Appendix A

Detailed Breakdown of Submissions

Air Quality
General

The respondent feels Option E would have pollution impacts on the two local schools during construction. (7)

The respondent feels Option E would have pollution impacts on the two local schools during operation. (7)

The respondent notes that in Volume 1, page 7.67 it states that "air quality at schools and residences adjacent to the existing highway would be improved by the operation of the proposed Upgrade". The respondent states that the 2018 projections are quite acceptable, however this level is likely to be reached 8 years after the opening of the Highway upgrade. The respondent asks whether the pollution levels would be acceptable after 10 years of highway operation. (7)

The respondent does not accept that schools should be subjected to any level of toxic highway pollution if there is a viable alternative. (7)

The respondent states "There is no known safe exposure to diesel exhaust for children" apparently derived from the United States EPA. The respondent states this in context of the Summary of the proposal stating on page S.23 "The Pacific Highway at Bulahdelah carries relatively high numbers of heavy vehicles - about 19.5 percent of total. (9)

The respondent states that the aims of the upgrade in relation to efficiency of travel are not met because the efficiency of travel may be affected by toxic diesel fumes which would concentrate in cuttings in the still air in front of the mountain. (9)

The respondent believes that the elevated siting of Option E hard against the Alum Mountain would ensure that the people of Bulahdelah get a full dose of toxic fumes. The respondent also believes that Option E is the most polluting option of all, and what is worse the Bulahdelah Central School would be the first in line to receive highway pollution. (10)

The respondent states that there is very little wind movement in the Alum Mountain Park picnic area, the mountain blocks the prevailing summer breeze (north-east) and also blocks direct southerlies. The respondent states that the RTA knows well that diesel exhaust emissions sink to a lower level and have been rated as a human carcinogen. This is why the respondent believes that Option is would be the most polluting option, and would effect the 600 students, from kindergarten to year 12, who attend the Bulahdelah Central School. (10)

Respondent asks that the RTA consider carefully whether the intrusion into Bulahdelah (Alum) Mountain is a wise move. They feel that there is a chance that the dust caused during construction could be very dangerous, something similar to asbestos. (11)

The respondent is concerned about the effects on residents exposed to Alum, as a result of the use of Option E. (14)

The respondent is concerned that with Option E fumes would leak down from the Alum Mountain onto residents and School children below. (14)

The respondent has concerns about dust levels during construction. (17)

The respondent has concerns about dust levels during operation. (17)

The respondent feels that the quality of the air in Bulahdelah would be adversely affected by the positioning of a highway above the town and in an area where the "topographical barrier" (Bulahdelah (Alum) Mountain) will prevent the free flow of wind to disperse the pollution. (19)

The respondent states that from experience (observing smoke from a bushfire on Bulahdelah Mountain) air flow moves up slowly then rolls back down in sinister manner engulfing everything in its path. This pollution would firstly roll down over 600 children who attend school for over 6 hours a day, and then the rest of town. It has been proven that exhaust from traffic is carcinogenic, not to mention adversely affects those who already having breathing problems. The respondent states that pollution would move in exactly the same path. The respondent states that even when the tops of trees are raging with wind, the air at ground level is motionless. The RTA proposal to place the highway in a trench, that due to thermodynamics, would initially allow the pollution to rise but as it cools it would fall and flow continually over present future generations, damaging health and lowering IQ levels. (19)

The respondent states that the EIS argues the movement of the highway from the centre of Bulahdelah and placing it above the town would somehow improve the air, noise and water quality for the residents of Bulahdelah, unfortunately this would not be the case. Moving the noise and pollution of the highway from below the town to above the town would be an absolute failure, merely exchanging one set of problems for another. (21)

The siting of this highway upgrade within a cutting in an area in which there is little wind movement does not provide safety of travel. (21)

The respondent is concerned about the impact the highway would have in terms of motor traffic pollution. The respondent has cited various media programs that have illustrated the impacts of traffic pollution on human health, and motor traffic pollution-related deaths. (21)

The respondent is concerned with the placement of the highway above the two schools in Bulahdelah, particularly the Bulahdelah Central School, with over 400 children in attendance. Traffic fumes travelling down upon these school children from Option E is not healthy. (27)

The respondent believes that the generation of dust during construction is not acceptable, the respondent states that it is another health risk. (27)

The respondent states that at the moment air quality on the Alum Mountain is excellent. The respondent believes this would not be the case if Option E is allowed to proceed. (27)

The DEC states that in addition to the Air Quality Management Plan (AQMP) described in Technical Paper 15, the RTA should also consider the following when preparing the AQMP: All fixed material transfer points should be enclosed and fitted with dust control devices to ensure emissions of dust are minimised; mobile conveyers should be enclosed to minimise the emission of dust; and all material stockpiles should be maintained in a manner that will prevent or minimise the emission of dust. (30)

The DEC states that it should be ensured that the works are carried out within the DEC's objectives, which are to minimise adverse effects on the amenity of local residents and sensitive sites, and to limit the effects of emissions on local and regional air quality. (30)

The respondent states that the impact of poisonous dust from alum during construction should be considered. No mention is made of the potential dangers of alum powder, which is known to be poisonous when it pollutes the atmosphere. (31)

The respondent states that Option E would expose residents and children who are incarcerated in Bulahdelah Central School for over a thousand hours each year to carcinogens from a highway located at a level above and in close proximity to the township, despite there being an alternative route to the west of the township - Option A. (37)

Biodiversity

Aquatics

The DPI (NSW Fisheries) would prefer that no snags are removed from the river but is supportive of relocation to enable bridge construction and still maintaining fish habitat. (26)

The DPI (NSW Fisheries) would only be supportive of the removal of sand and gravel deposits from Frys Creek during the removal of old timber piles if the material has the potential to impact upon good quality aquatic habitat downstream. The DPI (NSW Fisheries) suggests that the material may be more useful for infilling of the holes left after the removal of the old timber piles. (26)

The DPI (NSW Fisheries) requests consideration of the potential for rehabilitation of the wetland areas south of the Myall River after construction of the Highway to improve the quality of the habitat. This could include fencing to prevent gazing damage, and replanting riparian vegetation to maintain and improve the habitat values. (26)

The DPI (NSW Fisheries) requests that the potential impacts upon the aquatic habitat stemming from the use of temporary access platforms within the Frys Creek banks or a temporary crossings providing access for machinery should be included in the EIS. Otherwise suitable alternatives should be investigated to minimise impacts. The DPI (NSW Fisheries) also state that this should be a consideration for the proposed removal of the old timber piles still in the creek. (26)

The DPI (NSW Fisheries) refers to the statement in the EIS outlining how the rock armouring for Frys Creek would be kept to a minimum to reduce impacts on the creek. The DPI (NSW Fisheries)has found through previous experience that the extent or rock armouring for scour protection is dependent on the flood events which has resulted in major realignment and full rock lining of the entire length of creek within the road reserve, resulting in additional impacts upon fish and aquatic habitat. If this modelling is applicable to this project, then the extent of the impacts and necessary mitigation measures should be included in this assessment document. (26)

Fauna

The respondent states that the severing of the landscape from north to south must impact adversely to wildlife corridors for endangered species like squirrel gliders and koalas. (16)

The respondent feels that the following statement: "a significant barrier also remains where the preferred alignment runs along the existing powerline easement. Although small ground-dwelling and sedentary fauna species would not be able to cross this barrier, highly mobile species such as birds and bats would not be affected" is very mistaken. The existing powerline easement has never stopped fauna species crossing this easement. (18)

The respondent feels that 5 hours and 45 minutes (whatever this means in real time) over three days is not sufficient to be claimed as relevant in the context of searching for Koalas. The respondent feels this is ridiculous. The respondent states that if there were Koala scratchings found, then Koalas have used the area, and would continue to use the area, whenever their need arises. Koalas are transient. (19)

The respondent is concerned about the removal of habitat for the threatened Glossy Black Cockatoo (Callyptorhyncus lathami) and the removal of the fauna winter foraging area of Swamp forest. What does the RTA plan to do about winter foraging habitat - hopefully establish a new one before clearing the old. The respondent asks whether the RTA will build crossing bridges before construction starts so that species become used to them and can move with greater ease. (24)

Will the hollow dwellers be given "prior notice" before the clearing starts given that many are nocturnal creatures. (24)

The DEC notes from Section 8.4 that the Proposal would create a 52 to 100m barrier to Squirrel Gliders moving between seasonal foraging habitats (I.e. winter and summer resources). As there is very limited information on the success of mitigation measures to enable arboreal animals to cross a "six lane" highway (potentially), DEC is concerned about the long-term impacts on this species (potential extinction as indicated in EIA). For this reason, the identification and subsequent implementation of suitable mitigation measures is extremely important. As indicated previously, the DEC feels that as the issue of arboreal movement over the road is becoming highly important and procedures need to be developed to ensure that the various safety, constructability, usability issues are properly addressed. The development of these "arboreal" crossings should be undertaken prior to awarding and contracts for construction and needs to have the input of various "experts" to ensure all concerns can be addressed. (30)

As indicated previously the DEC is concerned about the need to ensure that the swamp mahogany vegetation on the western side of the proposed highway doesn't become deficient in water (this vegetation is also important for other threatened species). The maintenance of the quality and quantity of this vegetation is critical and may also ensure that the proposed fauna crossings success is maximised. (30)

It is suggested that prior to construction a protocol be implemented to survey and tag Squirrel Glider individuals within these areas. (30)

The DEC notes that a number of mitigation measures have been proposed to alleviate impacts on Common Planigale associated with the Proposal, including exclusion fencing and fauna underpasses. It is unclear however if these structures would be suitable for this species. (30)

The fitting of radio collars to gliders during the operational stage, to determine usage of fauna overpasses is highly supported by the DEC. The DEC suggest however that useful information may be obtained by fitting radio collars prior to construction to determine what impacts construction may have on resident individuals currently within the area. The DEC notes that the aim of radio tracking would be to demonstrate if and how gliders are crossing the highway. The question is raised by the DEC as to what is proposed should it be determined that squirrel gliders are not crossing the highway? (30)

The DEC suggest that the RTA, prior to awarding any contracts, investigates further measures to reduce fragmentation issues for gliders, including glider crossings, as these are still experimental in design and implementation. This is to ensure that there is no uncertainty when a construction contractor becomes involved. This has the potential to reduce long-term costs, project delays and unsuitable designs. (30)

The DEC notes that a number of culverts would be stepped higher than the surrounding culverts to enable fauna use. It is noted that wallabies are included in this list. The DEC is concerned that there is not adequate height to enable access for these larger species. (30)

It is important that any scour protection measures must be designed to facilitate terrestrial fauna movements. Minimum requirements for these area are to be obtained in consultation with DEC. (30)

The DEC request that the detailed design for the two bridge crossings also incorporates provision for terrestrial fauna passage. (30)

The DEC notes that further surveys are proposed for the Green-thighed Frog, however no information is provided on when or how many surveys are proposed to be undertaken. The DEC acknowledges that this species is very cryptic. (30)

It is noted that the introduced Mosquito Fish has been implicated in the decline of a number of frog species. It is noted that any sediment basins constructed as part of the proposed upgrade would not provide habitat for this species, however it is unclear how this is proposed to be achieved. The DEC support this proposal, however is unsure how the RTA plan to implement this measure. The DEC suggests that information could be gathered from the Threat Abatement Plan, developed under the TSC Act. (30)

The respondent states that the severing of the landscape from north to south must impact adversely to wildlife corridors for endangered species like squirrel gliders and koalas. (32)

The respondents questions the effectiveness and the number of Koala underpasses and their design. (34)

The respondent states that they have not had the benefit of RTA studies showing that Squirrel Glider aerial bridges actually work, nestboxes over time are successful, Koala underpasses are frequently used as corridor by these animals or that edge effects would not impact upon animals and habitat. (34)

The respondent asks for the RTA to send results of film taken at Bulahdelah and elsewhere for gliders and koalas as well as nestbox habitation by resident colonies and implications of predation levels at entrances and exits of aerial bridges and underpasses, and within nest boxes. (34)

Flora

The probable destruction of numerous threatened species of orchids, must surely be given more consideration than is currently the case, even considering the requirement with Option A to build two bridges and require roadworks of a different type. (5)

The probable destruction of 25% of the Bulahdelah population of *Corybas dowlingii* (syn. *Corybas sp. aff. Aconitiflorus*) will not enhance the scientific knowledge of its recent discovery. (5)

Rhizanthella slateri is synonymous with Bulahdelah and is an intrinsic part of the fabric of the town. The respondent is aware of the work done by the EIS study team on the orchid, however feels that despite this, very little is known of the biology and reproduction of this species. No scientific information is available as to the pollinator and the same applies to the method of seed distribution other than individual theories. The respondent feels that the loss of 28 of the 50 known plants in situ is little more than an act of state sponsored vandalism. (5)

The respondent states that *Cryptosylis hunteriana* is listed on Schedule A of the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, and the colony on Bulahdelah (Alum) Mountain is the largest ever recorded, only being discovered in 2002. This species immediate habitat is critical to its survival and changes to it would prove fatal to the colony as a natural entity. According to Table S4, at least 45% of the colony would suffer direct impact and another 10% an indirect impact. The respondent finds this estimate of loss to be unacceptable considering the significance of the species. (5)

The respondent feels that *C. dowlingii* is the only threatened species of orchid that could be successfully translocated, as this species has no special habitat or mycorrhizal requirements upon which it is reliant for survival. (5)

The respondent feels that the lack of scientific data available as to pollinators or mycorrhizal needs of *Rhizanthella slateri* or *Cryptostylis hunteriana* means that any move to translocate either species would be fraught with danger, and the world could not afford to lose such botanical rarities. (5)

The report seems to treat individual sites of *Rhizanthella slateri* as though they are isolated plants, nothing could be further from the truth; the plants in each area are all dependent upon the same two types of mycorrhiza for their survival and the plant hosts of these mycorrhiza are unknown. Their pollinators and seed distributors are also unknown. Destroy the habitat and this species will disappear, possibly forever. (9)

The EIS Summary Book does not detail who wrote the report on the rare and threatened orchid species. Whoever they are, they seem to have no knowledge of the past history of *Rhizanthella slateri*. The historical record does make us aware of one fact, for *Rhizanthella slateri* to survive, there is only one rule - do not disturb. (9)

The respondent wishes to highlight sections of the EIS and SIS that deal with the Eastern Underground Orchid and the Leafless Tongue Orchid, specifically issues relating to the saprophytic nature of the species, the relationship between the species and other host plants, the fact the locations surveyed are the largest known populations of the species and the acknowledged difficulty of translocating the species. The respondent directly quotes numerous sections of the EIS and SIS in highlighting these points. The respondent states via a quotation from Orchids Australia that "the known sites for the Eastern Underground Orchid represent internationally significant locations for one of the world's rarest and most intriguing orchids. Failure to conserve these sites immediately will lead to irrevocable loss of known habitat and undoubtedly result in the species facing extinction. For a developed country such as Australia, the loss of these last remaining sites is a national tragedy". (13)

The respondent states that the Rhizanthellas do not require photosynthesis for survival. Who knows what challenges the human race may face in the future, surely this unique quality which the Rhizanthellas possess should be the subject of scientific investigation. (13)

The respondent acknowledges the need for a high standard alignment of the Pacific Highway, but does not accept that it is necessary to cause the probable local extinction of the largest known populations of three species or rare orchids to achieve this objective. (15)

The respondent states that conversations with local residents who took a keen interest in the survey activity for *Rhizanthella slateri* show that the total population recorded of this plant could be as low as 10-20 individual plants. (15)

The respondent states that the *Rhizanthella slateri* is no doubt a plant of national and global significance. (15)

The respondent agrees that in the interests of conservation the location of the individual plants should not be disclosed. However, the respondent cannot accept that the deletion of total numbers of *Rhizanthella slateri* has any relevance to their sensitivity to disturbance. The respondent feels that the absence of population numbers for *Rhizanthella slateri* and *Cryptostylis hunteriana* have made the evaluation of the SIS impossible. (15)

The respondent regards the suppression of population details as a deliberate attempt to conceal the pitifully small numbers of *Rhizanthella slateri* and *Cryptostylis hunteriana* which 2 orchid experts were able to find over a lengthy period of 91 person days, representing 82% of the total terrestrial flora survey effort for the whole SIS, with 71.5 person days (64% of the total survey effort) being devoted solely to the search for *Rhizanthella slateri*. The respondent feels that this action indicates the degree of desperation the producers of the SIS felt to produce figures that justify the selection of the proposed road alignment. The respondents feel that there is no reason why the rider concerning variability of population numbers (page 5.3 of the SIS) could not have been appended to a table showing survey results. (15)

The respondent feels that for both *Cryptostylis hunteriana* and *Rhizanthella slateri* the future is bleak. Neither species has been successfully cultivated or translocated in the past and any effort in this direction must be considered experimental. The respondent states that there is scope for only one attempt at this exercise as road construction will immediately destroy all plants within the 'footprint' , destroying all stock for ongoing experimentation. Initial failure will have drastic results. (15)

The respondent states the following: The habitat of *Corybas dowlinglii* is a small area of 1.55 hectares and lies wholly within the habitat zone of *Rhizanthella slateri*. Despite its small size, it is proposed to destroy approximately 25% by construction of the proposed road and, as with the other 2 species of orchid, the remaining small parts will be fragmented. This fragmentation has the potential to threaten the viability of the species. The respondent states that it is possible for a captive population of *Corybas dowlingii* to be established and maintained for re-introduction or possible translocation, however would consider this action as a last resort. (15)

The respondent states the following: The habitat for *Rhizanthella slateri* as identified in Figure3-6 comprises a total area of 35 hectares. Of this total, 81% (28.3 hectares) is on publicly-owned land and 19% (6.7 hectares) is on undeveloped private land within the village zone. It is indeed fortunate that over 80% is (or was) permanently preserved by it's location. The population (even at the assumed number of 20) is by far the largest known; it has a conservation target of 80% (Environment Australia, 1999) and is the type location for this species. Given the unique significance of this species, and the fact that it is already threatened beyond its conservation target (when the power line easement is considered) it is difficult to see how the destruction of a further 10.2 hectares or 29% of the habitat area can be justified. The habitat area is also subdivided longitudinally by the proposed road alignment, so it is proposed to leave only 52% of the original area in two fragmented parcels. This is only 65% of the conservation target, but the impact is far greater because of the fragmentation. The area identified as habitat for *Cryptostylis hunteriana* is contained in 2 separate parcels, the larger southern one of which is severely impacted by the proposed road in the same manner as the *Rhizanthella slateri*, while the smaller northern parcel is largely undisturbed. However, the northern parcel lies almost wholly on privately-owned undeveloped land. The impact on the area of publicly owned is sever indeed and when considered with the possible future loss of the whole of the northern section to village development, only 32% or less than one third remains protected in 2 fragmented parcels divided longitudinally by the proposed road. The population is the largest known of this species and has a conservation target of 100% in north-east NSW. It is difficult to see how environmental destruction of this magnitude by a NSW Government Department can be tolerated. (15)

The fact that the unique underground orchids occur in this limited location should be setting off warning bells. (16)

The respondent feels that seed collection of the threatened plants required to be removed is another example of environmental destruction by the RTA, particularly in the case of *Rhizanthella slateri*. It is well known that *Rhizanthella slateri* cannot be cultivated, transplanted or grown by seed as is the case with many of the affected flora species along the Option E route. (18)

The respondent cites the determination listing of *Rhizanthella slateri* by the NSW Scientific Committee, in the context of stating that the study of the species is a long way from being complete. The RTA would greatly compromise a study being made on the Alum Mountain plant if Option E is allowed to proceed. There is no justification in the destruction of this species and the Scientific Committee's recommendations should be followed. (18)

