Acid sulfate soils

Issue

The site contains potential acid sulfate soils.

Consideration

The EIS includes a specialist acid sulfate soil assessment undertaken by Gilbert and Sutherland Pty Ltd. The assessment included field sampling and analysis to determine the net acid generation potential of the soils on the site.

The assessment concludes that while some soils on the site exhibit a risk of acid generation, the potential for significant acid production on the site is low because the soils generally contain excess natural buffering capacity in the form of calcium carbonate derived from shell grit and other marine organisms.

The potential for acid generation would be minimised by using wet excavation methods (ie. suction dredging), hydraulic separation of fines during processing, and strategic reburial of fines below the water table. These techniques would minimise the potential for oxidation of sulfidic sediments, and hence minimise the risk of acid generation.

The assessment's conclusions and management measures are supported by the evidence from the existing quarry, which has not recorded any significant issues related to acid generation.

The DNR raised some concern about the impact of re-excavating concentrated fines deposited on the base of the Phase 1 lake, during Phase 3 operations. The DNR suggested that the processing facility may not be able to separate the fines adequately from this concentrated source. The Applicant subsequently clarified that the fine sediments at the base of the Phase 1 lake would be directly re-interred to the bottom of the Phase 2 lake prior to excavation of production material, thus by-passing the processing facility altogether. The DNR is satisfied with this approach.

Conclusion

The Department, the DEC and the DNR are satisfied that the proposal is unlikely to result in any significant acid generation impacts. However, the Department believes the Applicant should be required to:

- immediately place all fines from the processing facility below the permanent water table to ensure that sulfides are unable to oxidise;
- discharge the fines slurry at a depth no less than 3 metres below the water surface, with final deposition no less than 8 metres from the water surface;
- not allow the off-site disposal or transport of any potential acid sulfate material;
- maintain comprehensive surface water and groundwater monitoring programs, including monitoring of iron and sulfides; and
- develop a comprehensive Soil and Water Management Plan that includes protocols for managing potential acid sulfate soils on site.

6.1.6 Rehabilitation, Landform and Long Term Management

Issue

The proposal could result in ongoing environmental impacts, or constrain future landuse opportunities on and off the site, if not planned and rehabilitated adequately.

Consideration

The proposed final landform is centred around the creation of a single large lake of about 70 hectares (including Phase 5), with its shape defined by the proposed extraction to within 10 metres of the property boundary (see Figure 5). The lake would support ongoing use by the recreational fishing facility following the end of the quarrying operations.

The EIS provides fairly scant information on the rehabilitation of the site. The proposed extraction to within 10 metres of the property boundary is based on maximising resource extraction alone and would result in a rather

unnatural looking lake, with long straight edges and only a relatively small area of terrestrial land surface remaining within the property boundary.

Significant concerns about the size of the lake, the lake design and the long term stability of the lake's banks were raised by the Department, the DNR and the public. As detailed in Section 6.1.1, the Department recommends restricting the proposal to Phases 3 and 4 only, which would reduce the size of the lake to around 40 hectares. This reduction goes some way to addressing the concerns raised.

To address concerns about long term stability and the potential for ongoing erosion of the lake's banks given its large final size (ie. more than 1 km across excluding Phase 5), the Applicant engaged specialist coastal engineers, International Coastal Management, to prepare a detailed review of slope stability. The review considers that waves up to 1 metre would form in a severe storm event over 1 km, and that in these conditions erosion of up to 16 metres could be expected on the lake's banks if no stabilisation mitigation measures are implemented (ie. greater than the proposed 10 metre buffer).

Given this significant erosion potential, the review goes on to assess possible bank treatments, including gravel and rock stabilisation. The assessment indicates that gravel would suffer some erosion and therefore require regular maintenance (topping up). As such, the Department does not consider this to be a suitable long term proposition. However, a rock layer (190mm rocks to a thickness of 380mm) would provide suitable long term stability. The rock layer would need to extend about 1 metre above the water level to prevent overtopping by waves. The Department notes that the existing water level is about 2 metres below the natural ground level, and as such, the remainder of the bank would also need to be suitably stabilised through various 'hard' (engineered) and 'soft' (stabilisation plantings) rehabilitation methods to prevent erosion during flood events, and to reduce visual impacts associated with the final landform.