The respondent wishes to disagree with the statement that there are no flower heads of *Rhizanthella slateri* located 10-20 metres from the proposed alignment (Volume 3, Technical Paper 4 - Appendix A, 4.2.1 Page 10). The respondent states that *Rhizanthella slateri* has been found flowering within the 10-20 metres from all the proposed alignments. These were obviously not found by the RTA employed orchid "expert". Orchid experts have also stated that Option E would affect the orchids that

grow above the Option E proposal. The rising fumes from vehicles would in time kill off a lot of the orchid population on the Alum Mountain. (18)

The respondent feels that the proposed upgrade would have a major effect on the values of the entire area of Alum Mountain. More flora species in particular are being discovered on the Alum Mountain. Already a possible new hybrid of Greenhood is being carefully monitored for documentation later this year. (18)

The RTA statement that they will or have diverted the option to avoid the protected flora species on the Bulahdelah (Alum) Mountain is wrong according to the respondent. Unless the RTA leaves the Mountain alone and moves to the previously cleared land on the outer west of town (say Old Inn Road) they will not be able to claim diversion enough. Some of these plants may hold the key to a cure for any number of diseases. (19)

The respondent states that Alum Mountain has at least one orchid variety not found elsewhere in the world. (20)

The respondent does not believe that relocation is ever a realistic option for flora that clearly has very special requirements in terms of habitat. (24)

The respondent asks whether it is possible to provide something akin to a raised area for the survival of the orchids. (24)

The respondent feels that the impacts of Option E of the Bulahdelah Highway Upgrade upon the Leafless Tongue Orchid are completely unacceptable; not just in terms of direct mortality to the population present, but in terms of fragmentation of a nationally significant population and the likelihood of ongoing decline in population of the population due to edge effects and airborne and waterborne contamination from vehicles passing along the carriageway. (25)

All relevant literature and expert opinion indicates that the translocation of Leafless Tongue Orchid is impossible. (25)

The respondent states that the construction of a four lane carriageway with the inherent necessity for landform modification (e.g. cut and fill and changes in substratum structure and drainage) would result in substantial hydrological impacts upon upper and lower remnant populations (of Eastern Underground Orchid) and contribute to unacceptable and highly threatening impacts upon the population. (25)

The respondent states that many of the concerns raised in relation to the Eastern Underground Orchid apply equally to the Leafless Tongue Orchid. (25)

The respondent states that Technical Paper 7 has not proposed any viable or ecologically feasible impact mitigation measures for the protection of an internationally significant population of the Eastern Underground Orchid. The only known option for mitigating impact upon the species is the prevention of all disturbances to known habitat and in-situ conservation management, with complete avoidance of ecological, hydrological, reproductive and toxic contamination threats. (25)

The respondent states that with the exception of the very limited (and likely ineffective) fauna mitigation measures (e.g. wildlife passageways), Technical Paper 7 has failed to address or mitigate significant (and irreversible) adverse impacts upon the largest known population of the Eastern Underground Orchid. (25)

The respondent states that the development of Option E would result in large infestations of a range of ecologically destructive environmental weeds would be created. According to the respondent, the primary weeds of concern include Camphor Laurel (*Cinnamomum camphora*), Large-leaved (*Ligustrum lucidum*) and Small-leaved Privet (*L. sinense*), Slash Pine (*Pinus elliotti*) and Lantana (Lantana camara). Each of these species has the potential to substantially modify the status and composition of detrital layers to the detriment of mycorrhizal assemblages upon which the Eastern Underground Orchid is critically dependent. Furthermore these exotic species would have the potential to change the frequency and intensity of fire events, to the potential detriment of the large populations of the Eastern Underground Orchid present. (25)

The respondent states that the construction of Option E would result in the fragmentation of the largest known population of the Eastern Underground Orchid. The expected edge effects of this fragmentation have not been satisfactorily documented and addressed within Technical Report 7. (25)

The respondent feels that Option E would substantially reduce available habitat for fossorial mammals both within and adjacent to known habitat for the Eastern Underground Orchid. The respondent states that according to limited available literature these mammals are likely to be responsible for the dispersal of the Eastern Underground Orchid. (25)

The respondent states that in the assessment there has not been consideration given to the likelihood of substantial deleterious impacts stemming from the airborne release of hydrocarbons (in particular Polycyclic Aromatic Hydrocarbons (PAH's) and Diesel Particulates) into areas of known habitat of the Eastern Underground Orchid on a permanent basis. (25)

The respondent states that from a review of the available literature, conservation of the Eastern Underground Orchid can only be achieved through retention of suitable and known habitat and prevention (rather than minimisation) of impact. (25)

The respondent states that the high level of disturbance to hydrology that would occur as a result of construction of the Option E upgrade, substantial impacts upon leaf litter availability would occur. This would result in major disturbances to mycorrhizal fungal assemblages upon which the Eastern Underground Orchid is entirely dependent, and has the potential to contribute to local extinction. (25)

The respondent states that the ecological significance of, and likelihood of irreparable ecological impact to, significant terrestrial orchids as a result of construction and commissioning of the Bulahdelah Pacific Highway Upgrade Option E is unacceptable. (25)

The respondent states that Option E would directly destroy certain populations of *Rhizanthella slateri*, and impact upon the entire known population at the site. (25)

All authorities on the Eastern Underground Orchid indicate that translocation is impossible. In-situ retention and removal of threatening agents is the only sound option for maintaining viable populations of the species in perpetuity. (25)

The respondent states that the impacts upon *Rhizanthella slateri* of edge effects, loss and reduction of dispersal and pollination agent populations, and hydrological modification has not been adequately documented and no sound, effective, or feasible mitigation measures proposed. (25)

The respondent states that the three terrestrial orchid species *Cryptostylis hunteriana*, *Rhizanthella slateri* and *Corybas dowlingii* would be adversely and unacceptably impacted by the Bulahdelah Pacific Highway Upgrade of Option E. (25)

The respondent states that from publicly available information it is apparent that the Bulahdelah population of the Eastern Underground Orchid is of taxonomic and genetic distinctiveness. The respondent states that this indicates that the population may be sufficiently morphologically and genetically distinctive to be recognised as a unique species. The respondent stets that there was no reference to this found within the Ecological Assessment Technical Paper. (25)

The respondent states that although the EIS has acknowledged the state significance of the Eastern Underground Orchid, a review of available literature has indicated that the species is nationally and globally significant. (25)

The respondent states that the population of the Eastern Underground Orchid at Bulahdelah is at the northern limit of the known distribution of the species, and this fact has been omitted from Technical Paper 7. (25)

The respondent states that the Ecological Assessment Technical Paper has failed to address the long term impacts associated with a four-lane carriageway bisecting known habitat of a globally significant population of the species. (25)

The respondent states that given the rarity, patchiness and very small overall population of the Eastern Underground Orchid , in tandem with the lack of knowledge of ecological function of the species (and hence lack of knowledge regarding the likelihood of impact); it is essential that impacts upon this poorly known and globally significant species are prevented. Without the availability of more detailed knowledge of population dynamics and function, a precautionary approach (preventing rather than minimising impacts) must be adopted. (25)

The respondent states that the loss of large areas of proximate habitat for those species likely to disperse the Eastern Underground Orchid has not been adequately considered within the Ecological Assessment Technical Paper, particularly considering that those Bandicoot species occurring within the study area are not listed on the NSW or Commonwealth Threatened Species schedules, and as a result have not been studied in detail in the locality. (25)

The respondent states that the Ecological Assessment Technical Paper has failed to address the high level of sensitivity of the mycorrhizal assemblages, supporting the Eastern Underground Orchid, to both nutrient and toxic pollutant (particularly hydrocarbon/petrochemical) contamination. (25)

The respondent wishes to raise substantial concerns about the significance of populations of the rare and threatened terrestrial orchids within the study area, and the magnitude of impact of Option E upon these species. (25)

The ultimate cumulative removal of a large proportion of habitat suitable for the Eastern Underground Orchid (48%), combined with the direct removal of 21% of the available habitat at the site is unacceptable. All known, potential, and locally available habitat of this globally significant population must be protected from impact to ensure that a viable population remains. (25)

The respondent states the population of Underground Orchids in far south Queensland (Lamington National Park) is now considered to be a distinct species. (25)

The respondent states that the plant species of state and national significance would not only have up to half of their Alum Mountain population destroyed by the freeway - the nearby survivors would then almost certainly be affected for all time. (29)

The DEC notes that the known orchid plants within the study area are located at no greater distance that 75-130m apart. Given that some individual plants may not have been detected, this distance may in-fact be a lot less. As indicated within the report, it would appear to be critical to ensure that these distances aren't exceeded and that suitable provision for the Ichneumon Wasp is maintained to enable cross-pollination to occur. This issue needs to be investigated further. (30)

The EIA notes that the population of *Rhizanthella slateri* through which the proposed Bulahdelah Bypass would pass is the largest population known. This population is at least ten times larger than any other known population of this species. At some localities of *R. slateri*, each "population" (or solitary, spreading plant) is less than 0.5m wide. Presently the individuals at Bulahdelah are that only multiple plants that have been found over a relatively wide area. The DEC acknowledges that the identification of the largest "known" population may be due to (a more) intense sampling effort than at most other localities. However, until other large populations are discovered, their existence can't be assumed. (30)

The DEC states in regard to different construction techniques in the area of colluvium, that the location of sensitive flora species must be understood to ensure minimal impact on these species. (30)

The DEC state that successful translocation of mycoheterotrophic orchids has never been reported. These plants are completely reliant on their (usually highly specific) mycorrhizal partners, which are, in turn, usually reliant on other symbiotic partners, such as ectomycorrhizal trees. Severance of these relationships seems to result invariably in orchid death.

In one case (*Rhizanthella gardneri*), where these symbiotic relationships were well understood, it was possible to cultivate a mycoheterotrophic orchid from seed and establish it in a pot containing a plant of the ectomycorrhizal host of the orchid's mycorrhizal fungus. Such success is highly unusual and has relied on an excellent understanding of the biology of that symbiotic system. Given that the identity of the mycorhizal partner of *Rhizanthella slateri* is unknown, including details of its other biological interactions, the success of translocation for this species is limited (based on current knowledge). (30)

The DEC notes that the genetic testing is being undertaken to determine the relationship between the individuals of *Cryptostylis hunterina*, however the results are not yet known. Is there any indication when information might be available from these genetic testing? Is this genetic testing using individuals collected from the study area and/or other plants across a greater distribution? (30)

The DEC notes that the length of the interface between habitat of *Rhizanthella slateri* and highly disturbed environments suburbia and roadway would increase significantly. The narrow strip of bushland cut off between the proposed bypass and Bulahdelah township is likely to be especially vulnerable to edge effects such as weed invasion. *R. slateri* habitat east of the highway would also be subject to significant edge effects, including potential increased weed invasion of bushland. Given these factors and the uncertainty surrounding potential impacts, perhaps only 50% of the population may survive in the long term. (30)

The DEC states that consideration must be given to any erosion and sediment control requirements (e.g. scour protection etc) for the translocation of the orchids. (30)

The DEC refers to Section K1.5 - regarding ameliorative measures for the orchid species, it appears evident that maintaining surface and subsurface drainage and flow patterns downhill (western side) of the alignment is highly critical to the survival of not only the orchid populations but also the vegetation which supports threatened fauna (e.g.. Squirrel gliders). The implementation of the correct/adequate mitigation measures is highly important to ensure the survival of the very sensitive species on the western slope of Buladelah (Alum) Mountain. This outstanding issue needs to be resolved to the satisfaction of the DEC or any other approval organisations. (30)

The EIA (including Table 5.1) states that only 4% of the population of *Rhizanthella slateri* would be subject to "direct impact" (I.e. removed during road construction plus 10m within batter lines). It is noted that a further 21% of the population would receive an "indirect impact" and 13% "potential impact". It is noted that indirect impacts may affect those plants 10 to 20 metres from the edge of the batter lines and potential impacts may occur to those individuals greater than 20 metres downhill from the batter lines. It is noted that the EIS indicates that it is difficult to predict the full range of impacts on orchid species as limited information is known on habitat requirements, hence the potential impacts may in fact be greater than the percentage indicated. (30)

The DEC state that the *Cryptostylis hunteriana* is the rarest species in that genus. It is listed as vulnerable under the New South Wales and Commonwealth legislation. The Bulahdelah populations are the largest known of this species. Comments in relation to the *Rhizanthella slateri* and the potential impacts of construction and the difficulty of translocation and propagation apply equally to *Cryptostylis hunteriana*. (30)

The DEC comments on the level of conservation significance of *Rhizanthella slateri*, stating that as indicated within the EIA, *Rhizanthella slateri* is listed (from 6 December 2002) under New South Wales legislation as a vulnerable species but it is not listed under Commonwealth legislation. The EIS interprets this as indicating that the conservation of this species is only of state significance and not of national or international significance. While this species has not been listed under Commonwealth legislation, the high significance of this species should not be overlooked. (30)

As only a handful of plant species are known to be completely subterranean (including *Rhizanthella gardneri*, and unnamed *Rhizanthella spp.* known from south eastern Queensland, and R. slateri) the conservation of these species is extremely important given that they are capable of completing their life cycles entirely underground. (30)

While a small number of mycoheterotrophic plants remain subterranean for most of their lives, almost all of these emerge to flower and fruit. Subterranean flowering plants are therefore extremely unusual, specifically given their extraordinary physiological and reproductive adaptations and evolutionary history. For this reason the species is of great scientific interest, particularly as the selective pressures responsible for the evolution of this underground lifestyle is not understood. (30)

Section 8.1.4 of Technical Paper 7 indicates that no individuals of *Angophora inopina* would be impacted by the Proposal, however Section 8.1.7 indicates that there would be removal of a small number of individuals (this needs clarification). (30)

The DEC state that the fencing/parawebbing proposed within 3m from the edge of the canopy drip zone of the *Angophora inopina* individuals must be implemented into the detailed designs. The collection and propagation of seed from this species needs to be undertaken early in the project development stage particularly given past experience with propagation has had a limited success rate. (30)

The DEC is concerned about the potential fragmentation of the ability for pollinators (if known) and seed dispersers for orchid species to travel between each side of the road. It is noted that a number of comments have been made about investigating these options further. The DEC suggests that this be further investigated. (30)

The DEC ask when and where is the cryostorage of the threatened orchid seeds is going to happen. (30)

The DEC note that a discussion is provided in Section 3.3.1 of the preliminary listed Endangered Ecological Communities (under the TSC Act). The Dec ask that the RTA be aware that these preliminary listings have now been made final (as at 17 December 2004), hence a full assessment of the potential impacts on these communities is required. (30)

Clarification is sought from the DEC in regard to how the timeframe of comprehensive seed collection of natives (approximately 12 months) would be consistent with often tight construction timeframes. (30)

The DEC refers to Section K1.4 - stating that it is possible for other individual orchids to occur however they may only become exposed after clearing or excavation works. Careful procedures would need to be implemented to ensure that any individuals likely to be present are identified, particularly due to the size of the construction vehicles. (30)

The DEC states that the information collected as part of the survey for the orchid works should be detailed and included within an update to Appendix K. The RTA needs to ensure that this information has been adequately collected as described within the survey requirements. (30)

Any translocation of threatened plant species must follow the Australian Network for Plant Conservation (ANPC) Translocation Guidelines (2004) or the most current guidelines. It should be noted that translocation is not a "quick fix" measure and often requires extensive input and cost, particularly for a species where the success or otherwise of translocation is unknown. The DEC considers that the translocation of some orchid species is likely to be unsuccessful. (30)

The establishment of these translocation trials early is essential. While it is noted by the DEC that there are often delays between project approval and construction, it is essential to develop the translocation strategy sooner rather than later. It is extremely important to ensure that "relevant" experts are involved in this process. The DEC suggests that a "trial" translocation plan is a high priority and the development of this document prior to approval is warranted. (30)

Care would need to be taken during the translocation of the Eastern Underground Orchid, as it is noted that this is likely to be undertaken after flowering during dormancy, accurate locations for this species should be identified during flowering. (30)

It is unclear how long these translocation trials are proposed to be undertaken for. It is suggested that the time period for this should be developed in consultation with relevant experts. If the trials are only undertaken over a short period of time then results may be limited in value and not truly reflect the situation (i.e. dormancy periods etc.). (30)

The DEC suggest that any final translocation plan is developed prior to a construction contract being awarded and this can then be used to direct any contractor. Past experience has suggested that the best results are achieved when the responsibility for translocation is not left to the road construction contractor, but is undertaken by the RTA under separate contract. (30)

The DEC note that the wild fires caused a number of survey constraints for the various orchid species. It is unclear what (if any) additional survey measures are proposed. The DEC also state that given these fires, it is unclear what the predicted period of recovery for these species might be. (30)

The respondent states that the destruction of the underground orchid sites should be considered. (31)

The fact that the unique underground orchids occur in this limited location should be setting off warning bells. (32)

The respondent states that they have not had the benefit of RTA studies showing that extremely rare species such as the underground orchid can be successfully translocated. The respondent would be particularly interested in evidence of the successful translocation of these orchids. (34)

The respondent would also appreciate that information in Appendix K not concerned with location of the orchids to protect them from unscrupulous people who would dig them up resulting in their probable demise. If this is not possible the respondent would ask would that information be available after the translocation effort takes place and any reasons for not making it available at that time. (34)

The potential to destroy flora and fauna of regional and even national significance is horrific. The estimation of the populations of the *Rhizanthella slateri*, even their ultimate species identification, is at best hopeful. The Proposal to translocate the population affected is experimental guesswork relying on theory and hope that the fungi associations would transfer and thrive in a new soil and wider ecological location. (34)

The admission that in the worst case scenario the transfer of 56% of the Leafless Tongue Orchid may affect the long term viability of this population makes the RTA actions a threatening process. (34)

The proposed Route E would have substantial, adverse impacts on the vegetation communities of Alum Mountain. (35)

The respondent is particularly concerned about the potential impacts on the underground orchid, *Rhizanthella slateri*. *Rhizanthella slateri* is a remarkable species which is very difficult to survey and which is poorly known biologically. The Alum Mountain population, the type locality for the species is the largest known. (35)

Route E would certainly destroy part of the population, and impact on the rest. Although many details of the biology of *Rhizanthella slateri* are unknown, it is certain it is mycorrhizal, that it has specialised pollination and dispersal systems. Technical Report 7 fails to address this complexity or the possible impacts of the road construction on it. (35)

The respondent states A. priori (based on what is generally known) it is reasonable to predict that disruption of local populations of mammals such as bandicoots and potoroos, alteration of hydrology, weed invasion consequent or disturbance and altered fire regimes would adversely affect *Rhizanthella slateri*. These environmental changes would also affect a range of other species. It is extremely unlikely that translocation would be successful and effective mitigation if impacts is also unlikely. (35)

The respondent states that the RTA plans to destroy an ecosystem which, in the case of its Australian Native Orchids, is unparalleled in quantity of species varieties, despite having an alternative route to the west of the township - Option A. (37)

The respondent states that community members understand that the RTA and Parson Brinckerhoff would utilise any means to reach the goal of Option E, including (but not limited to) claiming that "seed collection and propagation of species" would "mitigate impacts" when *Rhizanthella slateri* can not be cultivated and attempts at same would not only be futile, they would retard multiplication of this species. (37)

Comparatively little is known about the ecology of the underground orchid. The species is known to be critically dependent on healthy soil and leaf litter and has a symbiotic relationship with mycorrhizal fungi and other plant species. These characteristics would make the species impossible to remove and relocate (successfully) as proposed in the EIS. (38)

The respondent appreciates the reasons for the confidentiality of Appendix K of the Species Impact Statement, and the exact location maps of the rare and threatened orchid species, the respondent is less convinced that the accompanying text detailing the population size and health of the orchids needed to be withheld from public exhibition. This lack of information in the public domain may disadvantage the case for protection of these important species. (38)