Given the ability of the lake banks to be adequately stabilised, and the significance of the resource, the Department is satisfied that a 10 metre minimum buffer to the property boundary is adequate. However, the Department is not satisfied that the proposed lake design would result in an acceptable final landform. The Department believes that the Applicant should be required to design the final landform to achieve a lake design that comprises a sinuous and natural-looking final landform. To achieve this landform, the buffer to the property boundary would in reality be generally greater than the 10 metre minimum. The Department acknowledges that this would result in the sacrifice of some of the resource around the edge of the Phase 4 area, but notes that the Applicant may offset this loss through an equivalent encroachment into the Phase 5 area of the site.

The Department also believes the Applicant should, within the context of ensuring the long term stability of the landform, incorporate a variety of bank treatments (eg. beaches, wetlands) to encourage a diverse and naturalistic range of habitats within the pond.

To manage the design of an acceptable final landform, the Department believes that the Applicant should be required to prepare a detailed Rehabilitation and Landscape Management Plan for the proposal at an early stage of the development (ie. within 6 months). The plan should be prepared by suitably qualified experts (including a hydrologist, hydrogeologist, wetlands ecologist and landscape architect) and include information on final landform, long term slope stability, rehabilitation methods and completion criteria, and detailed landscape planning. The plan should also be prepared in consultation with relevant agencies and the community.

Further, the Department believes that Applicant should be required to prepare a Long Term Management Strategy for the ongoing management of the site following the cessation of quarrying and rehabilitation.

The Department also recommends that the Applicant be required to lodge a substantial rehabilitation bond to ensure that rehabilitation is carried out to expected standards.

Conclusion

The Department is confident that the proposal can be managed in a manner that provides for a final landform that is generally compatible with the landscape and surrounding landuses as far as is practicable. The Department believes that the Applicant should be required to commence planning for the rehabilitation and post-extraction

management of the site from the very early stages of the development, and to involve relevant authorities and the community in this planning process.

In summary, the Department believes the Applicant should be required to:

- progressively rehabilitate the site to the satisfaction of the Director-General;
- establish and implement a comprehensive Rehabilitation and Landscape Management Plan that amongst other things defines the final landform and details the rehabilitation/treatment of the lake banks;
- lodge a substantial rehabilitation bond with the Department;
- establish and implement a Long Term Management Strategy for the proposed post-extraction management of the site; and
- limit the works to a period of 30 years, by excluding Phase 5.

6.1.7 Noise

Issue

The proposal would generate construction, operational, and traffic noise emissions.

Consideration

The closest residences are approximately 260 metres to the south/east of the site (see Figure 4).

The EIS includes a specialist noise impact assessment undertaken by James Heddle Pty Ltd. The assessment reports that the daytime background noise level is 35 dB(A).

Proposed Hours of Operation

The proposed hours of operation for the development are shown in Table 4 below.

Table 4: Operating Hours

Activity	Day	Time
Quarrying operations	Monday – Friday	7:00am to 5:00pm
	Saturday	7:00am to 4:00pm
	Sunday and Public Holidays	Nil
Quarrying transportation	Monday – Friday	7:00am to 5:00pm
	Saturday	7:00am to 12:00pm
	Sunday and Public Holidays	Nil
Recreational fishing facility	Monday – Sunday	Anytime

Some of the public submissions claimed that the proposed hours of operation were greater than those allowed under the existing consent. Upon review however, the Department notes that the proposed hours are the same as the hours approved under the existing consent (DA No.0041/2001).

Predicted Noise Impact – Construction

The development would not involve any significant construction works, as it is an existing quarry. However, prior to Phase 4 commencing a bund on this site would need to be removed, which would take up to two weeks to complete. The noise assessment indicates that removal of this bund would not cause a significant noise impact (ie. less than 55 dB), and would comply with applicable construction noise criteria (ie. background + 20 dB). The Department is satisfied that these works would not result in a significant noise impact.

Predicted Noise Impact – Operations

The noise impact assessment indicates that the quarry operations would generally comply with the operational criteria (ie. 40 dB daytime) at all stages, except when the dredge is operating within 320 metres of the residences in the south-eastern corner of Phase 4. When operating in this area, the noise assessment indicates that exceedances of around 3 dB would be expected. Understandably, surrounding residents in this area (with the closest 260 metres from the proposed dredge pond), raised concerns regarding these exceedances.

The DEC requested additional information with regard to the noise assessment, including requiring the Applicant to investigate all feasible and reasonable measures to eliminate the predicted exceedances of the noise criteria.

The Applicant subsequently provided an addendum to the noise assessment which includes details of additional noise mitigation measures to the dredges, such as installation of acoustic screening around the engines. The additional assessment concludes that, with this additional noise mitigation, the dredging operations would comply with the noise criteria at all stages.

The EIS did not include any detailed assessment of the noise impacts associated with the proposed recreational fishing facility, however the Department is satisfied that this component of the proposal would not involve the generation of any significant nuisance noise emissions. Notwithstanding, the Department recognises that this use involves early morning and late evening operations. Accordingly, the Department has recommended evening and night time noise criteria, in accordance with the project specific noise level criteria under the *NSW Industrial Noise Policy*, to ensure that this use does not result in any noise impact to surrounding landusers.

The Department also notes that the EIS does not include any detailed assessment of potential cumulative noise impacts. The area surrounding the proposed quarry site is subject to a number of future developments, including a wastewater treatment plant, an aquaculture project and an additional sand quarry development. As such, the Department has recommended cumulative noise criteria for the proposal, in accordance with the amenity goals under the *NSW Industrial Noise Policy*.

Predicted Noise Impact – Traffic

The noise assessment includes a traffic noise assessment, which found that the proposal would comply with the traffic noise criteria under the *NSW Environmental Criteria for Road Traffic Noise* at all receivers, provided truck movements are limited to a maximum of 20 per hour (as proposed).

Some of the submissions raised concerns regarding the traffic noise impacts associated with truck movements on the poorly maintained intersection of Crescent Road and the quarry's access road. However, the Department notes that the majority of this Access Road has recently been upgraded by Council (see Section 6.1.8) – associated with the development of the nearby Council wastewater treatment plant – and is therefore satisfied that traffic noise associated with this roadway would have decreased accordingly.

Conclusion

The Department and the DEC are satisfied that the proposal can be managed such that it would not result in a significant noise impact on sensitive residential receivers. However, the Department believes the Applicant should be required to:

- comply with strict operational and cumulative noise criteria and hours of operation;
- establish and implement a noise monitoring program; and
- effectively communicate operations with the community and manage any complaints.

The DEC has determined that it is able to licence the development under the *Protection of the Environment Operations Act 1997*, and has provided its General Terms of Approval.

6.1.8 Air Quality

Issue

The proposal could generate dust impacts through extraction, processing and transportation activities.

Consideration and Conclusion

The EIS considers that the dust emissions generated by the proposal would be similar to those of the existing quarry. An air quality impact assessment undertaken for the 2001 DA indicates that the quarry complies with dust deposition criteria, subject to mitigation measures including the regular watering of unsealed access roads.

The Department agrees that the impacts associated with the proposal are likely to be similar to the existing quarry, and that these impacts should be able to be managed in accordance with relevant air quality criteria. The

DEC concurs and has issued its GTAs for the proposal. Notwithstanding, the Department believes the Applicant should be required to:

- comply with applicable air quality criteria; and
- establish and maintain an Air Quality Monitoring Program for the development.