The species of greatest concern is the Eastern Underground Orchid. According to the EIS, the development would destroy or indirectly impact on almost 40% of the known population. There are good reasons to believe that Option E would have far greater impact on this species. (38)

The NCC is particularly concerned that the proposed Upgrade Option E would cut a swathe through and destroy significant numbers of three unique populations of "vulnerable" native orchid species: *Rhizanthella slateri* (Eastern Underground Orchid); *Cryptostylis hunteriana* (Leafless Tongue Orchid) and *Corybas sp. aff. Aconitiflorus* (Red Helmet Orchid), in addition to impact on other threatened flora and fauna. (38)

Long-term impacts of the Proposal on *Rhizanthella slateri* appear not to have been addressed in the EIS. Of particular concern are the threats of increased pollution and hydrological modification to the orchid's habitat. (38)

There are indications that the Bulahdelah population of *Rhizanthella slateri* is genetically distinct from other known populations of the species. The Bulahdelah population may be sufficiently different to be recognised as a species in its own right. If this were the case, the site would become the only known location of the species and rightly assume national and global significance. (38)

The Eastern Underground Orchid is clearly a very special rare and iconic species. Its effective conservation for the future can only be achieved through retention of its known habitat and prevention of any disturbance rather than impact minimisation. (38)

Bulahdelah Upgrade Option E would proceed through the centre of the largest known occurrence of *Cryptostylis hunteriana*, and according to the EIS directly destroy or indirectly impact on 56% of its population. Fragmentation would also occur as well as likely population decline due to edge effects such as airborne and waterborne contamination. (38)

Many of the issues raised in relation to the Eastern Underground Orchid apply equally to the *Cyrptostylis hunteriana*, indicating that relocation of this species is also (38)

Although not noted in the EIS, the Red Helmet Orchid was recently described as a new species (*Corybas dowlingii*) in September 2004. *Corybas dowlingii* has not been assessed under either the Threatened Species Conservation Act or the Environment Protection and Biodiversity Conservation Act. The EIS acknowledges *Corybas sp. aff. aconitiflorus* as a species of State significance, but with its reclassification, it takes on National significance. (38)

The Red Helmet Orchid would be severely affected by Route Option E, which would impact on 25% of its population. Fragmentation would occur together with the potential for population decline. (38)

The presence of the largest known populations of the three orchid species (Eastern Underground Orchid, Red Helmet Orchid and the Leafless Tongue Orchid) on the site of the proposed development elevates the conservation significance of the area to a national and global level. (38)

Rhizanthella slateri is listed as Vulnerable under the NSW Threatened Species Conservation (TSC) Act, but has yet to be assessed under the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act. The respondent understands that a "Threatened Population" nomination for the Bulahdelah site of the species has been submitted to the NSW Scientific Committee. The population at Bulahdelah is the largest known for the species. In fact it is the only population known (comprising close to 100 plants according to the respondent), all other populations consisting of just a few individuals. It is also the known northern occurrence of the species. (38)

The respondent submits that the RTA should proceed other than by Option E. However if Option E is to prevail, the respondent submits that a long term protection plan for the orchid species be prepared. This would include ongoing monitoring and evaluation of the populations. (40)

Until such time as the Red Helmet Orchid can be assessed for its distribution, there should be no impact upon its occurrence on the site. The delay occasioned by this is probably unacceptable. (40)

The respondent states that while Option E caters reasonable adequately for most flora and fauna concerns, it fails completely in relation to *Cryptostylis hunteriana* (Leafless Tongue Orchid), *Rhizanthella slateri* (Eastern Underground Orchid), and *Corybas sp. aff. aconitiflorus* (Red Helmet Orchid). (40)

The Red Helmet Orchid has not been classified under either State or Commonwealth legislation, only recently having been described as a new species. It may well be unique to this site. (40)

The respondent states that while the RTA has indicated it would translocate orchids displaced by the highway upgrade, this is scarcely a viable option as there is no evidence of the Leafless Tongue Orchid or the Eastern Underground Orchid ever having being successfully translocated. Both are saprophytic (reliant upon soil fungus for growth). Translocation would almost certainly result in the death of the plants, leading to a loss of 56% of the Leafless Tongue Orchid and 38% of the Eastern Underground Orchids.

While the RTA has indicated it would develop an experimental plan for translocation, this would only be acceptable if it demonstrated that saprophytic orchids can be successfully translocated. Until such evidence exists, the RTA should not proceed with Option E. The delay occasioned by this is probably unacceptable. (40)

The respondent states that the plant species of state and national significance would not only have up to half of their Alum Mountain population destroyed by the freeway - the nearby survivors would then almost certainly be affected for all time. (41)

Several omissions relevant to the Underground Orchid (*Rhizanthella slateri*) and Leafless Tongue Orchid (*Cryptostylis hunteriana*) were noted within the SIS. Without access to Appendix K Forests NSW has been unable to fully assess the impacts of the proposed bypass on these species, both of which occur on forest estate. (44)

In order to mitigate the impact on threatened orchid populations emphasis has been placed on translocation of plants out of the site. Since the success of this activity is highly dubious for these species, the use of this mitigative measure without extensive rigorous prior investigation is a concern. Further consideration of this measure is recommended. (44)

Forests NSW must be notified and consulted where the intention is to relocate populations of threatened flora from the area of the bypass to other areas of State Forest estate. (44)

A review of the Species Impact Statement identified several issues of concern. No reference was made to the Forest NSW environmental database which maintains flora and fauna records separate to the NPWS Wildlife Atlas and are not available via the Atlas. (44)

The respondent would like to see a restriction of clearing of trees to an absolute minimum. (45)

General

Respondent regards Mountain Park as one of the town's greatest treasures, and feels that the Proposal would ruin the unique environment. (1)

The respondent finds the prospect of enhancing the environment misleading. The respondent states that the current environment of much of the southern approach to Bulahdelah is greatly changed from anything which might have resembled a natural environment. (5)

The respondent states that the aims of the upgrade in relation to the improvement of environmental quality outcomes are not met because the Option E has appalling impacts on very rare flora and fauna and it destroys habitats of threatened species left, right, and centre. (9)

The respondent is concerned with the loss of flora and fauna, including rare and threatened species that would accompany the use of Option E. (14)

The respondent feels that there is no point providing a compensatory habitat package unless a site can be identified which supports existing colonies of the species of orchids which are to be destroyed. The respondent requests the RTA consider purchasing the private land within the village zone which has been identified as *Cryptostylis hunteriana* habitat (Figure3-6) to partly compensate for the destruction of the southern population. (15)

The respondent states that Alum Mountain is home to many rare flora and fauna species. The abundance of rare flora and fauna is testimony to the Mountain's environmental significance. Because of the unique geology of the mountain a wide array of unusual plants and animal associations are present. Not all of these are known or fully understood and as such the area should not be permanently disturbed by way of a major road construction. (16)

The respondent states that if a highway is built through a large area of forest there would be some hope that the wildlife would adapt to changed circumstances. The Option E Highway Upgrade is a narrow bush corridor between suburban development and the Alum (Bulahdelah) Mountain. The narrow strip of bushland left between the highway and the town would leave any surviving wildlife in that small area open to attack by domestic animals as explained in Technical Paper 7, page 5-20. (21)

The respondent is concerned with the likely changes in faunal and floral assemblages that would result from habitat fragmentation associated with the Proposal. The respondent feels that such changes could affect leaf litter layers upon which the Eastern Underground Orchid depends, and impacts upon dispersal and predation regimes within populations of the Orchid. According to the respondent there is also a very high potential for invasion by feral animals of what is presently intact habitat. (25)

The RTA need to ensure that the proposed design features and mitigation measures can be implemented and ultimately constructed. Concern is expressed when mitigation measures proposed within an EIA document cannot be constructed due to various factors such as safety, cost or ability to construct. (30)

The DEC state that the site data on the species recorded during the surveys must be forwarded to the DEC for inclusion with the Wildlife Atlas. (30)

The DEC state that the strategic compensatory habitat package developed does not negate the responsibility of the RTA to ensure that the Proposal avoids and minimises impacts on the environment. (30)

The DEC state that the approximate general extent of construction presented in Figure 5.18 of the Main Volume is noted as indicative, however suggest that there would need to be scope to ensure that in sensitive areas, the extent of construction may need to be limited. (30)

The respondent states that Alum Mountain is home to many rare flora and fauna species. The abundance of rare flora and fauna is testimony to the Mountain's environmental significance. Because of the unique geology of the mountain a wide array of unusual plants and animal associations are present. Not all of these are known or fully understood and as such the area should not be permanently disturbed by way of a major road construction. (32)

The regional effect of clearing piece by piece by the RTA claiming amelioration and compensatory habitat for local populations from the Hunter to the Tweed River on arguable scientific grounds actually amounts to greater clearance than any other developer or farmer in coastal NSW. (34)

Habitat

The respondent states that the contribution of hydrocarbon contaminated runoff to areas adjacent to the upgraded highway has not been adequately assessed, nor any sound mitigation measures proposed. (25)

The DEC state that from past experience during clearing operations, most medium to large hollows become damaged when the tree is felled. It is unclear from the documents if there is a suggested hollow log replacement with nest box ratio. It is important to ensure that artificial nest boxes focus on targeting a certain species (I.e. bats, birds etc). The design and ultimate construction of any artificial structures must incorporate "minor bird" (sic.) protection structures. (30)

The potential impact of hydrocarbon contaminated runoff into sensitive areas west of the proposed highway appears not to have been addressed. (30)

The DEC is concerned about the potential changes to hydrology as a result of the proposed construction activities. These changes may result in significant impacts to orchids and squirrel glider habitat (as mentioned in the EIS). Procedures must be developed to ensure that any proposed or envisaged changes to hydrology would not result in additional impacts to the lower slopes of the mountain. (30)

The DEC request that the design of structures proposed to reduce flooding within sections of the township continue to maintain sufficient flows to sensitive vegetation communities on the downslope of the Bulahdelah (Alum) Mountain. (30)

The DEC notes (as described in Section 8 of Technical Paper 7) that a number of the assessments for affected species indicate that if drainage culverts are the only mitigation measures used, then the swamp mahogany vegetation on the western side of the proposed alignment may be lost through desiccation. The DEC, as previously expressed, is concerned about the potential indirect impacts on this vegetation and is therefore very keen to see a solution to this potential problem. (30)

The DEC suggest that the location of the identified hollow trees be used in the development of the detailed design, with a view to reducing the number of actual trees lost. (30)

Regarding the design of nest boxes, it is important that any nest boxes do not encourage use by Mynas, Starlings and feral bees. There are a number of designs which can be implemented to ensure that these species are discouraged from using these artificial structures. (30)

The DEC state that the Glossy-black Cockatoos can have very specific feeding requirements. Research suggests that it is important to conserve large intact areas of Allocasuarina spp. forests. For this reason, it is important to ensure that the proposed rehabilitation works are undertaken correctly. It is also important to ensure that any seed collected for propagation includes the collection of "known" feed tree seeds, thus increasing the chances that "ideal/suitable" tree species are propagated. As with any mitigation measure proposed on land not owned or proposed to be owned by the RTA, the consent of the landowner is critical and the long-term protection of these measures is uncertain. The DEC advocates the implementation of mitigation measures that can be guaranteed or secured in the longer term. (30)

The following comments particularly relate to the proposal to dissipate concentrate surface flows out of drainage culverts in the orchid and swamp mahogany areas; and designing stormwater treatment devices to maintain existing flow paths and regimes. The DEC state that it is unclear how this is proposed to be implemented. This issue of maintaining water flow etc is particularly critical to the survival of important vegetation and significant flora and fauna species. This is also significant given soil moisture (within the lower slopes of the mountain) is dependent upon direct rainfall and runoff from Bulahdelah (Alum) Mountain rather than from ground water reserves. It is noted that the RTA proposes to examine this issue further during the Representations Report (including short bridged sections). The DEC is particularly interested in any measures proposed. (30)

The DEC notes that at least four hectares would be revegetated with Allocasuarina to mitigate the two hectares removed by the Proposal. Given the specific feeding requirements of the Glossy Black Cockatoos on certain individuals of casuarina, the collection of seed should be undertaken from the actual stand of trees within the southern area, including those trees proposed to be removed. (30)

Nest boxes and hollows placed within State Forests Estate must be spatially dispersed within the forest to reduce the risk of competition between sites. This practice is recommended for other non-State Forests areas. (44)

Monitoring of nest boxes needs to include consideration for invasion by European honeybees which are likely to invade up to one third of sites provided. Management of European honeybee colonies within nest boxes and hollows needs to be included as part of the Flora and Fauna Management Plan throughout the course of the monitoring periods proposed. (44)

Where nest boxes and hollows are placed to provide suitable roosting sites for fauna with State Forests Estate, detailed information on the location, style and size of the nest box or hollows must be supplied to Forests NSW both electronically and in hard copy formats. (44)

Community Impacts

Visual

All alignment options for Option E would have the visibility issues regarding the town and Alum Mountain. (18)

The respondent feels that the a much clearer and more constant view of the Alum Mountain and the township of Bulahdelah could be achieved by the use of Option A. No view of the town or the Alum Mountain can be obtained while driving through the park area. It would be much better to have the view of the Alum Mountain as a landmark to the approach of the town, and to keep as much as possible of that view by using a Western Option, preferably Option A. (18)

The respondent states that the gifts that Bulahdelah has are the river and the Mountain. If you drive at the foot of the Mountain you see nothing. (20)

The majority of Highway users have little interest in Bulahdelah and a pleasant view of the mountain is what they would appreciate. (20)

The adoption of Route E for the bypass is considered to have visual impacts on Bulahdelah township, and also impact on the rural nature of the town which could largely be destroyed. (44)

Property Impacts

The board of Directors of the Bulahdelah Golf Club feel there is not enough detail in regards to the exact location of the access road and its boundaries. Without this information the respondent feels they are unable to make any firm decision on the effect on the Golf Club with regards to safety for road users and their members. (6)

The respondent states that by locating Option E on the highest ground, the best real estate the town has would be ruined. (10)

The respondent is concerned that the road going from the northern interchange to the water reservoir, has a loop on the eastern side of the 110V transmission line that would be very close to their house. The respondent's property would be directly affected by the northern interchange, and they are seeking to have the road realigned to the western side of the transmission line. (22)

Tourism and Economics

The respondent feels that Option E does not give any opportunity to put a tourism strategy in place, as the main tourism asset for Bulahdelah is Bulahdelah (Alum) Mountain and the Alum Mountain Forest Park. The respondent feels that the highway would stuff-up Bulahdelah's tourism future. (7)

The respondent states that the highway option does not achieve the aims of acceptable socioeconomic and financial outcomes. The highway Option E would devastate the cultural life e of the town. The Alunite Mining Site is the towns most significant local history, and the respondent believes that it is being recognised as a National Heritage Site. Taking away a town's history, its recreation area and then because the highway would be located on the top edge of the town, filling it with highway noise and toxic fumes is not a good financial outcome for the residents of Bulahdelah. (9)

The respondent states that the upgrade does not achieve the aim of environmentally sustainable outcomes, as the Alum (Bulahdelah) Mountain is the world's only large above ground deposit of Alunite in mountain form, and is a major part of the tourism strategy that is being developed. (9)

The respondent states that the preservation of this complete heritage site (the Alunite Mine Site Complex) is a key element in providing a viable future for Bulahdelah. (10)

The respondent states that by taking away the tranquil atmosphere of this area and replacing it with a noisy and polluting highway the RTA would effect destruction of tourism in Bulahdelah. The Alum Mountain is Bulahdelah's major attraction for both travellers looking for respite and for tourists. The respondent understands that for the RTA it is important for the bottom number to read that the highway is shorter, but it still does not give the government the right to destroy such a beautiful place - a place where many a traveller recoups before travelling on; where they 'stop revive survive' if you will. (19)

The respondent states that the economic effect of bypassing Bulahdelah might well be minimised if the RTA were not to issues access approvals off the highway to any new service centres within a specified distance, dictated by reasonable refuelling needs, from the town. (20)

If the highway was moved away from the town, preferably a western route, Bulahdelah would surely have a good economic and financial outcome. (21)

The respondent believes that tourist dollars would be lost from the town, should Bulahdelah Mountain be split in two. The respondent states that at the end of the day, economically the town would adjust and survive, but if the Mountain is damaged, Bulahdelah could no longer truly promote it. (29)

The respondent's main concern is that drivers would no longer come into Bulahdelah. (33)

The respondent believes that Bulahdelah's economy would suffer because of the distance from the proposed exit at the south of the town. With the road being in a cutting in the Alum Mountain area, the town would never be visible to passing traffic. (33)

The respondent states that the potentiality of regional economic gain has not been established. Nor has the benefits or maintenance of economic viability of the local area. (34)

The respondent states that the Option E would extinguish the Alum Mountain's tourism and usage potential. (37)

The respondent states that the decrease in the amount of revenue local businesses derived from highway traffic would be exacerbated through northbound regular road users being accustomed to heading towards the Alum Mountain when planning to stop at Bulahdelah. (37)

NCC state that any bypass of Bulahdelah would have a negative economic impact on the township, perhaps for many decades. The current nature of Bulahdelah as a "service town" would probably mean that it would be more affected by an economic downturn resulting from a bypass than other such towns in NSW which have survived or thrived as a result of being bypassed. (38)

The respondent believes that tourist dollars would be lost from the town, should Bulahdelah Mountain be split in two. The respondent states that at the end of the day, economically the town would adjust and survive, but if the Mountain is damaged, Bulahdelah could no longer truly promote it. (41)

The respondent believes that Bulahdelah would suffer as a consequence of the upgrade and there would undoubtedly be job losses as business' feel the effect of being "bypassed". Flow on effects involving the school and hospital would also occur. (43)

The respondent states that every effort must be made to ensure that minimum disturbance takes place in the areas of Bulahdelah Mountain and Mountain Park. These two areas are of great significance to the people of Bulahdelah and have long standing benefits from tourist perspectives. (43)

The adoption of Route E for the bypass is considered to have an impact on Mountain Park, and a likely reduction in tourism as a result. (44)

The respondent would like to see an improvement to the picnic area on the western bank of the river; such as toilets and picnic shelters which are a necessity to attract travellers. (45)

The respondent wishes to commend the RTA for the placing of the 15km, 10km, and 5km signs south of Bulahdelah as requested. The respondent has not noticed them up north and request that this be rectified. The respondent also requests that the addition of a distinctive entrance for Bulahdelah be high on the agenda. (45)

Social

Respondent feels that the placement of the highway between Bulahdelah township and Bulahdelah (Alum) Mountain would be a disaster and that separating the town from the mountain, and placing the highway in the proximity proposed to the primary and secondary school shows a poverty of vision and a lack of community concern. (1)

The respondent feels that too little note has been made of the closeness of the nearest residences, with 60 metres an insufficient distance having regard to the projected increase in road traffic in the coming years. (5)

The respondent objects to the loss of a significant portion of Mountain Park. (5)

The respondent feels Option E would have impacts on the life-style of the citizens of Bulahdelah. (7)

The respondent states that there should be one paramount criteria for State Highways - no highways close to schools if there is any other possible alternative. (9)

The present highway is much to close to the Bulahdelah Central School, it is located just below the school. However the Option E Bulahdelah Highway Upgrade would place a State Highway just above the school. How can this state of affairs be an improvement? (9)

The respondent states that they object to the proposal, as they believe the construction phase for the highway upgrade would be three or four years, and this would be three or four years of disturbance for the school and the children who attend same, particularly as the school would no longer be able to use Mountain Park for all the usual school activities that take place there. (9)