6.1.8 Traffic

Issue

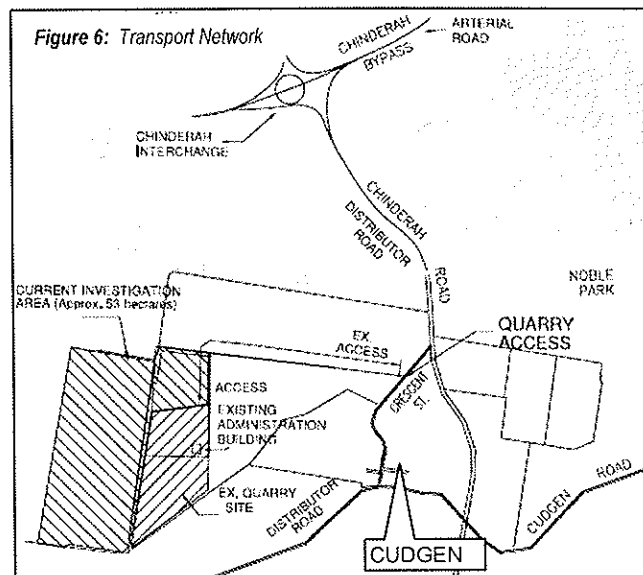
The quarry would generate a significant number of truck movements on local roads, and also has the potential for conflict between the recreational fishing facility and quarry uses.

Consideration

Quarry Operations

The truck access route from the proposed quarry extension to the arterial road network would follow the existing route, that is via an 'Access Road' on the northern side of the site, left into Crescent Street, left into Chinderah Road² and (generally) right onto the Pacific Highway (see Figure 6). Trucks would only travel through Cudgen Village for local deliveries.

The EIS includes a Traffic Impact Assessment undertaken by Blueland Engineers Pty Ltd.



The assessment indicates that the proposal would generate 80 truck movements (in + out) per day on average, and up to 200 trucks a day at peak production. The existing quarry generates up to 80 truck movements per day, and the consent allows up to 20 movements per hour (ie. 200 movements a day).

Following intersection analysis, the traffic assessment concludes that the existing road network is capable of accommodating the proposed number of truck movements without any significant impact.

The RTA does not object to the proposal, but requested additional technical data and recommended a number of conditions, including requirements to upgrade the:

- Chinderah Road/Crescent Street intersection;
- Crescent Road/Access Road intersection;
- Access Road/Site Driveway intersection; and
- Access Road, to a two-lane road standard.

The Department notes that the upgrade of the Chinderah Road/Crescent Street intersection, and the Crescent Road/Access Road intersection, were requirements of the 2001 quarry consent.

Condition 18 of the 2001 consent required the Applicant to upgrade the Crescent Road/Access Road intersection, which the Applicant subsequently implemented.

Condition 21 of the 2001 consent required the Applicant to contribute a fixed sum of \$70,500 for the upgrade of the Chinderah Road/Crescent Street intersection, with the works to be undertaken by the roads authority in line with the planned upgrade of Chinderah Road to four lanes (yet to occur).

The Applicant has informed the Department that it has paid the contribution required by condition 21, and therefore contends that it has fulfilled its requirements for the upgrade of this intersection. However, Council argues that the value of the works has increased substantially since the 2001 consent, and therefore the monetary value of the bond/guarantee should be increased accordingly.

¹ Now named Altona Road

² Now named the Tweed Coast Road

The Department acknowledges that the proposal would not increase the traffic using this intersection above that approved under the 2001 consent. As such, and in consideration of the specific nature of the wording of condition 21, the Department does not consider it justifiable or reasonable that the Applicant be required to directly contribute again to the upgrade of this intersection. The Department notes that Council's *Tweed Road Contribution Plan* includes a specific 'Heavy Haulage (Extractive Material) Contribution' which is levied on destination development (rather than on the quarry source), to offset additional wear and tear caused by heavy vehicles.

With regard to the RTA's recommendations for upgrade to the Access Road and Access Road/Site Driveway intersection, Council has reported that it has recently upgraded the majority of the road, as part of its proposed wastewater treatment facility development. Council reports that the first 400 metres of the road from the intersection with Crescent Street has not been upgraded, as it is subject to possible future realignment.

Recreational Fishing Facility

The tourist facility would generate approximately 4 vehicle (passenger vehicle or minibus) movements per day.

The RTA recommends that sand mining and tourist operations should be clearly separated, especially for internal parking and pedestrian movements, and that limitations be placed on the tourist activities to manage impact on the road network and safety. The Department agrees and has recommended appropriate conditions of consent.

The Department notes that the proposed fishing bays around the perimeter of the quarry, adjacent to Crown roads, do not appear to have provision for on-site parking (see Figure 5). The Department believes the Applicant should provide adequate parking for the recreational fishing facility on site, and that no vehicles are allowed to park on the adjacent Crown roads.

Conclusion

The Department is satisfied that the proposal would not result in a significant impact on traffic or transport, and that traffic levels associated with the quarry extension would be similar to those approved under the existing quarry consent. However, the Department believes the Applicant should be required to:

- restrict truck movements to the heavy vehicle haulage route, and not transport any material through Cudgen Village (except for local deliveries);
- limit truck movements to the stated levels (ie. same as existing approved levels);
- pay section 94 contributions to Council in accordance with Council's *Tweed Road Contribution Plan*; and
- provide sufficient parking on site (and not undertake any on-street parking), construct all vehicular and pedestrian facilities in accordance with the RTA's *Guide to Traffic Generating Developments*, and prevent conflicts between the quarry and recreational fishing facility operations.

6.1.9 Flora and Fauna

Issue

The proposal has the potential to impact terrestrial and aquatic flora and fauna, including threatened species.

Consideration

The EIS includes a flora and fauna impact assessment undertaken by James Warren and Associates. The assessment reports that the vast majority of the expansion area is in use as a tea tree plantation, and contains only small areas of remnant vegetation and habitat potential. Areas of remnant vegetation include Casuarina woodland, eucalypt regrowth and swampy vegetation, typically located around the perimeter of the site and outside the proposed expansion area.

Field surveys conducted during the assessment found 12 threatened fauna species (11 birds/bats and 1 snail) and no threatened plant species. Following 8-part tests of significance for these and other potentially affected threatened species, the assessment concludes that the proposal is unlikely to have any significant flora and fauna impacts.

With regard to the recreational fishing facility, the EIS states that the ponds would be stocked with a variety of native fish to a level that would not require supplemental feeding. DPI-Fisheries was originally identified as an integrated approval body for the proposal and, in issuing its General Terms of Approval, restricted the proposed species to locally endemic Australia bass and eel tailed catfish, because of concerns about other species escaping the ponds in times of flood. However, the CSIRO's investigation into blue-green algae (see Section 6.1.3) indicates that stocking the ponds with 'aquaculture' species may be inconsistent with the remediation of the ponds, and therefore the Applicant has removed the proposal to stock the ponds with such species. Subsequently, the DPI confirmed that the development would not require an approval under the *Fisheries Management Act 1994*, and therefore the DPI is not an integrated approval body for the proposal.

Conclusion

The Department is satisfied that the proposal is unlikely to result in any significant impacts to flora and fauna, but believes the Applicant should be required to:

- develop a protocol for vegetation clearing on the site;
- establish and maintain a Pest and Weed Management Plan, to manage the potential impact associated with terrestrial, and particularly, aquatic pests and weeds; and
- fully and progressively revegetate the final lake banks, using a diverse range of endemic species, in accordance with the Rehabilitation and Landscape Management Plan.

6.1.10 Heritage

Issue

The proposal could affect items of indigenous or non-indigenous heritage significance.

Consideration and Conclusion

The EIS includes an archaeological assessment undertaken by Adrian Piper in consultation with the Tweed Byron Local Aboriginal Land Council. The study did not identify any sites or items of indigenous or non-indigenous heritage significance.