The respondent states that the Alum Mountain Park is known far and wide as an area rich in native orchids and is very accessible for visiting groups. There are in fact at least six species of native orchids growing in the picnic and carpark areas. The respondent knows of no other public park that could make this claim. There are very rare orchids in this park, but the true beauty of the Alum Mountain Park's flora lies in the sheer numbers of more common native orchids. The respondent cannot understand why the RTA would decide to build a highway through the Alum Mountain Forest Park, apparently the RTA has no regard for environmental values. For these reasons, the respondent strongly objects to the Bulahdelah Highway Upgrade proposal - Option E. (9)

The respondent states that the upgrade does not achieve the aim of environmentally sustainable outcomes, because the Mountain Park is in constant use by citizens of the town as an area for walking and recreation, it is used by the local school as a cross-country course and open air classroom, and it is used constantly by weary travelers so they can rest and eat away from the noisy highway. (9)

The respondent feels that Option E would cause permanent damage to the Alum Mountain Forest Park. This horrendous cultural heritage and environmental damage would occur for a highway with the potential life of 30 years. The respondent feels that the damage caused would be permanent and irreversible. The respondent asks that the RTA consider an option to the west of Bulahdelah or much further to the east of the Alum (Bulahdelah) Mountain. (10)

The respondent states that Alum Mountain park is where they walk their dog, as of course do several other people. Not only can they enjoy the park they can enjoy the breathing fresh air, situated above the town the air is fresh and clean. The park is also used as an open air classroom for botany and geology for the children of the Bulahdelah Central School, and is a great cross-country running area. What a loss it would be to the community if the proposed highway is built. (10)

The respondent states that the Bulahdelah Central School has always made use of the Alum Mountain Forest Park for education and fitness. It would be a tragedy if the area which would be eradicated by Option E were to be lost when Option A is not only available but is the safest route for road users. (13)

The respondent feels, after reading through the EIS, that the use of Option E would have a very disastrous effect on the community of Bulahdelah. (14)

The respondent feels, after reading through the EIS, that the use of Option E would have a very disastrous effect on the Alum Mountain. (14)

The respondent feels that the construction of Option E would greatly diminish the unique area of Mountain Park and Alum Mountain, popular because of its natural setting. (14)

The respondent states that there is a social connection in Bulahdelah with the mountain, and states that the road should not be built as it would sever this connection. The town along the river and the mountain are one landscape, both physically and socially. To sever this connection by a major 4 lane highway is not acceptable. (16)

The respondent states that most of Bulahdelah's natural and cultural heritage is on the Alum Mountain. To propose to construct a 4 lane highway bypass through the Mountain Park has little regard or recognition of this natural and cultural heritage, and to modify the actual footprint to help minimise these adverse impacts is largely academic, the road should not go there in the first place! (16)

The respondent states that Mountain Park, established in consultation with the community, with recreational features and walking trails was never envisaged to have a highway running through it. A time capsule was buried there at the time of celebrations in 1988, when facilities were upgraded with Federal and State funds. The facilities are used by many people, travelers, locals and schools for history and nature studies. These facilities would cease to exist with Option E, yet were given to the people of Bulahdelah to be preserved for posterity. (16)

Nearly all in attendance at the Back to Bulahdelah Reunion opening ceremony held in Alum Mountain Park were deeply concerned and some, outraged when they were told and shown where Option E was planned to be constructed. (16)

The respondent states that the section of river which is used by boaters would also be affected by Option E. (19)

The respondent states that at a meeting which was addressed by the Great Lakes Council staff the Director of Planning remarked that Option E conflicted with Councils best development plans for Bulahdelah. (20)

The respondent states that Alum Mountain is developing as a tourist attraction and walk area. (20)

The respondent states that to all Alum Mountain is a thing of beauty, and it should not be interfered with any further. (20)

The respondent states that Alum Mountain is a most scenic landmark and beautiful backdrop to the town. (20)

The respondent states that Alum Mountain is a unique geological formation, the only one of its kind. (20)

Bulahdelah Mountain is an important part of the landscape and visual environment and should not be compromised. (24)

The respondent states that the overall integrity of Alum Mountain as a cultural heritage site would be lost should even part of it be altered by a freeway. The respondent states that the Option E is environmental and social vandalism. (29)

The respondent states that health does not rate a mention in the listing of the values which are important to the communities (Section 3.2.2 of the Main Volume). (31)

The respondent states that the distraction to students of the two schools close to the proposed highway during construction should be considered. (31)

The respondent states that the distraction to students of the two schools close to the proposed highway during operation should be considered. (31)

The respondent states that the lack of direct access to the mountain for recreational activities should be considered. (31)

The respondent states that most of Bulahdelah's natural and cultural heritage is on the Alum Mountain. Early newspaper and mine records clearly support this as well as the recent Great Lakes Heritage Study. To propose to construct a 4 lane highway bypass through the Mountain Park has little regard or recognition of this natural and cultural heritage, and to modify the actual footprint to help minimise these adverse impacts is largely academic, the road should not go there in the first place! (32)

The respondent states that Mountain Park, established in consultation with the community, with recreational features and walking trails. The respondent was involved as District Forester Bulahdelah for some 12 years, and states that a redesign with the Department of Primary Industries is envisaged. A time capsule was buried there at the time of celebrations in 1988, when facilities were upgraded with Federal and State funds. The facilities are used by many people, travellers, locals and schools for history and nature studies. The respondent believes that the closeness of the highway to any revamped facilities would seriously detract from the bush experience and fail to attract future travellers plus deter locals due to the level of traffic. (32)

The respondent states that Bulahdelah along the river and the (Bulahdelah) Mountain are one landscape, both physically and socially. To sever this landscape connection by a major 4 lane highway is not acceptable as it erodes; this local community's right to explore; the safety to do so even as a child, and the spiritual relationship people had, have and would have into the future, with the mountain. The road should not be built in order to maintain this social connection with the Mountain. (32)

The Proposal, it goes ahead, would be to the detriment of intergenerational equity and could probably be challenged. (34)

The impact upon "a small number of residences" does not allow for increased subdivision activity following the expected commercial boom for the town secured by the attractive entrances north and south of the town and projected increased traffic drawn northwards by decreased travelling time. It still remains a nebulous argument as to how reducing town traffic by 90% would guarantee the commercial survival of the town. (34)

The respondent states that Option E would create a void where, currently, there is both park and bush amenity, and it would not be possible to ameliorate this obliteration. (37)

The respondent states that the RTA plans to obliterate a large part of and mutilate and pollute the remainder of a respite area which has long been utilised by both residents and travellers, despite having an alternative route to the west of the township - Option A. (37)

The respondent states that due to the fact of Option E being located immediately adjacent to the eastern perimeter of the residential area and the eradication of established amenities which would be inevitable with this route's extremely narrow corridor, it would not improve the quality of the local environment for the community. (37)

The respondent states that the overall integrity of Alum Mountain as a cultural heritage site would be lost should even part of it be altered by a freeway. The respondent states that the Option E is environmental and social vandalism. (41)

The adoption of Route E for the bypass is considered to have an impact on Mountain Park, in terms of a loss of the recreation site, the creation of a barrier between the Mountain Park and the Bulahdelah Township, and the impact of increased noise, vibration and air pollution on the remaining recreation amenities of the Mountain Park. (44)

The respondent would like to see that there is a specification that money allocated for improvements in Bulahdelah be strictly adhered to by the council. (45)

Construction
General
Respondent would like to know if there is a proposed date for the start of work on the Proposal. (2)

The DPI (NSW Fisheries) suggests that when discussing the footprint of the project, associated ancillaries such as access tracks (including haul roads and temporary waterway crossings) and temporary occupation areas, should be included in the concept design because past experience has shown that they can have an additional impact on the environment, yet this is not generally assessed in the EIS. (26)

The DEC state that it is critical that facilities such as concrete batching plants, chemical storage facilities and site compounds are located in areas away from watercourses and that will have minimal impact on the environment including flora, fauna and cultural heritage sites. (30)

Consultation
General
The respondent asks that any further documentation that requires a response would not be put on exhibition during the peak holiday period. (24)

The respondent feels that the decision by the RTA to put the EIS out for comment during the peak holiday period reflects poorly on the RTA and can only be perceived as a move to limit the number of submissions. (24)

The respondent is concerned about the composition of committees, citing the example of Oxley Highway where according to the respondent the farming community have been protected ahead of the environment. The respondent states that probably the lack of conservationists on committees, if that is the case, is simply due to apathy until something happens. The respondent encourages the RTA to look at committee composition in each area to see if additional invitations should be issued. (34)

The respondent states that they would like to engage in further consultation in regard to Section 3.2.3 of Technical Paper 13, specifically the opportunity for Great Lakes Council to define the township of Bulahdelah as a highway service town in their Local Environmental Plan. The respondent has participated actively in the preparation of the Great Lakes Highway Service Centre Strategy (Ove Arup 2004), and largely endorses the recommendations of the strategy. (39)

During EIS preparation
The respondent feels that the consultation process described in the EIS is not exactly as they remember it. They feel that the EIS places very little emphasis on the exit survey, when they were actually told by a staff member of Parsons Brinkerhoff at the Community Information Night on 2nd November 2000, that the exist survey would form the first stage of a three stage process, prior to the Value Management Workshop, and submissions from the general public. The respondent feels that instead the EIS nominates the Focus Group as playing a more important part in the choice of Option E as being the option put forward for further discussion and refinement. (7)

Respondent feels that although the RTA consultative group did hold meetings with local community groups before the Preferred Route was chosen, at no time was any meeting held with the Bulahdelah and District Historical Society. (7)

It has been stated in various volumes of the EIS that the Bulahdelah & Districts Historical Society Inc. were consulted throughout the Pacific Highway Upgrade - Bulahdelah process. This statement is incorrect, at no time did the RTA or PB (formerly PPK) meet with the Bulahdelah & District Historical Society Inc., only Mr Carrall as a concerned resident and neighbour. (16)

The respondent finds the manner in which the RTA conducted consultation convoluted. The respondent feels that the RTA ignored and impeded input from community members. (19)

The respondent states that there seems to be a need to establish positively with evidence the extent of local citizen agreement with Option E as a preferred route. (20)

The respondent states that they do not believe that the RTA is getting true public participation on this issue from the local citizens. People are reluctant to express their view publicly but would have no problem with a ballot. The respondent states that the RTA expertise should know how to get a representative result, and as the man at the General Meeting (at the local School of Arts) said "You had better get it right". (20)

The respondent wishes to congratulate the RTA on a well conducted appraisal meeting at Bulahdelah in March 2000. The respondent states that a broad spectrum of aspects surrounding the Pacific Highway upgrade through Bulahdelah were covered as well as might be expected. (20)

The respondent wishes to express concern with the process of public consultation to date and believes that it has not been carried out in the spirit of what public consultation is intended to be and perceived to be by the community. The respondent believes the voice of the community has not been adequately heard and not factored into the decision making which led to the choice of Option E. (24)

The respondent states that they attended the site inspection on 31 August 2002. All attempts of opponents to Option E to voice their concerns were contemptuously. (31)

The respondent states that they attended the meeting on 12 December 2001. No mention is made in the report of the enormous dissension at that meeting. The majority of the citizens of Bulahdelah who were present did not want Option E. The respondent wishes to question the composition of the members of the community focus group. (31)

The respondent states that submissions could not be made via telephone. Despite having provided a toll free telephone number, the RTA failed to give the community the opportunity to make submissions by telephone (Newsletter 2 (July 2000) "Submissions must be received by Monday 21 August 2000 - in writing or by email"). (37)

The respondent states that the RTA and PB's "consultation" was pseudo-consultation. During this process that RTA and PB not only failed to "create stakeholder and community awareness of the proposal", they barred non-members of the CFG from entering CFG meetings and deliberately withheld vital route safety information from the community. (37)

The respondent states that public meetings held by the RTA and PB did not involve consultation with attendees; they were held to present members of the public with the results of secretively conducted meetings. The RTA and Parsons Brinckerhoff "notes" of CFG meetings available for perusal at a limited number of locations was not consultation. As was the case with Public Meetings, this was merely presentation of secretively made decisions. (37)

The respondent states that Community Focus Group (CFG) meetings were conducted "in capite". At CFG meeting 6 (18 October 2001) two community members who were not, at that stage members of the CFG were barred from entering the said meeting. According to CFG members, at a CFG meeting which was held approximately mid 2004, the Mayor of Great Lakes Council was prevented from entering the room where the meeting was to be. (37)

The respondent states that the fact that Option E reached the EIS stage, together with even solely the "Justification and Conclusion" regarding the same displays the fact that the RTA and Parsons Brinckerhoff failed to "incorporate stakeholder and community issues into each phase of investigation, from the development of preliminary route options to the environmental impact process on a preferred route." (37)

The respondent states that all community members, with the exception of Community Focus Group (CFG) members, were barred from entering CFG meetings. This is evidenced in the notes (which the respondent states are inaccurately described as "minutes") of CFG meeting 6 ("should new members be allowed to join the CFG? Page3): "… Following the establishment of membership rules, other people who have tried to attend occasional meetings have been turned away from the CFG…" (37)

The respondent states that the RTA deliberately withheld geotechnical information from the community during the pseudo-consultation process. The respondent cites a letter dated 18 June 2002, written by Dave Young (former Project Manager of Bulahdelah Upgrade from Parsons Brinckerhoff (PB)): (37)

"We were made aware earlier that some geotechnical information had been given to the community. This is unfortunate as we would have preferred that this information was checked by our geotechnical staff before its release. This information will be officially released as part of the EIS. The matter is being investigated by the RTA and PPK (PB)." (37)

The respondent states that the geotechnical information referred to in the above, was "Geotechnical Issues for Community Information" - documentation which clearly displays the fact that Option E is an unsafe route and also clarifies the fact that geotechnically, Option A is the best route. This information was not made available to the general public by either the RTA or PB; and the RTA and PB did not want the community to be aware of the facts presented in the said document. The respondent feels that the title provides the RTA with documentation which falsely indicates that the community was presented with this information. (37)

The respondent states that the Alum Mountain, Bulahdelah: Is the only known outcrop of alum stone in mountain form; has a mining history which is of Australian and potentially world significance; Is home to one of only two known species of underground orchid (*Rhizanthella slateri*); is the location where the species *Rhizanthella slateri* (formerly *Cryptanthemis slateri* - "hidden flower") was first discovered; has over 80 species of native orchids growing on its lower slopes; is of cultural heritage value - both non-indigenous and indigenous; has long been valued as a stopover point for travellers; and is a valuable tourism asset with over 7000 visitors every years far back as the early 1980s. The respondent states that for the RTA and PB to continue to pursue this route after being informed of the above by community members alone displays that they failed to "understand stakeholder and community issues, values and concerns related to the project." (37)

The respondent states that during the consultation period, the RTA together with Parsons Brinckerhoff did their utmost to withhold facts related to this upgrade from the public. The respondent states that the first Newsletter distributed to the public was Newsletter 1, March 2000. At that time the RTA had drawn up a "spaghetti" of route options, yet none of these was presented on the said newsletter. It was not until late July 2000, that the community received notification of the proposed route "Option E" via newsletter. By that time the Community Focus Group had been formed, with its first meeting having been conducted on 10 April 2000. (37)

In the notes of the Community Focus Group (CFG) Meeting 1 it is stated "Everyone in Bulahdelah has been given an opportunity to join the CFG". The respondent states this is not the case, as CFG meeting were held at night. The respondent feels that this rendered joining the CFG impossible for female parents of young children and was discriminatory. (37)

The respondent states that prior to the commencement of the consultation process most members of the community were aware of at least one aspect of the Alum Mountain's many heritage values. The Community Focus Group (CFG) was formed prior to the RTA's informing the community via newsletter that a route at the base of the Alum Mountain was under consideration. Because of this, many members of the community were denied the opportunity to join the CFG due to omission on the part of the RTA. (37)

Environmental Impact Assessment Content
Assessment Methodology and Documentation

The numbers of *Corybas dowlingii* (*syn. Corybas sp. aff. Aconitiflorus*) in situ on Bulahdelah (Alum) Mountain have been reduced due to the destruction during seismic testing. (5)

In the Summary for Bulahdelah Upgrading the Pacific Highway there is practically no mention of the detrimental effect of toxic highway fumes, this subject seems to be completely ignored in this book. (9)

The respondent states that there is an error in the Summary of the Proposal (page S.32). The Summary states "Bulahdelah Primary School", the title should be "Bulahdelah Central School" as it is a combined primary and high school which enrolls children from four years and nine months to young adults aged 19. (9)

The respondent quotes page 149 of Volume 7 of the EIS, "Beryl's sister Joyce is pictured sitting on a wicker chair in the foreground". The respondent states that Joyce is their cousin, not their sister. (14)

The respondent states that the whole area from the Scott Street boundary to the top peak and continuing over the eastern side of the Mountain is of historical significance, yet RTA, in their publications and maps, do not acknowledge that Scott Street exists. The Scott Street boundary is a very important key to the workings of the Alum Mountain. It is also a known habitat for rare and threatened orchid species. (16)

The respondent states that during the research and testing by the RTA and PB (formerly PPK) there was an apparent lack of regard and a level of disturbance that cause great concern for the respondent. Many of the tiny Helmet Orchids were literally blown out of the ground, saplings and tress were just cut off leaving tiny stumps above the ground level for people to trip over, marking pegs and rubbish could be seen just dumped where it was placed. The respondent asks what guarantee there would be that the same type of disregard and abuse would not be repeated during construction, possibly on a grand scale? (16)

The respondent finds the EIS convoluted. The RTA has glossed over important issues with a pseudo-considerate EIS presentation which, with its many duplicates of photographs, is reminiscent of the trivial, "tarted-up", projects schooled children are forced to endure. On CD, addition of irrelevant photographs is time-wasting and frustrating - but perhaps that was the RTA's goal. The respondent feels that having content links that will not link is equally frustrating - and, perhaps, equally deliberate. (19)

The DPI (NSW Fisheries) states that in the EIS Australian Bass is listed as a "commercial species" however, Bass have been protected from commercial fishing for many years. The EIS should reflect that this species is commercially protected. (26)

The DPI (NSW Fisheries) states that Figure 3.5, page 3.12 of the Main Volume showing the Acid Sulphate Soil risk areas indicates a high risk area at a depth between 1 and 3 metres on the floodplain, south of the Myall River, however, the Key Biophysical Constraints map in Figure 3.6, page 3.13 of the Main Volume does not show the same high risk area which is located within the proposed road alignment. (26)

The DEC refers to Table K.1 - stating that extensive locality information is presented within this table. Please ensure that all this data/information is forwarded (in the correct format) to DEC. The DEC understands that this information has been updated and this information should be incorporated into supplementary information compiled. (30)

Table 2.3 of Technical Paper 7 notes that the total survey effort is indicated as 111 person days. This figure should be 113 person days (when correctly added up). The DEC understands that this figure may be greater, particularly with additional orchid surveys. (30)

The DEC note that an aerial photograph and topographic map (as per the requirements of the Director General for the SIS) have not been included in Technical Paper 7, even though Appendix A indicates they are included. (30)

There is a contradiction between Figure J17 and the statement made is Section J2.17 (Appendix J to Technical Paper7). This Section indicates that the study area probably does not represent potential habitat for the Barking Owl, however Figure J17 indicates that most of the study area is potential habitat. This needs clarification. (30)

Figure J25 of Appendix J (Technical Paper 7) does not include the historic record for this species even though one exists in the southern part of the study area. (30)

It is noted by the DEC that the Black-chinned Honeyeater was recorded in the study area, however Table 7.4 does not indicate this. (30)

The respondent states that individual plants of six of the Nationally and State significant species would be directly or indirectly impacted during construction of the proposal. In addition, individuals of 10 of the of the species of regional significance would need to be removed. The respondent feels that the above would be more appropriate in the Summary Document, page S.36 "S.9 Justification and Conclusion". (37)

The respondent states that the fact that road user delay costs during construction of Option E (estimated as being $650000) compared with $348000 for Option A should be mentioned in the Summary Document, page S.36 "S.9 Justification and Conclusion". (37)

The respondent states that community members understand that the RTA and Parson Brinckerhoff would utilise any means to reach the goal of Option E, including (but not limited to) omitting Scott Street, the street which of all streets in the Alum Mountain Park area, is nearest to the proposed route, from their maps. (37)

The respondent states that insufficient consideration was given to the principles of ecologically sustainable development during route selection, during design development and the environmental assessment phases of the development of the proposal. The respondent states that due to the quantity of impediments contained within the said narrow corridor all attempts to avoid or mitigate impacts of the route have encountered further impediments. (37)

Environmental Management

EMP issues

The DEC requires all fuels and chemicals to be stored in appropriately bunded areas to prevent soil, water and groundwater contamination. It should also be ensured that incompatible chemicals are segregated. Bunded areas must be contracted in accordance with the EPA's Technical Bulletin "Bunding and Spill Management, November 1997", or to the satisfaction of the DEC. (30)

The DEC notes that a Flora and Fauna Management Plan would be prepared as part of the Construction Environmental Management Plan and Operational Environmental Management Plan, however some of the measures proposed would need to be implemented a lot earlier than when a construction contract is awarded (I.e. orchids, translocation trials, arboreal crossings, rehabilitation). (30)

The DEC recommends that an Emergency Management Plan should be established to deal with chemical spills and should address as a minimum: Appropriate emergency response training; stocking, maintenance and use of spill kits; storage and disposal of contaminated material; and emergency telephone numbers. (30)

Forests NSW request provision of a fire management plan for implementation during the construction phase of the bypass through Bulahdelah State Forest. This must include provision for access by fire control vehicles and staff to Alum Mountain. (44)

General

The DEC is concerned that the use of "unsuitable material" as topsoil may reduce the revegetation/rehabilitation works. Care needs to be undertaken to ensure that any material proposed to be used as topsoil is "suitable". (30)

The DEC note that Table 5.1 of Technical Paper 5 lists a number of monitoring framework, and comment that it is important to ensure that these are consistent with any comments made in other volumes and documents. (30)

The DEC state that the summary of Environmental Management Measures provided in Table F.1 of the Main Volume should be consistent with relevant sections of the other volumes and documents. (30)

The DEC recommend that landscaping activities should not adversely impact on the environment through discharges of sediment into waterways or the generation of particulates in the air. The RTA should ensure that appropriate erosion and sediment controls would be maintained until any steep batter slopes are fully stabilised. (30)

The DEC notes that a variety of mitigation measures have been proposed to minimise impacts on flora and fauna, the RTA need to ensure that these measures proposed (or any subsequent measures) can be implemented into the construction of the project. Problems in the past have arisen where some mitigation measures have not been able to be implemented, sue to constructability. This has been of great concern to the DEC in the past. (30)

The DEC comment that in Section 4, the RTA should be aware that impacts which cannot be minimised must also be mitigated, not just those impacts which cannot be. (30)

The respondent states that despite extensive measures incorporated into the concept design of the proposal, adverse impacts have not been reduced. (37)

The adoption of Route E for the bypass is considered to have an impact on Forest Management, specifically pest and weed management during the construction phase and within 6 to 12 months after completion. (44)

Forests NSW request provision of fire breaks along the edge of the bypass once completed. This includes ensuring that existing fire trails are not dead ends which is a safety risk for fire control, suppression and fuel management activities. (44)

Forests NSW request provision of a pest and weed control plan to be implemented during the construction stage and for 12 months after construction is completed. This plan should include measures to reduce the potential of new populations of pest and weed species establishing within adjacent areas of native forest. An annual reporting process should also be included. (44)

Forests NSW request that there is appropriate disposal of excess building materials and unused fill off site, and that appropriate sediment controls are implemented during the construction process. (44)

Heritage

General

The respondent asks how anyone can justify the impact on ten historic sites or features (as stated on Page 120 of Volume 7) all in one small area. (12)

The respondent is concerned with the destruction and loss of Heritage and proposed Heritage items associated with the use of Option E. (14)

The Alum Mountain, Bulahdelah is the most significant heritage valuable area within the township of Bulahdelah. It contains a collection or grouping of Aboriginal, European and Natural heritage items that are unique to here and virtually anywhere. This is recognised in the recent Great Lakes Heritage Study. The construction of Option E through this area would be irresponsible and destructive to these rich heritage values. (16)

The respondent states that the Alum Mountain is the most significant Heritage valuable area within the township of Bulahdelah. It contains a collection or grouping of Aboriginal, European, and Natural heritage items that are unique to here and virtually anywhere. This is recognised in the recent Great Lakes Heritage Study. The construction of Option E through this area would be irresponsible and destructive to these rich heritage values. (32)

The respondent states that every effort must be made to ensure that minimum disturbance takes place in the areas of Bulahdelah Mountain and Mountain Park. These two areas are of great significance to the people of Bulahdelah and have long standing benefits from heritage perspectives. (43)

The respondent requests being kept informed of any progress made on initiatives for its future management during and after the intended highway upgrading. (47)

The EIS refers to the need for an integrated and coordinated approach from government agencies including the Roads and Traffic Authority and the Department of Primary Industries. The respondent strongly supports this approach. (47)

The EIS is considered to have provided an adequate assessment of the heritage impacts of the work in Section 7.3 of the EIS. (47)

Indigenous heritage

The respondent states that in the Navin Officer report "Investigation into reported Aboriginal graves at the base of the Bulahdelah Mountain (Alum Mountain), NSW" there is a letter from Steve Brereton, outlining the sacred nature of the Alum Mountain as the Indigenous tribes laid to rest in platform burial the most influential men in their culture. The respondent believes that there are two facts from Steve Brereton's letter that need to be recognised. The first fact is that the letter is dated November 2000, at that time Option E was only one of five options being considered. The second fact is that Steve Brereton states in his letter that "For the past 10 years I have been spending time with Aboriginal Elders from different areas. Learning Traditional ways and beliefs of our ancestors." (10)

The issue of Aboriginal cultural significance of the Bulahdelah Mountain is very complicated. The mountain was originally Worimi land, but with the formation of Aboriginal Land Councils the Bulahdelah Mountain came under the control of the Karuah Aboriginal Land Council. During the consultation period for the Highway Upgrade, Forster Aboriginal Land Council expressed their opposition to the Option E Highway Upgrade. Many Worimi Elders regard the Bulahdelah Mountain as being of immense spiritual and cultural importance. The respondent quotes from the EIS Summary Book (page S29) that "Aboriginal cultural heritage significance can only be determined by the Aboriginal communities and is dependent on written submissions by the Karuah Local Aboriginal Land Council". (10)

The respondent finds quite derogatory the manner in which the EIS Summary Book treats Indigenous Heritage. (10)

The respondent states that the Karuah Land Council has a pecuniary interest in the approval of the Bulahdelah Highway Upgrade, this indicates that this possibly explains why Karuah Land Council has shown so little interest in the Aboriginal Heritage of the Alum Mountain. (10)

The respondent believes that there is a contradiction between the attitude towards Indigenous Heritage displayed in the EIS Summary Book, and that of Volume 7, Appendix 2 Page 154, which states "the fact that two apparently independent and credible sources relate the same account, provides a strong basis for treating seriously the possibility that Aboriginal burials occurred on the mountain." (10)

The respondent states that the "Guardian Tree"(described on page 31 of Volume 7) is of strong Aboriginal Significance, and importance to the culture of the Worimi and Biripi Elders. Signatures (attached in the representation) from Worimi and Biripi Elders confirm this belief. (12)

The respondent states that the Karuah Local Aboriginal Land Council have a pecuniary interest in the Option E Project. Great concern for the Aboriginal sites on the Bulahdelah (Alum) Mountain has been shown by the Forster Local Aboriginal Land Council members, which include the "Healing Stream" and "Guardian Tree" sites. (12)

The respondent states that the information presented (on Page 37 of Volume 7) in relation to the "healing stream" is incorrect. The EIS describes how the streamline has been previously impacted by changes in hydrology due to the construction of two upstream dams, however the respondent states that only one of the dams was man made (the top dam as it is called today) by the respondent's father Mr Leslie Robert Carrall in the late 1940's. The respondent states that the other dam is natural. The respondent feels therefore that this dam cannot have changed the hydrology of the "healing stream". (12)

The study commissioned by the National Parks and Wildlife Service recommended the listing of Alum Mountain as an Aboriginal place from the Scott Street boundary to the top of the Alum Mountain continuing over the other side. The respondent states that the Alum Mountain is a very special area, with significance in Aboriginal history as a striking landscape feature, with deep spiritual values. This has led to some divisions between the Forster and Karuah elements of the Worimi People. The respondent feels that some of the sites located in the footprint of the Option E have been trivialised by playing the two Aboriginal factions against each other. It does not matter where the artificial Local Aboriginal Land Council boundaries are drawn; it is what the Worimi people as a whole nation think! The respondent request that the RTA not underestimate the significance of the Bulahdelah Mountain (including the proposed route) to them and the need to keep the landscape as one, not severed from the river landscape. (16)

The proposed management recommendations for Aboriginal objects (Table 7.8 of the Main Volume and Section 6.3 of Technical Paper 16) are supported, noting that further consultation would be required between the RTA, the DEC and Aboriginal stakeholders on some aspects. It is anticipated that this consultation would be undertaken in advance of the lodgement of the necessary permit applications in accordance with sections 87 and 90 of the National Parks and Wildlife Act 1974. As part of this consultation the DEC has an interest in continuing discussions on the feasibility of the proposed Aboriginal Place nomination for lands described as Alum Mountain (as detailed in Section 4.2 of Technical Paper 16). (30)

The respondent states that the destruction of Aboriginal sites should be considered. (31)

The respondent states that the National Parks and Wildlife Service have recommended the listing Bulahdelah Mountain (including the footprint of Option E) as an Aboriginal Place of significance. The respondent states that the Alum Mountain is a very special area, with significance in Aboriginal history as a striking landscape feature, with deep spiritual values. This has led to some divisions between the Forster and Karuah elements of the Worimi People. The respondent feels that some of the sites located in the footprint of the Option E have been trivialised by playing the two Aboriginal factions against each other. It does not matter where the artificial Local Aboriginal Land Council boundaries are drawn; it is what the Worimi people as a whole nation think! The respondent request that the RTA not underestimate the significance of the Bulahdelah Mountain (including the proposed route) to them and the need to keep the landscape as one, not severed from the river landscape. (32)

The Aboriginal cultural status has not even been clarified by the RTA so the Option E is pre-emptive. (34)

Non-indigenous heritage

The respondent feels Option E would have a impacts on significant heritage sites. (7)

Respondent feels that if Option E goes ahead a National Heritage Site (stated as such in the EIS) would be fragmented and destroyed. (7)

The respondent states that the proposed highway route would devastate our most significant local history. The Alum Mountain (the only above ground outcrop of Alunite in the world) has provided the town of Bulahdelah with the remnant of the only Alunite Processing Plant in existence. (10)

The respondent states that the sandstock brick platform has been listed in the Great Lakes Draft Heritage Study. This study has been approved by the Great Lakes Council, and is now on public exhibition for comment. (10)

The respondent wishes to highlight the fact that the EIS in Technical Paper 16 (page 109) states that the Alunite Mine Site Complex has national heritage significance. The respondent would like to take issue with the statement on the last page of the EIS summary (Page S.37) "the proposal would cut through the historic Alunite Mine Precinct. The integrity of this site would be altered". The respondent states that the integrity of the site would not be altered, it would be completely annihilated. As it is now the Bulahdelah (Alum Mountain) Alunite site complex has perfect cohesion and is quite complete. If it is fragmented by the Option E Highway upgrade and further disrupted by the powerline easement sited above the highway, this fully documented Alunite Mine Complex would be completely disconnected, have no cohesion and would make no sense whatever. The respondent states that what is important is that traces are still evident of the mining sequence that developed, from quarrying on the high slopes, tramline transport delivered the alunite to the processing plant. Thence sorting and stock-piling and tramline transport to the Myall River for shipment. (10)

The respondent quotes a section of the EIS (Page 120 Volume 7) which states "The reported location of Ada King's private burial ground falls outside of the extent of construction for the proposed Upgrade and would not be impacted". However the respondent states that the private burial ground would be greatly impacted by the construction of Option E. Ada King is the respondent's great grandmother, and they feel that with the re-designing of the Alum Mountain Park that is planned, the burial site would be greatly disturbed. (12)

The respondent feels that the use of the word "only" in the description of the heritage significance of Bulahdelah Alunite Mine Site Complex (Page 109, Volume 7) clearly shows the uniqueness of the Alum Mountain. The respondent states that no highway should be constructed through an area of this significance. (12)

The respondent is concerned that the use of Option E would upgrade the Alum Mountain park area, which was once the site of the Mine Manager's Residence and Processing Plant. (14)

The respondent feels that the Alunite Mine Precinct contain artefacts that have not necessarily been found or known about. To locate artefacts during road constructions is a bit too late. This is the only Alunite mining works in Australia and is best left alone for future generations to explore and understand this industry that was so unique and important to Bulahdelah and even Australia. (16)

The respondent has been involved in erecting crosses at various locations on Alum Mountain as a memorial to lives lost. The entire mountain should be treated as an area of significance and a memorial to the men and children who lost their lives during early mining operations. (16)

The respondent feels that the man made clay brick loading wall located within the path of Option E will be affected, contrary to what is stated in the EIS. The respondent feels that this relic is non-relocatable, and any notion that it would be moved could not be justified, as there is no detail pertaining to where it would go, or how it would be. (16)

The respondent states that if stabilisation measures were required for the top of Alum Mountain (as described in Geotechnical Issues for Community Information, commissioned by the RTA) then it would lead to the defacing of an identified Heritage Item, as the upper half of Bulahdelah Mountain is already under a Heritage order for its unique geological features. (16)

The respondent states that they informed the RTA of the existence of Rachel Hemming's Bulahdelah Home, however the RTA showed little concern at the time. The respondent believes this important site will still be in great danger if Option E is adopted. The site is one of the earliest house sites in Bulahdelah and its significance is compounded by the presence of Rachel Hemming, whose letters are recognised nationwide as an important record of early pioneer Australia, as seen through the eyes of an educated women. The respondent believes this site would be significantly compromised by the Option E construction, despite minor alterations to the route. (16)

The respondent state that the recent discover of an in ground clay brick crucible represents the only surviving relic of the processing of Alunite on the Alum Mountain. The respondent feels that given the proximity of this relic to Option E footprint, it would be likely to be impacted by construction access and drainage. As the layout of the site is not well known, the respondent feels that such an item is better left alone, and to exposed to the unnecessary destruction of a highway passing through its centre. (16)

The respondent states that the proposed Mountain Access road over the highway, would run through an area that holds a very valuable part of the history and heritage of the mining activities on the Alum Mountain. The respondent feels that the RTA is blind to the significance of this area. This significance of this area is presented in the Great Lakes Council Heritage Report. (18)

The respondent states that some of the vital key survey maps from the mining operations of the Alum Mountain, showing the extent of the site seem to not have been included in the Navin Officer documentation. (18)

The EIS states that the E2H alignment was designed to minimise impacts on the alum mine site complex (identified as having State heritage significance). The respondent says that many more items of State heritage significance have been discovered within the alignment of the proposed upgrade since 2001. (18)

The respondent states that the entire Alum Mountain from the Scott Street boundary to the very top and over the other side should be included on the Australian Heritage Database, as reported recently in reports from both Umwelt and the Great Lakes Shire Council Heritage Study. Option e would greatly affect the Heritage values of this area, creating a divide from the park and the mountain area. The RTA seem not to want to acknowledge that the Alum Mountain is already a well established recreational area with a very high heritage value. Why destroy the heritage values of the Alum Mountain for a highway that will be built to last for maybe 20 years? (18)

The respondent states that the destruction of historical sites should be considered. (31)

The respondent states that the recent discovery of an in ground clay brick crucible represents the only surviving relic of the processing of Alunite on the Alum Mountain. The respondent feels that given the proximity of this relic to Option E footprint, it would be likely to be impacted by construction access and drainage. Such an item and its surrounds would need protection. As the layout of the Mining Precinct is not well known, the respondent feels that such an item is better left alone, and not exposed to the unnecessary destruction of a highway passing through its centre. (32)

The respondent states that the safeguards proposed for Rachel Henning's Bulahdelah home, including the temporary no-go fenced off area, and the area requiring conservation management, are essential and must be adopted. The site is one of the earliest house sites in Bulahdelah and its significance is compounded by the presence of Rachel Hemming, whose letters are recognised nationwide as an important record of early pioneer Australia, as seen through the eyes of an educated women. The respondent believes this site would be significantly compromised by the Option E construction, despite minor adjustments to the planned route. (32)

The respondent states that the Alunite Mine Precinct is accepted as an archaeological site so important not to be massively disturbed as not all artefacts have necessarily been found or are known. The respondent states that this is the only Alunite mining works in Australia and is best left alone for future generations to explore and understand this industry that was so unique and important to Bulahdelah and even Australia. (32)

The respondent has major concerns that the man made clay brick loading wall situated within the path of Option E would be affected, due to its close proximity to the road construction - a matter of metres, both during construction as well as later in general maintenance processes. The respondent believes the clay brick loading wall is a non-relocatable relic and interfering with this structure cannot be justified. (32)

The respondent feels that reference should be made in the Summary Document, page S.36 "S.9 Justification and Conclusion" to the fact that the Bulahdelah alunite mine site complex is assessed as having high local and state significance, with some aspects of the mine having national significance. The respondent states that as there would be nothing left of the lower part of the mine site complex which contains the remnant processing plant and the non-relocatable relic, the loading dock (located approximately in the median strip of the proposal); and the non-relocatable relic, the clay brick crucible (impacted by the pedestrian and vehicle connection to the mountain, no management plan would be necessary. (37)

The respondent states that the RTA plans to eradicate a large part of a mining history and heritage which is unique in, at least, the Australian context, despite having an alternative route to the west of the township - Option A. (37)

The EIS also refers to the requirements for Permits under Section 140 in relation to the following sites: BH3, BH8 and BH12. This information contradicts the advice that item BH3 the remnant fence, lies adjacent to the area of construction and that detailed design would be undertaken to avoid any impact. If the fence is affected by the works it may be more appropriate for the fence to be included within the proposed Exception application that within a S140 permit application. (47)

It is noted that of the 15 historic heritage items (including 'relics') identified by the sub-consultants Navin Officer Pty Ltd, that: 3 would not be impacted (BH1 remnant post and rail fence, BH5 European artefact scatter, BH9 quarry/borrow pit); 5 are less than 50 years old or considered to be of such low significance that no mitigation strategy is warranted (BH2 Refuse dump, BH11 sawmill site, BH13 fence, BH14 remains of farm bridge, BH15 remains of shed); 2 quarry or borrow pits are of low significance but would be recorded (BH6, BH10); two further sites are outside the area of proposed construction (BH3 rail and wire fence, BH4 site of Sommerville's Cottage). The sites to be impacted by the proposed works include part of a remnant section of the Old Pacific Highway (BH8); an abandoned item of moveable heritage (BH7) and the Alunite Mine Precinct (BH12). (47)

The respondent wishes to note the significance of the Alunite Mine Site, part of which would be impacted by the proposed highway upgrading works. (47)

The Alunite Mine Historic Precinct (Site BH12) is an item of high significance. The new road corridor would impact the mine site. It is appropriate that the EIS has noted that the requirements for a permit under Section 140 of the NSW Heritage Act, 1977 for an archaeological testing and salvage program. (47)

The management recommendations included within the EIS include reference to the 'relics' provisions of the Heritage Act and the need for applications under Section 139(4). The correct term for these applications is 'Exception'. The EIS has referred to the following sites/items as requiring an Exception under S139(4): BH2, BH6, BH10 and BH11. (47)