Given the findings of the study, and the disturbed nature of the site, the Department is satisfied that the proposal would not have any significant impact on heritage. The Tweed Byron Local Aboriginal Land Council does not object to the proposal.

6.1.11 Visual Amenity

Issue

The proposal could affect the visual amenity of surrounding landusers.

Consideration and Conclusion

The extended quarry would be visible from scattered rural residences along Cudgen ridge to the south of the site, but would not be readily visible from any major roads. Views to the site from the north, east and west are generally not available due to the low lying nature of the land.

Given the relatively small number of visual receivers and the nature of the site and the proposal (ie. an extension to an existing quarry), the Department is satisfied that the proposal can be managed in a way such that it would not result in a significant visual impact, subject to:

- the sympathetic design of the final landform to create a natural looking lake; and
- the progressive and high quality rehabilitation of the lake, incorporating significant revegetation.

These rehabilitation objectives are discussed in Section 6.1.6 above. Further to, and as part of this rehabilitation, the Department believes the Applicant should be required to establish and maintain a tree screen along the southern boundary of the site, to help screen the site from visual receivers to the south.

6.2 Suitability of the Site

The Department is satisfied, subject to the removal of Phase 5, that the site is suitable for the development. The site is adjacent to, and forms part of, an existing quarry that has been operating since the 1980's. As an existing quarry, the site is adequately serviced with the extraction and processing infrastructure required for the proposal.

The sand resource is significant and has been identified as one of only four regionally significant sand deposits in the Tweed Shire. Of these deposits, the resource at the site is the only off-stream (ie. not located in a waterbody) one which produces fine washed sand, making it the largest source of fine washed sand within Tweed Shire.

The Department acknowledges that the development would result in the destruction of existing Class 3 agricultural land and an aquifer that contains generally good quality fresh water. However the Department and the DPI are satisfied that this loss is justified given the significance of the sand resource and the localised nature of the development.

Importantly, following its assessment of the environmental impacts of the proposal the Department is confident that the development can be managed such that it would not have a significant impact on nearby residents and the environment.

6.4 Submissions to the Proposal and the Public Interest

In consideration of the range of submissions received during the exhibition period – including 5 public submissions objecting to the proposal (see Section 5) – the Department acknowledges that there is some local opposition to the proposal. The Department notes that no public authorities expressed opposition to the proposal.

Notwithstanding the local opposition, the Department believes that the proposal is broadly in the public interest, given:

- the ability of the proposal to be conducted generally in accordance with applicable environmental criteria;
- the socio-economic benefits of the proposal, including the continuation of employment for more than 10 people, and capital investment in the quarry of up to \$500,000; and
- the need to ensure the ongoing supply of fine construction sand to the Tweed and North Coast construction industry.

The Department believes that much of the concern raised in the public submissions has been addressed through its recommended conditions of consent.

7. CONCLUSION

The Department has assessed the DA, EIS, and submissions on the proposal, and is satisfied that the impacts of the proposal can be mitigated and/or managed to ensure an acceptable level of environmental performance, subject to conditions.

In particular, the Department has recommended restricting the proposed quarry extension to Phases 3 and 4 only, which in effect reduces the duration of the quarry operations from 58 years to 30 years. This limitation removes the uncertainties that arise from the Phase 5 component of the proposal, and reduces the development to a reasonable scale and duration. The Applicant does not object to this limitation.

The Department has also recommended conditions that will require the Applicant to design and rehabilitate the quarry to achieve a natural looking final landform, with curved lake fronts incorporating a variety of long-term stable bank treatments. These requirements are necessary to ensure that the large waterbody formed by the development ultimately forms an amenable and environmentally sustainable component of the Tweed River floodplain. The Applicant will be required to commence detailed planning for the rehabilitation of the site from the very early stages of the development, and involve relevant government authorities and the community in this process.