The respondent states that the statutory protection of the mine site through inclusion on the State Heritage Register may be appropriate in the future and strongly supports the preparation of a Plan of Management for the site as recommended in Section 7.3.1 of the EIS. A Plan of Management would be an extremely useful document to accompany any future Section 140 Application made to the Heritage Council. (47)

Planning Process and Justification
Disagree with Route Selection Process

Respondent is extremely disappointed that the RTA has persisted with its plans for the Option E Bypass, and wishes to object to the choice of Option E as the preferred route for the Proposal. (1)

The respondent agrees that Bulahdelah needs a bypass, but feels the bypass needs common sense, in the way S.9 of the Summary, Justification and Conclusion outlines. (5)

The respondent feels that the preferred option has been rejected by 88% of the Bulahdelah population. (5)

The respondent feels that the RTA has not seriously considered any option but Option E. (5)

The respondent feels that quoted shorter length of Option E is misleading. The respondent feels that although the route of Option E might be less in terms of distance, but in reality the difference in time needed to drive the length of Option E or Option A would prove to be negligible. (5)

Respondent feels that never before has Bulahdelah been faced with such a widespread threat to the good life that the citizens lead, as they have in the past four years, when the Option E Highway upgrade was first proposed. For that reason, the respondent totally opposes the preferred Highway route of Option E. (7)

The respondent states that the aims of the upgrade in relation to accessibility are not met because the accessibility of Option E is no better than any other option suggested. (9)

The respondent states that they have written many letters objecting to Option E since October 2000, all to no avail, Option E just keeps rolling on. (10)

The respondent wishes to advise their strong objections to the use of Option E, for the Pacific Highway Upgrade - Bulahdelah. (14)

Considering the number, extent and significance of the consequences outlined in S.9 of the summary document, the respondent feels that the RTA should seriously start considering Option A, which the respondent believes to have considerable less impact on Bulahdelah township and its immediate surrounds, as it is largely located on open plains west of the river and town. (16)

The respondent feels that Option E is not the right route as the composite of all the individual impacts studies in your EIS add up to an overwhelming significant and long term impact that can be avoided particularly as the project is really only still in the planning phase. (16)

The respondent feels that the route the RTA has followed totally lacks logic in every way. (19)

The respondent states that they wish to record their opposition to the re-routing of the highway other than to the west of town. (20)

The respondent does not believe that the Proposal fulfils any of the adopted proposal objectives for the Pacific Highway Upgrade, as stated in the Main Volume, Chapter 8.4, Page 8.10. (21)

The respondent states that in late 2002, 585 residents of the then 1000 people resident in Bulahdelah were surveyed as to their views on the Bulahdelah bypass. 86% of those surveyed did not want Option E. At the same time a year school student surveyed the population and found that 87% of them did not want Option E. (31)

The respondent states that "when the fog starts to cross the mountain, there's no shame in returning". It's never too late to change poor decisions. (31)

The respondent states that the project is still in the planning phase. (32)

The respondent believes that Option E is not the right route as the composite of all the individual impacts studied in the EIS add up to an overwhelming significant and long term impact. (32)

The respondent cites the conclusions put forward in S.9 of the Summary, and states that given the number, extent and significance of all of these consequences of building Option E the only conclusion that be drawn is that the impact is environmentally significant. If the RTA has to work so hard to justify its location then it would be better for everybody to scrap Option E. (32)

The respondent states that it would be wise to change the preferred route now given the complexity of the problems the EIS has identified as resulting from Option E. The projects should not accept Option E with all its impacts just because so much work has been done to date. The respondent states that Option A should be examined under the EIS process as soon as possible and be adopted as the preferred route in recognition that Option E is too environmentally sensitive and socially sensitive. The respondent also states that the RTA should recognise that after detailed design, Option E has moved dramatically away from the community's expectations to deliver a socioeconomic benefit. (32)

Considering the number, extent and significance of the consequences outlined in S.9 of the summary document, the respondent feels that the RTA should seriously start considering Option A, which the respondent believes to have considerable less impact on Bulahdelah township and its immediate surrounds, as it is largely located on open plains west of the river and town. (32)

The respondent states that it is comforting to read of the extensive conferencing with local stakeholders, state and local government and the process of evaluating, reviewing adopting or eliminating until one realises that the preferred option of the community was discarded, the best environmental routes were discarded, the best environmental routes were discarded and the worst natural environmental choice was selected by the RTA. The respondent wonders why the process was held at all if this is to be the result. (34)

In the opinion of the respondent, "the strong community preference" is an option which should be revisited. (34)

The justification for the Proposal admits the local businesses and the National, State and local environment loses. Who wins? RTA? (34)

The respondent states that they have read the summary paper for Bulahdelah and the submission from the Nature Conservation Council of NSW. The respondent has also perused comments by ecologists and orchid specialists from the scientific field. The respondent states that all of these submissions offer a calm, reasoned analysis of the situation and conclude that the route chosen by the RTA is the worst possible choice for the environment. The respondent states that they can only conclude that the RTA knew this when they chose that route. (34)

The respondent states that the admission by the RTA that the Proposal has no intention of remaining at a four lane highway and would proceed to 6 lane before 2040 probably makes the EIS irrelevant as all environmental considerations for clearing, pollution, orchid translocation, percentage impact are voided by the real proposal of 6 lanes. (34)

The respondent wishes to object to the suggested Route E. (35)

The respondent states that the Upgrading of the Pacific Highway at Bulahdelah may be inevitable. However, it is not acceptable that the chosen Route for the proposed bypass should cut through a diverse vegetation community of national (and global) environmental significance. (38)

The respondent states that the RTA should not implement Option E. (40)

The adoption of Route E for the bypass is considered to have an impact on Forest Management, as there would be a loss of the timber resource. (44)

Disagree with Route Economic Justification for Route Selection

The respondent feels that the difference in proximity to the town between Option A and Option E is negligible. (5)

Option A is the obvious choice as a reasonable alternative to Option E, both in terms of costs and less environmental impact. The socio-economic impact of Option A on Bulahdelah is no greater than Option E as the bypass is currently planned to be entrenched into the base of Alum Mountain hence there is no visual contact with the town and there is no central turn off to the town centre, as originally planned when Option E was chosen as the preferred option. The current turnoffs on each end of town require the traveller to have a predetermined plan to turn into Bulahdelah, same as for Option A. (16)

Option A was always played down as Option E was chosen from the VMW workshop held at Myall Shores which at the time advocated a central turnoff in town and that the town would be visible from the road, hence promoting tourism. economic growth. Neither of these parameters has since been met due to "design constraints", yet Option E has still been forced along. Option A would equally fit the bill without the major impacts on the town environment and its related cultural values. Given Great Lakes Council success in proclaiming Bulahdelah as a Service Town, through zoning amendments, has assured that there will be no establishment of competing business houses at each end of the bypass, hence Option A meets any pervious socio-economic concerns. (16)

The respondent states that from the outset, business interests in the CBD of Bulahdelah have been proponents of Option E and they seem to have been successful in maintaining the inertia through a committee of well disposed supporters. It is worth noting that the most outspoken supporters of Option E have since sold there business interests. What real business benefits Option E has over western routes is not readily apparent. (20)

The respondent states that the proposal seems like a victory for business interests over environmental awareness and aesthetic quality. Signatures of non-residents in favour of Option E were mostly obtained at the local business counters and are not overly meaningful as only a smaller proportion of through traffic stops through town. (20)

The respondents state that they are shocked to learn that the proposed relocation route is E which skirts close to the Alum Mountain. The respondents believe that this choice is not an economically detached input. (20)

The respondent states that right from the start Option A has always been an even runner with Option E. The respondent states that only because of the VMW at Myall Shores, was option E chosen, based primarily on the ability for passing traffic to sight the town from the route and consequently have the ability to runoff half way around and come into the town near the current Shell Roadhouse. The detailed Option E draft contained no halfway turnoff and the entire route was entrenched in the ground by 5 to 8 metre with one cut down to 26 metres. The respondent believes that this seriously detracts from the need to adopt Option E as it has virtually no advantage over Option A in attracting at least some of the passing highway traffic. Option A achieves the same outcomes with less environmental impact. (32)

Option E was also selected as the preferred route, because of its "proximity to town, providing enhanced opportunities to attract passing trade and visitors and supporting the concept of Bulahdelah as a highway service town". However the access roads/turn-offs to and from Bulahdelah in respect al alternate options A and B would be locatable at very similar distances from the town. (38)

The respondent states that it is difficult to believe that the RTA has seriously considered Option E for the Upgrade of the Pacific Highway. The respondent states that travellers on the Pacific Highway have to stop and rest somewhere, and as more towns are bypassed, travellers would be forced to enter the bypassed towns. The respondent believes that Options B, C and D are shorter in distance, and asks how Option E can be justified as better for encouraging travellers to stop. The respondent believes that Option D is the community's preferred route, although questions whether other options need to be presented. (41)

Opposition to Route Selection due to Environmental Impacts

The respondent wishes to challenge the assertions regarding Option E and its expected reduced impact on the natural environment. (5)

The respondent feels that Option A would have a lesser impact on the natural environment. (5)

Respondent states that when the five bypass routes were made known to the public in mid 2000, many letters were written to the RTA to make them aware that Option E would destroy their most significant local history, and also eradicate the historic landscape in which the original discovery of the Eastern Underground Orchid species was discovered in 1931. (7)

The respondent strongly objects to the proposal on the ground of heritage (non-indigenous and indigenous), tourism, health, lifestyle, town planning and environment. (10)

The respondent cites the conclusions put forward in S.9 of the Summary, and states that given the number, extent and significance of all of these consequences of building Option E the only conclusion that be drawn is that the impact is environmentally significant. If the RTA has to work so hard to justify its location then it would be better for everybody to scrap Option E. (16)

I view it as environmental vandalism to encroach on the Bulahdelah Alum Mountain. (20)

The respondent questions why Option A or a variation thereof has not been adopted. The respondent states that this surely cannot be because of some endangered species of flora or fauna. (20)

The respondent states that this highway proposal must have more devastating impacts than any other highway proposal put forward. No mitigation measures can lessen the destructive potential of the Option E Bulahdelah Highway Upgrade. (21)

Other route options that extend to the west of Bulahdelah and through the town itself would create far lesser and more acceptable ecological impact. The respondent states that it is imperative that these issues are given careful consideration before progressing toward finalisation of the route. (25)

The respondent states that the listing of the Leafless Tongue Orchid on the Commonwealth EPBC Act (1999) demonstrates the national significance of this species. The presence of the largest known population of this species, combined with the presence of the internationally significant population of the Eastern Underground Orchid and the newly described, state significant Red Helmet Orchid is considered sufficient grounds to remove Option E from consideration as a viable route option. (25)

The respondent states that the total package of impacts, covering such a vast array of values including Aboriginal and European Heritage, flora and fauna, geological, educational and tourism plus social implications that it is overwhelmingly obvious that Option E should not proceed. The decision is made easier in the fact that there exists a cost effective, lower environmental impact alternative, in the form of Option A. (32)

When all the options at Bulahdelah result in the recommendation by the RTA that the recognised worst option for the environment is chosen there has to be more effort made by that entity to find a different route. (34)

The respondent state they have very strong reservations about Options A and B in which further study could well establish problems with Yellow-bellied Glider and other fauna populations and possibly similar flora communities to those found in Option E. (34)

Route E would have large and unacceptable environmental impacts and should be considered a sustainable option (in the context of the representation the respondent was interpreted to mean "should be considered an unsustainable option"). (35)

The NCC is opposed to the preferred Route Option E due to its environmental impact, particularly on threatened flora and fauna. If the Bulahdelah by pass is to proceed, it should be built along one of the other Route Options, all of which have been identified as having lower environmental impacts. (38)

The NCC believes that the presence of the largest populations of the three threatened orchid species (Eastern Underground Orchid, Red Helmet Orchid and the Leafless Tongue Orchid), within the footprint of Option E of the Bulahdelah Pacific Highway Upgrade, provides sufficient grounds to remove Option E from consideration as a viable route option for this proposal. Alternative Options through or to the west of Bulahdelah must be preferred on environmental grounds. (38)

The respondent understands that there was, and remains considerable opposition to Option E from the Bulahdelah community. Abandoning Option E may very well be supported on grounds other than environmental. (40)

Consideration of other Options

Option A (the western option) would have been a far better choice, as that area contains no significant heritage sites, and there would have been no impact on the life-style of the citizens of this town, nor any possibility of pollution affecting the two local schools, both during the construction phase and when the highway would be operating. (7)

The respondent states that although the bottle-neck that has developed at the northern end of the Karuah Bypass is a cause for concern, surely the RTA is capable of building an acceptable highway; and as such should be aware that Option E is not acceptable. (9)

The respondent states that Option A is safest route for road users. (13)

The respondent feels that Option A would have been a far better option, taking the Highway away from the township, as opposed to directly above the township. (14)

The respondent feels that there are other options that could achieve the objective of a high standard alignment of the Pacific Highway. (15)

The Option E route is within a very narrow corridor, whereas Option A is much wider with a much greater range to avoid impacts. (18)

The respondent does not understand why Option E was chosen as the preferred option over the western option. (19)

The respondents' preferred route would be a four lane roadway to the west of the town. It could be located to impinge only slightly on the flood prone area and or the town's water supply. The highway has skirted the Grahamstown storage at Raymond Terrace since 1956, without ill effects. (20)

The respondent states that since the upgrading was first mooted we have favoured Option A on a route to the West of the town and we have been opposed to the adoption of Option E at the base of the Alum Mountain. The respondent states that they have all but despaired of expecting anyone in authority of taking notice of our views. (20)

The respondent states that Bulahdelah Mountain cannot be appreciated by the general traveller on the highway from Option E anything like it can from a more remote western route. (20)

According to the EIS, travel efficiency would be achieved by removing highway traffic that passes through the town on the present highway. The respondent states that it is quite obvious that any out of town option would also achieve this objective. (21)

The respondent would like to strongly object to the use of Option E for the Pacific Highway Upgrade - Bulahdelah section. (27)

The respondent states that travellers on the Pacific Highway have to stop and rest somewhere, and as more towns are bypassed, travellers would be forced to enter the bypassed towns. The respondent believes that Options B, C and D are shorter in distance, and asks how Option E can be justified as better for encouraging travellers to stop. The respondent believes that Option D is the community's preferred route, although questions whether other options need to be presented. (29)

The respondent wishes to protest the proposed Option E bypass to the east of Bulahdelah. (31)

The respondent states that they became actively involved in "Say No to Option E" in August 2001. The respondent states that they feels that (Parsons Brinckerhoff) and RTA had favoured Option E from the start and never presented credible information about the alternative options. The respondent states that although the EIS mentioned some environmental considerations of Option E, they were given perfunctory attention. (31)

Given Great Lakes Council's success in proclaiming Bulahdelah as a Service Town, through zoning amendments, it has been assured that there will be no establishment of competing business houses at each end of the bypass, hence Option A meets any previous socio-economic concerns. (32)

The respondent feels very strongly about the township trof Bulahdelah and thinks it is heartless to bypass a town that depends so much on passing trade. The respondent understands how the RTA arrived at the proposed upgrade (the respondent was a member of the Community Focus Group) but will never agree it was the best option for everyone. (33)

The respondent is completely opposed to Option E. (34)

If the Bulahdelah Bypass is to be constructed, then it should be along one of the other Stage 2 options, all of which appear to have fewer environmental impacts than Route E. (35)

The respondent states that as a safer route - Option A - which is, in every way, superior to Option E is available to the west of the township there is no justification whatsoever for the Option E route. (37)

The respondent states that Option E would adversely impact upon this and future generations. (37)

The NCC states that Western Route Options A and B traverse land that is largely already cleared. Although these routes bisect an identified wildlife corridor, NCC believe the impacts of these options can be better mitigated by careful design and construction than the environmental impacts of Option E. (38)

The respondent submits that the RTA should proceed other than by Option E. (40)

The respondent states that they have been a member of the Community Focus Group since its inception, and feel that they are well informed on the entire process to date. The respondent states that Option E is a compromise, however agrees that it was a suitable outcome from the negotiations which have taken place over the years. The respondent feels that Option D would be a better choice for Bulahdelah. (43)

State Forests state that the cumulative impact of the Proposal on the township is considered to be significant and is considered likely to have much greater than any of the western options. The adoption of route E addresses several short term issues but in the long term there would have been a greater benefit for Bulahdelah township had one of the western option been adopted. (44)

Noise and Vibration

General

The respondent notes that in Volume 1, page 7.67 it states that "air quality at schools and residences adjacent to the existing highway would be improved by the operation of the proposed Upgrade". The respondent states that the 2018 projections are quite acceptable, however this level is likely to be reached 8 years after the opening of the Highway upgrade. The respondent asks whether the noise levels would be acceptable after 10 years of highway operation. (7)

The respondent does not accept that schools should be subjected to any level of noise if there is a viable alternative. (7)

The respondent believes that the elevated siting of Option E hard against the Alum Mountain would ensure that the people of Bulahdelah get a full dose of highway noise. The respondent also believes that Option E is the most polluting option of all, and what is worse the Bulahdelah Central School would be the first in line to receive highway noise. (10)

The respondent feels that noise associated with Option E both during and after construction should be considered, especially in relation to the reflected noise bouncing back from Bulahdelah Mountain. (14)

The respondent feels that noise associated with Option E both during and after construction should be considered, especially in relation to the reflected noise bouncing back from Bulahdelah Mountain. (14)

The respondent has concerns about noise levels during operation. (17)

The respondent has concerns about noise levels during construction. (17)

Take the noise pollution away from town, don't place it directly above the town. (18)

The respondent states that the EIS argues the movement of the highway from the centre of Bulahdelah and placing it above the town would somehow improve the air, noise and water quality for the residents of Bulahdelah, unfortunately this would not be the case. Moving the noise and pollution of the highway from below the town to above the town would be an absolute failure, merely exchanging one set of problems for another. (21)

The respondent notes that details of noise attenuation would be determined at the detailed design stage. The respondent is concerned about the impact of noise on the local school and trusts that the RTA's estimation, that noise would decrease for the school is correct. (24)

The DEC notes that the methodology used to determine the criteria for operational noise levels generally appears to be consistent with the requirements of the Environmental Criteria for Road Traffic Noise. The Dec notes that ameliorative measures to be taken where required, including for the Catholic Church and school, and would expect them to be consistent with mitigation procedures and requirements of Environmental Criteria for Road Traffic Noise. (30)

The DEC note that Technical Paper 14 predicts that construction activities are likely to exceed the noise criteria specified in the DEC's Construction Noise Guideline at a number of locations. The DEC state that the mitigation measures outlined in the EIS are considered to be satisfactory. (30)

The DEC state that careful consideration should be given in the design of all blasts to ensure conformance with DEC criteria. (30)

The DEC recommend that a noise, vibration and blast management plan should be developed for the project prior to the commencement of any works. The DEC outline the matters for consideration when preparing the plan, including: Compliance standards; community consultation; complaints handling monitoring/system; site contact person to follow up complaints; mitigation measures; design/orientation of the proposed mitigation methods demonstrating best practice; operational times; contingency measures where noise complaints are received; and monitoring methods and program, with monitoring to be undertaken at the nearest affected residential properties. (30)

The respondent states that all residences to the east of the current section of highway plus two schools, the Alum Mountain Park and the golf course would experience increased noise conditions due to the Alum Mountain's quality of intensifying noise during reverberation, and as such these would be long-term. (37)

The small office at the Bulahdelah Water Treatment Plant was originally located toward the rear of the building to mitigate noise effects from the existing highway. Now that the highway is proposed to be moved towards the other side of the building, MCW would like to ascertain the noise mitigation measures (if any) required to maintain the amenity of the office. (42)

MCW request that the Bulahdelah Water Treatment Plant, both Bulahdelah Reservoirs and the pipelines connecting these two assets be considered in any vibration monitoring regime or risk assessment, and that MCW is kept informed of any blasting activities that are likely to affect these assets. Damage to these assets could potentially impact the reliability of the overall Bulahdelah Water Supply. (42)

The respondent would like to see the minimising of noise levels with sound barriers and quiet road surfaces as proposed. (45)

Other

General

The respondent states that recently the government conducted Property Vegetation Plan trials as part of the process of developing the Native Vegetation Regulations. The Government hopes to gain biodiversity certification for its package. Of the 12 trials conducted most farmers received "red lights" for thinning, lack of offsets which would work (amelioration/compensation), plans to remove small pieces of riparian growth and so on. (34)

None of these farmers wanted to clear whole forests, significant species such as EPBC threatened species or rare and endangered underground orchids. If a corporation of farmers wanted to clear remnant forest and threatened species in a swath from the Hunter to the Tweed there would be international headlines and government action. (34)

Yet in the case of the Pacific Highway upgrade we have cumulative clearing of remnant or untouched forest and threatened flora and fauna species by the very body which should be setting the example and not be hiding behind its own legislation to justify this destruction. (34)

For instance concerns have reached us regarding the broadscale clearing at Karuah, the efficacy of squirrel glider aerial bridges and koala underpasses as well as the apparent replacement of perfectly good forest with growtubes. In the case of the Oxley Highway Deviation the preferred route chosen is to be bulldozed through the habitat in preference to cleared land and again we have the assertion that squirrel glider and koala amelioration measures actually work. Ballina to Woodburn, Iluka to Woodburn and Well's Crossing to Iluka all seem to be heading into the same environmental quagmire. In at least one of these areas the preferred route runs straight through the habitat instead of cleared land. (34)

Project Design

General

The respondent is aghast at the need for a 24 metre deep cutting through the foothills of Bulahdelah (Alum) Mountain. The respondent feels that this is not a minimal impact on the environment. (5)

The base of Alum Mountain's severance by a freeway is bad enough, but a cutting up to 24 metres deep on the south-western foothills is simply unacceptable. (29)

The DEC notes that final alignment and footprint are subject to further clarification, including contractor input. It is important that all constraints are input into the design development phase to ensure that the environmental impacts are identified early and minimised. (30)

The DEC note that in Section 5 of Technical Paper 7 residual impacts are also included within this assessment, however it is important to develop procedures to ensure that these are identified and implemented correctly. The DEC has a number of concerns when additional "residual" impacts often develop during construction. This results in works (and subsequent impacts) which were not envisaged during the EIA phase then becoming essential works. (30)

Table 4.10 in Technical Paper 4 - The Proposal, shows that the informal track on crown land would be closed as part of the Proposal. The DEC state that this track continues into an area, which is proposed for a change in land tenure in the near future, and that long term management requirements in light of the proposed land tenure (including fire management requirements), need to be considered. The DEC request clarification on the long-term access arrangements. (30)

The base of Alum Mountain's severance by a freeway is bad enough, but a cutting up to 24 meters deep on the south-western foothills is simply unacceptable. (41)

Intersections and Bridges

Respondent asks how high the proposed bridge over the Myall River would be. The respondent sails a trailer sailer, and currently has to launch his vessel mast down, proceed under the bridge, and then put the mast up. The respondent feels that it would safer if the bridge was ten meters from the mean high water mark, as it is safer to put the mast up on land, before launching. (4)

The DPI (NSW Fisheries) supports the use of a barge for water access during construction activities for the Myall River bridge. NSW Fisheries suggest that for access from the side of the structure, to install the girders and deck superstructure, a barge-mounted crane would be the preferred option. However if there is a requirement for a temporary work platform, NSW Fisheries requests the consideration of using a temporary timber wharf or pier structure instead of a rock fill platform to minimise impact on the prolific bankside aquatic habitat. (26)

The RTA needs to ensure that the retention of the natural substrate along Frys Creek is achievable and can be implemented into the final designs. Concern is expressed over the recent implementation of a 1:2000 year flood protection for bridge structures at the construction stage. (30)

The DEC notes that no temporary bunding or blocking of Frys Creek is proposed. Recent experience in a number of construction projects, has often resulted in the need to bund or block creeks to enable temporary access or construction or bridges/culverts This issue requires further clarification. (30)

The suggestion to leave the stump and roots in situ of one large remnant tree on the northern banks of the Myall River (to enable construction of the Myall River Bridge) needs to be incorporated into the design. In past experience these areas are often highly damaged by construction works (particularly with previously required 1:2000 year flood modelling). (30)

The DEC is concerned as the construction of recent projects has resulted in the 1:2000 year flood modelling being used to protect these structures. This results in extensive disturbance to the creek bed and has often resulted in full creek alignment. The RTA must ensure that the length of the proposed bridge crossings is adequate concerns over structure protection. (30)

Perhaps a centre interchange as suggested in earlier discussions may have been the better option after all. (43)

The respondent is concerned with the positioning of the south bound traffic exit on the northern side of Bulahdelah. The town is not visible to those on the highway until they have moved beyond the hills in the exit area. The only to get back is to travel several kilometres further south and then turn around. A second exit at the southern interchange would be a simple way to rectify this problem and prove more convenient for those people travelling along Boral Road. (43)

Safety

General

The respondent states that the provisioning of ample accommodation for pedestrian traffic on the Mountain Access Overbridge is a major concern. The respondent state that Alum Mountain is a very rocky area, and the throwing of rock from the Access Overbridge onto motorists below is a very realistic possibility. The respondent feels that if Option A were chosen instead, this possibility would not exist as no Access Overbridge would be required. (12)

The respondents are concerned about the service road accessing the Bulahdelah Golf Club, as they feel that there needs to be an appropriate buffer zone between the "ball zone" of the 4th fairway, and the public access road, for safety reasons. (28)

The respondents state that the proposed changes to the 4th fairway at the Bulahdelah Golf Club would mean (given the nature of the hole) that some golfers could carry a ball up to 15 meters in height across the area in question. The respondents state that the height and materials used in the barrier are, for this reason, critical. (28)

The respondent states that driver fatigue is recognised as being a major killer on our roads. The upgraded highway would increase the risk of drivers pushing themselves thus increasing the risk of them falling asleep at the wheel. (33)

The adoption of Route E for the bypass is considered to have an impact on Mountain Park, and an associated risk to public safety during and after construction. (44)

The adoption of Route E for the bypass is considered to have an impact on Forest Management, as access to Alum Mountain during construction to allow for bushfire management and suppression would be affected. (44)

Geotechnical

The respondent states that the aims of the upgrade in relation to safety are not met because the upgrade would be built through a slip zone beneath unstable cliffs. (9)

The respondent states that to build a highway on the lower slopes of the Alum Mountain would be a very dangerous undertaking, requiring extensive stabilisation measures. To build and operate a highway through a slip zone, beneath unstable cliffs is totally irresponsible. Why pursue this dangerous option when there are alternatives with no such risks? (9)

The respondent is concerned with the use of Option E, in relation to the instability of Alum Mountain. (14)

The adoption of stabilisation measure for the top of Bulahdelah Mountain would represent an unacceptable risk to road users. (16)

The respondent cites the section in the EIS Summary that deals with the parts of Bulahdelah Mountain covered with colluvium. The respondent correctly notes (from the EIS) that the colluvium is an area of soil containing rock fragments and boulders which have been transported down the slope. The respondent states that as a result of the steeply dipping strata of Bulahdelah Mountain (nearly 80 degrees), they are prone to frequent rock fall and slippage. The fact that it has been heavily mined and quarried only increases the likelihood of further slippage, particularly if the base is undercut by construction of the planned 4 lane highway in a trench of around 5 to 8 metres with individual batters up to 26 metres deep. The respondent states that frequent rock fall and sheet slides occur on the mountain, especially after vibration and heavy rainfall. Boulders rolling down the mountain were a common occurrence during the mining era, and even during the geotechnical investigations undertaken by the RTA and PB, rock falls were noted by the local residents. (16)

The respondent states that the disused quarries and shafts are fragile, contrary to what is stated in Section 7.1.7 of Volume 4. (18)

The respondent states that there are some huge odd-shaped monoliths precariously perched high up near the top (of the mountain) which could be dislodged in the event of an earthquake. (20)

The respondent quotes from the EIS the geotechnical risks identified in Chapter 7 of Volume 1, and notes that the risk have been found to be 'not credible' risks. The respondent states that on no other option did such a danger to highway users exist. (21)

The respondent cites the section in the EIS Summary that deals with the parts of Bulahdelah Mountain covered with colluvium. The respondent correctly notes (from the EIS) that the colluvium is an area of soil containing rock fragments and boulders which have been transported down the slope. The respondent states that as a result of the steeply dipping strata of Bulahdelah Mountain (nearly 80 degrees), they are prone to frequent rock fall and slippage. The fact that it has been heavily mined and quarried only increases the likelihood of further slippage, particularly if the base is undercut by construction of the planned 4 lane highway in a trench. The respondent states that frequent rock fall and sheet slides occur on the mountain, especially after vibration and heavy rainfall. Boulders rolling down the mountain were a regular occurrence during the blasting operations of the mining era. The adoption of stabilisation measure for the top of Bulahdelah Mountain would represent an unacceptable risk to road users. (32)

The respondent states that there is further evidence that a highway route at the base of Alum Mountain, Bulahdelah would be extremely dangerous, quoting from "Soil Landscapes of the Dungog 1:100000 Sheet" where it states "Mass movement occurs on steep slopes, particularly the Alum Mountain Volcanics, which are also prone to rockfall." (37)

The respondent states that Option E, despite meeting improved road safety objectives and thereby improving the efficiency and travel on the Pacific Highway, is not the safest route for this section of the upgrade. (37)

The respondent states that the RTA plans to put road users and construction workers at risk through locating a highway within the base (foot) of a mountain which is "particularly" prone to "mass movement" and "rockfall" despite having an alternative route to the west of the township - Option A. (37)

Soils

Contaminated Soils

The DEC state that any stockpiles of contaminated soil are managed to prevent contaminated runoff from leaving containment areas. (30)

The EIS does not mention whether the decommissioned Sewerage Treatment Works site was classified as contaminated land by the DEC, or otherwise consider any EPA requirements for assessment or remediation of the site prior to construction works. MCW state that given no chemicals were used in the operation of the site, potential remediation requirements should be minimal or perhaps even non-existent however the DEC (EPA) should be consulted. (42)

Acid Sulphate Soils

In regards to Acid Sulphate Soils, the respondent states that just as you can build an earth dam out of horse dust if you make the batters flat enough, the RTA can do the same with a highway embankment with the appropriate attention to detail. Concern about Acid Sulphate Soils is a relatively recent ingredient in earthwork considerations. (20)

The DEC state that wind-blown acid sulphate soils have the potential to adversely impact on waters. In addition to the proposed strategies for inclusion in the acid sulphate soil management plan (considered appropriate by the DEC) it should be ensured that material stockpiles are managed to prevent the generation of windblown material from the containment areas. (30)

Support Proposal

Generally Supportive of the Proposal

Respondents feel that Proposal is a good one as it really just circles Bulahdelah and they believe that general commerce would not be affected due to the proximity of the new road. (2)

Respondents are not adverse to the Bulahdelah Bypass in any way, in fact the sooner the better. (2)

Respondent is impressed by the detail of the Proposal, and feels that the upgrade of the highway to dual carriageway can only be a good thing for all motorists. (4)

The respondent is pleased that bicycles would be allowed to use the new road and that they would be accommodated on the bypass in the form of a 2.5 metre shoulder on its entire length. (8)

Respondent states that they are well aware of the urgent need to upgrade the Pacific Highway, and wishes that the entire length could be fixed quickly. (11)

The respondent states that the Proposal is a good one and they gladly lend their support to the Proposal as such, but hope that their concerns are given due consideration. (17)

Other than the problem with the northern interchange link road, and affect on their property, the respondent is very happy with the proposal and they've found everyone they've dealt with to be helpful and courteous. (22)

The respondent supports the selection of Option E but trusts that their concerns would be given due consideration and practices developed and put in place to protect the flora and fauna, in particular species currently threatened by the Proposal. (24)

The respondents do not oppose the upgrade. (28)

The respondent appreciates that the RTA has approached the upgrade of the Bulahdelah section of the Pacific Highway with all due diligence. (40)

The respondent commends the RTA team for their professional, caring and considerate manner. (43)

The Mineral Resources Division, Department of Primary Industries (formerly Department of Mineral Resources) has no objection to the proposed highway upgrading. Nor does it wish to raise any issues concerning the EIS or SIS. (46)

Utilities & Other Infrastructure

Electricity

The DEC state that it is important to ensure that any clearance requirements for the proposed powerline relocation are taken into consideration as part of any proposed mitigation works. (30)

Regarding the activity associated with the proposed powerline upgrade/relocation would be subject to a separate approval system, however DEC is concerned that this proposal may result in increased impacts to the Orchid species (and threatened species in general). Clarification is required about the ability to retain shrub and ground cover vegetation in the gully line, associated with the powerline easement. (30)

The DEC notes that relocation of the powerlines would be subject to a separate environmental impact assessment process by TransGrid. Clarification is required as to what works are proposed to be undertaken by the RTA and what works would then be the subject of the separate EIA to be undertaken by TansGrid. This is particularly relevant due to the sensitive within the area and it is critical that any EIS correctly identifies and deals with these issues. (30)

TransGrid state that there has been several discussions with the RTA, and DIPNR regarding the relocation of the 132kV Transmission Line from Tomago to Taree for the proposed highway realignment. These discussions have focused on the EIA process, whereby the RTA, would as part of the EIS process include the provision of specialist environmental services to include the area where the transmission line is to be relocated to. (30)

Transgrid state that these studies should support the RTA's undertaking to Transgrid to clear the vegetation and undertake the necessary groundwork for the transmission line relocation, including access tracks. The clearing shall be in consultation with the TransGrid Regional Manager/North. TransGrid would carry out a Review of Environmental Factors in accordance with section 111 of the Environmental Planning and Assessment Act for the remaining work associated with the physical relocation of the transmission line. (36)

TransGrid state that their examination of the EIS documents indicated that the areas surveyed for flora and fauna are adequate for the transmission line relocation. TransGrid also state that the areas of field survey for the cultural heritage (Historic and Indigenous) are confined only to the "footprint of the highway" construction work. These areas surveyed as shown in Figure 5.24 of Technical Paper 16 do not appear to include the area for the relocation of the transmission line and access tracks and are therefore not adequate. The cultural heritage field survey and assessment should be expanded to include the transmission line relocation area as it has been done for the flora and fauna surveys. (36)

It is important that the specialist environmental studies are adequate to cover the proposed transmission line relocation, otherwise the relocation process may involve another EIS/SIS process with its financial and time implications. (36)

TransGrid state that it is difficult to finalise plans for the exact location of the transmission line, as the proposed highway is still in concept plan. TranGrid state that it their intention to place the transmission line close to the highway, however practical and technical restrictions may require the transmission line to be located further away. TranGrid state that the following additional requirements should be noted: RTA proposed fencing and road cutting should be at least 15 metres away from the realigned Transmission Line centreline; and Access tracks shall be provided by the RTA so that all relocated and existing structures would have 24 hour/ 7 day access. (36)

TransGrid state that the RTA shall bear all costs arising from the relocation of the transmission line including the cost of environmental impact assessments and approvals, environmental management plans, physical transmission line relocation works, associated costs arising from the outages of the transmission line for the relocation work and any other costs that may arise from the relocation of the line. (36)

TransGrid state that Figure A of the main volume of the EIS shows that the extent of the proposed upgrade may extend to cross the transmission line again on the northern end of the project. The possibility of this crossing at the northern side has not been identified by the RTA to TransGrid in earlier meetings. Confirmation of details at this crossing, if any, would need to be provided to TransGrid for any environmental impact assessment on the part of RTA and TransGrid to enable the highway upgrade to extend to this crossing. (36)

Water Supply

MCW state that they are considering locating a future balance tank/reservoir adjacent to the site of the northern interchange, and provision for a future water service might be considered across the proposed alignment east of Mountain Park however this has not been discussed in any detail with the relevant bodies (for example Great Lakes Council). Accounting for this potential pipeline would involve providing adequate space fro a pipeline on the new bridge. (42)

MCW states that detailed design and estimation for the relocation or adjustment would only be possible once an agreed location for the replacement assets has been locked in. MCW's preference is to undertake this work using MCW resources, however recognises that the highway may be procured using a "design, construct and maintain" contract, which may make the use of MCW resources not possible. MCW seek further discussions on this matter, and resolution prior to the procurement of the highway upgrade. (42)

MCW state that the air quality assessment for the EIS did not consider the potential risks to the water supply at the Water Treatment Plant from air borne pollutants settling in the water treatment units. If the risk of this event occurring was considered to be higher than could be accepted, consideration of control measures such as covering the water treatment units with buildings might need to be considered. (42)

MCW would prefer that construction depots or stockpile sites not be located in the Crawford River catchment to eliminate the risk of spills or other pollution events in the water supply. (42)

Water supply infrastructure would need to be adjusted or relocated at the following locations: Treated water rising main from the Bulahdelah Water Treatment Plant to the Bulahdelah reservoirs; Gravity main from Bulahdelah Reservoirs to the reticulation; The power and control cables between the Bulahdelah Water Treatment Plant to the Bulahdelah Reservoirs; The scour from the Bulahdelah Reservoirs to the Water Treatment Plant; Reticulation main at the Lee Street/ Pacific Highway Intersection; and the Private water service to the Golf Club crossing under the existing Pacific Highway. (42)

In relation to the Lee Street pipeline, it is important to note that the pipeline cannot be located any higher than the existing pipeline, because this is constrained by the height of the existing Bulahdelah Reservoirs. This matter might however be overcome with the installation of the 3rd Bulahdelah Reservoir. (42)

MCW state that previous negotiations with the RTA for the highway upgrade to replace the access to the Bulahdelah Reservoirs with an access track connected to the proposed Northern Interchange at Lee Street. The two issues that need to be considered in the provision of this access track are: The access track need to be constructed to a suitable standard for maintenance trucks, and mobile cranes to travel on, be low maintenance and be well drained; and MCW's preference is to own the land containing the access track, to avoid concerns with crossing paddocks owned by others which are often stocked with cattle, and require fencing and gates. An underpass providing direct access between the Bulahdelah Water Treatment Plant and the Reservoirs has been excluded during previous negotiations, but would still be considered as an option by MCW. (42)

Sewerage

MCW and Great Lakes Council, in consultation with the RTA, Department of Lands, and DEC have agreed on a compulsory acquisition plan for a public road to resolve access sharing issues with the Bulahdelah Sewerage Treatment Works and the Bulahdelah Waste Facility, as well as meet environmental constraints in choosing the location of the road. The proposed two-way service road described in the EIS integrates with this road, which would be located parallel to and south of the site of the existing waste facility. It would be important to ensure that the interface of these two projects remains smooth to avoid unexpected additional cost or delay to either project. (42)

MCW is interested in acquiring land for a buffer that would be surplus to the RTA's needs between the Bulahdelah Water Treatment Plant and the proposed highway boundary. RTA's intentions with regards to the purchase of MCW's former Bulahdelah Sewerage Treatment Works site on Bombah Point Road also need to be resolved. (42)

Sewerage infrastructure would need to be relocated or adjusted at the following locations: Sewer rising main at the Lee Street/Pacific Highway intersection; Gravity sewer at the Lee Street/Pacific Highway intersection; Bulahdelah Sewerage Pump Station No.1 would require replacement of pumps if the sewer rising main needs to discharge into the sewer at Lee Street/Pacific Highway intersection at a higher level; and Private sewerage pump line from the Golf Club crossing under the existing Pacific Highway and travelling to the Bulahdelah Sewerage Treatment Works. (42)

Water Quality, Hydrology and Sedimentation

General

The respondent states that there is a great danger of increased flooding in the future, and wishes to know why the highway planned would provide a solid embankment downstream of Bulahdelah. (10)

The respondent is concerned about the impacts associated with the use of Option E in relation to Alum reaching the Myall River system. (14)

The respondent is concerned that water runoff from the Alum Mountain would be effected by the use of Option E. (14)

The respondent is concerned about the impacts of the Proposal on water quality, and asks if the best resources were used in making calculations, because the water bodies of the Great Lakes Area are much to sensitive and valuable. (24)

The respondent is concerned about the impacts of the Proposal on flooding, and asks if the best resources were used in making calculations, because the water bodies of the Great Lakes Area are much too sensitive and valuable. (24)

The DPI (NSW Fisheries) is concerned with the stockpile of excess material from the Karuah to Bulahdelah Project on the floodplain, as there would be the potential for the fill to be inundated or affected by flood flows and enter into the waterways. The DPI (NSW Fisheries) does not support the the stockpiling of large amounts of fill material on the floodplain unless in the process of embankement construction and all necessary measures taken to ensure that it would not be transported during a flood event into waterways. This is especially important because of the potential for material to be carried into the Myall Lakes, a wetland of national significance. (26)

The DPI (NSW Fisheries) suggests that the positioning of the floodplain culverts for the southern section of the alignment be considerate of the northern and southern wetland areas to maintain connectivity of hydrological flow between the eastern and western sides of the alignment. (26)

The DEC state that the Construction Environmental Management Plan and the Soil and Water Management Plan should be submitted with the application for an Environmental Protection License (EPL) and prior to any works commencing on the project. The DEC state that the strategies outlined in the Soil and Water Management Plan are considered to be appropriate. (30)

The DEC recommends that the design of sediment basin settling volumes should be capable of controlling run-off from a 90th percentile 5 day rainfall event where practicable. The RTA should provide justification at the time of submitting an application for an Environmental Protection License for adopting sediment basins with settling volumes sized to contain run-off less than 90th percentile 5 day rainfall event. During the design of these basins, consideration must also be given for the protection of sensitive flora, fauna and cultural heritage sites within the road corridor, particularly commitments made within the SIS. (30)

The DEC commends the RTA's initiative to convert some of the sediment basins used during construction into water quality basins to capture road runoff and contain chemical spills at the completion of works. (30)

The DEC recommend that the detailed design of any concrete batching plant incorporate a segregation of the site into "clean" and "dirty" areas. The "dirty" area is that area of the site in which any runoff may be contaminated by cement material or other chemicals (e.g. batching plant, washout pits). The "dirty" area should be as small as possible and all runoff from this area collected for re-use. The "clean " area is the remainder of the site and may contribute sediment to any runoff from the site (e.g. aggregate storage are, site office). The runoff from the "clean" should be collected and treated prior to discharge. (30)

The DEC state the RTA should ensure that activities in the cut section at the base of Bulahdelah Mountain, and at the location of the new bridge over the Myall River are appropriately managed to minimise the transportation of sediment and other contaminants off site. (30)

The respondent states that it is not known how many residents might be affected by increased flood level during the one in one hundred flood periods. The respondent also states that Option E would have a potential adverse impact on the flood plain/swamp in a township which already has some flood prone residential areas. (37)

MCW state that meeting all of the water demands of the project with town water alone is unlikely, especially during the dryer conditions that have been experienced in recent years. It is important to note that use of the Crawford River for construction water would be discouraged, and potentially banned during drought conditions and/or water restriction periods. How alternative water sources are to found during dry periods may need to be a consideration for the EIS. (42)

Appendix B

Addendum to the Biological Impact Assessment

Bulahdelah Pacific Highway Upgrade- Addendum to the Biological Impact Assessment

January 2006

RTA

PARSONS BRINCKERHOFF

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Signed: .....

Date: ..... 4 January 2006

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Appendices

1. Introduction

The NSW Roads and Traffic Authority (RTA) proposes to upgrade the Pacific Highway at Bulahdelah. The impacts of this proposal have been previously assessed in an Environmental Impact Statement (EIS) and the ecological impacts further assessed in a Species Impact Statement (SIS). The SIS (Parsons Brinckerhoff 2004) identified that the proposal is likely to impact directly 1.8 hectares of Wet Meadow vegetation community. This community meets the classification of Freshwater Wetlands on Coastal Floodplains, which is listed as an Endangered Ecological Community pursuant to the *Threatened Species Conservation Act 1995 (TSC Act)*. At the time of writing the SIS, this community had only a preliminary listing and it was stated that the RTA would review this issue following the display of the EIS and SIS subject to the final determination of this Endangered Ecological Community.

Approximately 23.1 hectares of freshwater wetlands occur within the Bulahdelah region. Two wetlands occur on the floodplain of the Myall River in the southern section of the proposed highway. This report provides the results of additional surveys and assessment of this community along the proposed route. This further survey aims to meet the requirements of the NSW Department of Environment and Conservation (DEC) for completion of the SIS.

1.1 Aims

This report aims to update the Species Impact Statement for the Bulahdelah Upgrade through the assessment of the recently listed freshwater wetlands. Specifically, this report deals with the potential impact of the proposed highway upgrade on freshwater wetlands in the Bulahdelah area and aims to:

- Outline the details of the survey methods used
- Provide a full floristic composition including estimations of cover abundance for all plant species recorded within four 50 by 20 metre quadrats
- Estimate numbers of individuals of threatened taxa at each site
- Describe the community including the size age class assessment, weed invasion and condition
- Provide an eight part test for this community as required under Section 5A of the *Environmental Planning and Assessment Act 1979*
- Outline the relationship to the mitigation measures already proposed in the SIS/EIS and provide any further measures considered necessary.

2. Methods

The site was inspected over two days between the 8 June and 9 June 2005 by Selga Harrington and Nick Corkish. During the field studies the weather was mild and fine with temperatures ranging between approximately 15 and 24 degrees celsius.

All work was carried out under NSW Department of Environment and Conservation Scientific Licence number S10445 and a NSW Department of Agriculture Animal Research Authority (AW01/1380).

The methodology used in this assessment was based on the Director General's requirements for the Species Impact Statement for the proposed Upgrade of the Pacific Highway at Bulahdelah.

2.1 Personnel

The names and qualifications of personnel involved in the field studies and report preparation are shown in *Table 2.1*. Full CVs are shown in *Appendix A*. Additional plant identification was undertaken by the Royal Botanic Gardens Sydney.

Table 2.1: Personnel involved in the field studies

Name	Qualifications	Years Experience	Role
Selga Harrington	BSc (Hons)	6	Botanist- field survey, plant identification, report preparation
Nick Corkish	BForSc	9	Botanist- field survey, plant identification

2.2 Taxonomy

Names of plants used in this document follow Harden (1992, 1993, 2000, 2002) with updates from PlantNet (Royal Botanic Gardens 2004). Names of vertebrates follow the Census of Australian Vertebrates (CAVS) database maintained by the Department of Environment and Heritage (2004).

2.3 Quadrat assessment

Four vegetation quadrats were undertaken within the site. Three quadrats were placed within the northern wet meadow with the fourth within the southern wet meadow. All species within each 50 by 20 metre quadrat were recorded and their abundances estimated using a one to six cover abundance score. The data sheets are provided in *Appendix B*.

2.4 Condition assessment

The quality of vegetation was assessed using parameters such as intactness, diversity, history of disturbance, weed invasion and health.

Three categories were used to describe the condition of vegetation communities:

High: Vegetation still retains the species complement and structural characteristics of the pre-European equivalent. Such vegetation has usually changed very little over time and displays resilience to weed invasion due to intact ground cover, shrub and canopy layers.

Medium: Vegetation generally still retains its structural integrity but has been highly disturbed and has lost some component of its original species complement. Weed invasion can be significant in such remnants.

Low: Vegetation has lost most of its species and is significantly modified structurally. Often such areas now have a discontinuous canopy of the original tree cover, very few shrubs and exotic species, such as introduced pasture grasses or weeds, replacing much of the indigenous ground cover. Environmental weeds are often co-dominant with the original indigenous species. It can often be difficult to assign a vegetation type to such remnants as they are so species poor.

2.5 Impact assessment

For the purpose of the impact assessment the local area was defined as the area within 10 kilometres of the study site. The region is the North Coast as defined in the Interim Biogeographic Regionalisation for Australia (Thackway and Cresswell 1995).

Significance assessment (Eight Part Test) was carried out for Freshwater Wetlands as required under Section 94 of the *Threatened Species Conservation Act* and Section 5A of the *Environmental Planning and Assessment Act 1979* and followed the methods suggested by the NSW Department of Environment and Conservation Information Circular on Threatened Species Assessment (NSW National Parks and Wildlife Service 1996).

2.6 Limitations

The vegetation within the study site is subject to grazing and individuals of some species may have been present only within the seedbank and thus would not have been recorded.

3. Results

3.1 Existing environment

Approximately 23.1 hectares of freshwater wetlands occur on the floodplain of the Myall River within one kilometre of the proposed Upgrade of the Pacific Highway at Bulahdelah. Two of these wetlands, covering approximately 1.8 hectares (7.8 per cent of the local distribution), are within the footprint of the proposal.

The northern wetland has been previously cleared and is surrounded by pasture grasses. It is moderately polluted, stressed and has a moderately impaired aquatic community (Rooney and Associates 2003). The southern wetland is partially lined with vegetation including melaleucas and sedges. It occasionally dries out but is connected to the Myall River via an artificial channel that maintains the water at a constant level (Parsons Brinckerhoff 2004).

Vegetation

The freshwater wetlands are dominated by sedges (up to 20 per cent cover and to 1.3 metres high) including *Juncus usitatus*, *Juncus prismatocarpus, Carex* sp.*, Cyperus exaltatus and Juncus microcephalus.* The ground cover is dense (65 to 95 per cent cover) and is dominated by native aquatic herbs such as *Persicaria strigosa*, *Ranunculus inundatus* and introduced weeds *such as Myriophyllum aquaticum, Ludwigia peploides, Pennisetum clandestinum* and *Axonopus affinis.*

A total of 46 species of plant were recorded within the site *(Appendix C)* of which 34 (74 per cent) are native. No threatened or rare species were recorded.

Weed invasion within the wetlands is moderate with 12 species of weed recorded. None of these weeds are listed as noxious species in the Great Lakes Local Government Area under the *Noxious Weeds Act 1993.*

Fauna

These wetlands provide habitat for frogs, insectivorous bats and wetland birds. A number of migratory and wetland species were opportunistically observed during the survey including Black Swans, White-faced Heron, Australian Wood Duck and White-bellied Sea Eagle. The threatened Eastern Freetail Bat has been recorded in the vicinity of the wetlands and the site provides foraging habitat for wetland birds including the endangered Black-necked Stork (Parsons Brinckerhoff 2004).

The wetlands are a class three wetland and provide only minimal fish habitat. Native fish recorded within the wetlands include Striped Gudgeon, Empire Fish and Short-finned Eel. The introduced *Gambusia holbrookii* has been recorded in the northern wetland (Rooney and Associates 2003). This species preys on native frogs and small fish and thus this wetland would not provide significant habitat for native frogs.

Condition

The freshwater wetlands have been partially cleared in the past, are surrounded by grazed grassland and are subject to ongoing disturbance from grazing. This community is in poor condition.

3.2 Impact assessment

Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions is listed as an Endangered Ecological Community under the *Threatened Species Conservation Act 1995*.

a) In the case of a threatened species, whether the life cycle of the species is likely to be disrupted such that a viable population of the species is likely to be placed at risk of extinction

Not applicable

b) In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised

Not applicable

c) In relation to the regional distribution of a habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed

Within NSW it is estimated that less than 21 700 hectares (39 per cent) of this community remained in 1969. Continued clearing and drainage works in the 35 years since this survey has resulted in significant decreases in its distribution. One recent estimate indicates that there is currently 90-160 square kilometres of wetlands remaining (60-90 per cent of original extent). However, this is an overestimate of the extent since it includes freshwater wetlands on coastal sandplains which is excluded from this determination (NSW Scientific Committee 2004). Vegetation surveys of this community within the north coast bioregion are old and incomplete, however the estimates of extent in this region include:

- less than 150 hectares remaining on the Tweed lowlands in 1985
- approximately 10 600 hectares on the lower Clarence floodplain in 1982
- approximately 11 200 hectares on the lower Macleay floodplain in 1983.

The subject freshwater wetlands at Bulahdelah have been partially cleared in the past, are surrounded by grazed grassland and are subject to ongoing disturbance from grazing. This community is in poor condition, has a high level of weed invasion and provides limited habitat for fauna. Approximately 23 hectares of wet meadow occur within the area. The proposal would require the removal of 1.8 hectares (7.8 per cent of the local distribution) of poor condition wet meadow. This is not considered to be a significant area.

d) Whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community

The proposal traverses the Myall River floodplain, which contains small patches of wet meadow and freshwater wetlands. It would bisect two of these patches resulting in fragmentation and isolation of these patches. This community is however already fragmented and isolated as a result of clearing and agricultural activities within the area and the proposal is unlikely to significantly increase this fragmentation.

e) Whether critical habitat will be affected

Critical habitat is listed under the *TSC Act* and the Director General of the NSW Department of Environment and Conservation maintains a register of such habitat. Critical habitat is the whole or any part or parts of an area or areas of land comprising the habitat of an endangered species, an endangered population or an endangered ecological community that is critical to the survival of the species, population or ecological community (NSW National Parks and Wildlife Service 1996).

Critical habitat has not been listed for Freshwater Wetlands on Coastal Floodplains and the site is unlikely to be critical for the survival of the community.

f) Whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or similar protected areas) in the region

Small areas of freshwater wetlands on coastal floodplains occur within conservation reserves, however, these reserves are unevenly distributed throughout the range and would be unlikely to represent the full diversity of this community. Within the north coast bioregion, freshwater wetlands occur within four conservation reserves: Ukerebagh, Tuckean and Tabbimoble Swamp Nature Reserves as well as Bungawalbin National Park. These reserves all occur within northern NSW and this community is under represented in the southern area of the bioregion. Wetlands occurring within these conservation reserves are still exposed to threats such as hydrological changes that occur outside the boundaries of these reserves and thus reservation provides only limited protection (NSW Scientific Committee 2004). This community is unlikely to be adequately represented within conservation reserves within the region.

g) Whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process

Key Threatening Processes are listed in Schedule 3 of the *TSC Act.* Freshwater Wetlands on Coastal Floodplains are subject to a number of key threatening processes as well as other threats *(Table 3.1*). The proposed development will include an increase in clearing of native vegetation and human-caused climate change which are listed as a key threatening process. Alteration of the natural flow regimes of rivers, streams, floodplains and wetlands, also a listed key threatening process, would be minimised by the construction of culverts up to 100 metres in length between Stations 94800 and 95400 under the road fill embankment, allowing natural water regimes to maintain these wetlands.

The proposal could also result in an increase in a number of other recognised threats including weed invasion, pollution and eutrophication from runoff and rubbish dumping. Operational fill basins would be established which will help to minimise pollution and eutrophication.

The proposal also has the potential to activate acid sulfate soils, a recognised threat for this community. An acid sulfate soils management plan will be prepared by the contractor prior to the commencement of construction activities. This plan will include measures to minimise the disturbance of acid sulfate soils and treat any acid sulfate soil in areas that have been disturbed (Parsons Brinckerhoff 2004). Mitigation measures provided will limit the impacts of acid sulfate soils on this community.

Table 3.1: Recognised threats to freshwater wetlands on coastal floodplains

Threat to community[1]	Key Threatening Process	Threat likely to increase as a result of the proposal
Clearing of Native Vegetation	Yes	Yes
Weed invasion	No	Yes
Fragmentation	No	Yes
Flood mitigation and drainage works	No	No
Filling associated with urban and industrial development	No	No
Pollution and eutrophication from urban and agricultural runoff	No	Yes
overgrazing, trampling by livestock, soil disturbance by pigs	No	No
Activation of acid sulfate soils	No	Limited. Mitigation measures provided to minimise impacts of acid sulfate soils
Rubbish dumping	No	Yes
Human-caused climate change	Yes	Yes
Alteration of the natural flow regimes of river, streams, floodplains and wetlands	Yes	Limited. Mitigation measures provided to minimise changes to flow
Invasion of native plant communities by exotic perennial grasses	Yes	No
Predation, habitat destruction, competition and disease transmission by feral pigs	Yes	No

1) listed in final determination (NSW Scientific Committee 2004)

h) Whether any threatened species, population or ecological community is at the limit of its known distribution

Freshwater wetlands on coastal floodplains occur below 20 metre elevation in NSW North Coast, Sydney Basin and South East Corner Bioregions (NSW Scientific Committee 2004). The proposal is within the Great Lakes Local Government Area and is not at the limit of distribution of this endangered ecological community.

Conclusion

The freshwater wetlands have been partially cleared, are surrounded by grazed grassland and are subject to ongoing disturbance from grazing. This community is in poor condition. The removal of 1.8 hectares of poor condition wet meadow subject to ongoing disturbance is unlikely to have a significant impact on this community or its recovery.

3.3 Impact amelioration

A general principle of environmental management is to, in order of preference;

1. **Avoid** environmental impacts
2. **Minimise** impacts
3. **Mitigate** the impacts
4. as a last resort once the above options have been investigated, **compensate** for the residual impacts.

Mitigation measures for the proposed highway are outlined in detail in the Species Impact Statement (Parsons Brinckerhoff 2004). Mitigation measures of particular importance for the freshwater wetlands are:

- culverts up to 100 metres in length between Stations 94800 and 95400 would be provided under the road fill embankment to allow natural water regimes to maintain these wetlands
- all culverts will be designed to maintain fish passage to the wetlands south of the Myall River in accordance with Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge 2003)
- scour protection measures for culverts and bridges will be designed so that fauna movements are facilitated
- drainage structures will be located as close as possible to existing drainage channels to channel water down existing gullies and watercourses
- a fauna rescue framework for clearing has been developed by the RTA in consultation with NSW Department of Environment and Conservation and will be used as a basis for developing a protocol for the removal of injured animals during this project
- fencing/parawebbing of the footprint/“no-go” areas will be undertaken early in construction to ensure that vehicles and other direct disturbances associated with road construction do not encroach into adjacent wetland areas

- a hygiene protocol for contractors to minimise the spread of the amphibian chytrid fungus will be developed in consultation with Department of Environment and Conservation
- water quality and surface and sub-surface flows will be maintained by:
  - constructing and maintaining appropriate drainage structures
  - installing sediment controls on the Myall River bridge approaches prior to commencement of earthworks
  - traps and other mitigation structures to minimise the likelihood of run-off from the road surface entering the environment without removal of contaminated substances such as oil and heavy metals.
- any disturbed areas within the footprint, especially those adjacent to potential underpasses will be revegetated
- monitoring water quality within wetlands and condition of the community.

4. Conclusions

Approximately 23.1 hectares of freshwater wetlands occur on the floodplain of the Myall River within one kilometre of the proposed Upgrade of the Pacific Highway at Bulahdelah. Two of these wetlands, covering approximately 1.8 hectares (7.8 per cent of the local distribution), are within the footprint of the proposal.

These wetlands have been partially cleared, are surrounded by grazed grassland and are subject to ongoing disturbance from grazing. This community is in poor condition. An eight part test for this community was undertaken for this community and concluded that the removal of 1.8 hectares of poor condition wet meadow subject to ongoing disturbance is unlikely to have a significant impact on the recovery of this community. Mitigation measures have been provided to minimise impacts.

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