Somersby Fields
PARTNERSHIP
ABN 41 781 514 513

Somersby Fields Project

Response to Government Agency Submissions and Non-Confidential Public Submissions

Prepared in conjunction with:

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FOREWORD

This document presents responses addressing relevant issues incorporated within submissions provided by Government Agencies and non-confidential public submissions relating to the Somersby Fields Project.

The responses have been assembled into three sections in this document.

Section 1: Information compiled by the Proponent responding in a general manner to the various issues presented in non-confidential public submissions.

Section 2: A more detailed response to the various technical issues raised in both the Government Agencies' and non-confidential public submissions.

Section 3: An updated copy of the Proponent's Statement of Commitments that incorporate a range of amended or new commitments compiled in response to the issues raised in submissions.

The document concludes with a list of references referred to in the various responses and an Appendix recording the coverage of the various issues in the *Environmental Assessment*, Specialist Consultant Studies Compendium and this document.

It should be noted that this document does not include responses to flora, fauna, or biodiversity offset issues. A detailed response to these issues will be covered in a separate document.

ACRONYMS COMMONLY USED

EA	*Environmental Assessment*
DECC	Department of Environment and Climate Change
DoP	Department of Planning
DPI	Department of Primary Industries
DWE	Department of Water and Energy
RTA	Roads and Traffic Authority
SFP	Somersby Fields Partnership

SECTION 1
GENERAL RESPONSE

This section has been compiled by the Somersby Fields Partnership. It provides the Proponent's general response to those issues raised in the public submissions.

1.1 INTRODUCTORY COMMENT

Apart from identical form submission letters, there were about 160 submissions to the proposal by the Somersby Fields Partnership from members of the local community and interested individuals. Most of these 160 submissions simply listed the headings of the matters they were concerned about without the benefit of reference to the *Environmental Assessment* and supporting documentation or providing evidence to support the basis of their concerns.

Some submissions in this group were signed by a number of individuals. Some of the submissions were identical or very similar in wording to other submissions. A number were from present and former students of the Somersby Public School. Issues raised in the more detailed submissions have been addressed in the following comments.

Adopting a classification system around issues (and noting that the figures regarding submissions in this response are approximate rather than precise), the number of times each issue of concern was raised with the "general public group" was as follows.

Issue		Nº of Submissions
1.	Water (both ground and surface)	150
2.	Impacts on the school	145
3.	Dust	57
4.	Traffic	50
5.	Lifestyle, stress and general environment	32
6.	Alternative sources of sand	26
7.	Environmental Assessment and Modelling	25
8.	Flora and fauna	24
9.	Noise	22
10.	Other:	
	▪ Loss of farm land	11
	▪ Depression of land values	10
	▪ Difficulty in enforcing conditions	8
	▪ Effects on local businesses	6
	▪ Too many quarries at Somersby	5
	▪ Effect of climate change	7

Additionally, our response to other issues raised is outlined at the end of this section.

1.2 WATER

Water issues related to the following.

1. Surface Water.
2. Groundwater.
3. Specific bores / springs near the site.

1.2.1 Surface Water

The submissions referring to detrimental effects on water quality and/or water quantity in the headwaters of:

- Narara Creek;
- Ourimbah Creek (Platypus Creek);
- Robinsons Creek; and
- Little Mooney Mooney Creek (Somersby Village Creek);

due to the project, are not supported at all by the technical evaluation undertaken by our consultants.

Key points in response to the specific issues raised are as follows.

1. The majority of the submissions received were not supported by any technical evaluation and provided no new evidence to refute the conclusions of our consultants.
2. The modelling and specialist consultant's investigations indicate that the project will have negligible impacts on surface water. The quality of the surface water from the site (ie. from Dam A off the site and into Narara Creek catchment) will improve, principally because of the effectiveness of the dams on the site. For example, concentrations of total suspended solids, total phosphorus and total nitrogen will all fall.

There is no need to give any undertakings to surrounding land owners about surface water although we have provided an assurance to the Department of Primary Industries (DPI) that the base flow of water to its Research Station from Dam A would continue. A special diversion pipe to achieve this outcome has been designed for Dam A (see Commitment 9.1).

1.2.2 Groundwater

Many of the submissions were from landowners whose properties are predicted not to be affected or from people believing the project will "use" groundwater thereby reducing the quantity of groundwater available to others.

Key points in response to the specific issues raised are as follows.

1. The project will cause localised reductions in groundwater levels. However, this is caused by the removal of sand not from any direct use of groundwater by the project.
2. The project does not propose to use any bores.
3. The effects on the groundwater table would be caused solely by the creation of a land depression from where the sand is removed.
4. In Section 1.2.3, we deal with the individual properties whose springs / bores are likely to be adversely affected by the project.

1.2.3 Specific Bores / Springs Near the Project Site

Key points in our response to the specific issues raised are as follows.

1. The modelling / consultant's evaluation shows that only two bores will experience a draw-down of around 10% or greater, namely Somersby Public School (13%) and the Daniel's property (9.6%). This is forecast to occur between Years 9 and 12 but will not continue when the final landform is in place. In relation to this, the Proponent has offered to deepen both the Somersby Public School and the Daniel's existing bores to ensure the water flow is maintained.
2. We have offered to immediately deepen the bore at the Somersby Public School to demonstrate the ability of a deeper bore to penetrate deeper water flows (see Commitment 8.5).
3. Specialist consultant studies identified seven springs adjacent to the Project Site. Three (Ozbagler (two springs) and Weller properties) are sourced from perched water and hence reliant on rainwater. The remaining springs (Fischer, Cahill and Hawker properties) were inspected and were regarded as true groundwater springs and the other (Gregory property) could not be inspected on site but was also believed to be a true groundwater spring.

   The evaluation showed the following likely effects on these seven springs. Our commitment to each landholder is also given.

Spring	Effect Expected	Loss	Commitment
1. Cahill	Long-term recovery not expected due to lower groundwater table.	Significant	Written undertakings to provide alternative satisfactory water supplies have been made to these six landowners.
2. Hawker			
3 & 4. Ozbagler	Long-term recovery not expected.	Moderate	
5. Fischer	Impact would be less and delayed.	Minor	
6. Weller			
7. Gregory			

4. Although the nearby Rindean Quarry is currently not operational, the combined effect of it and the Somersby Fields operation on these springs has been assessed. Only two springs (Weller and Gregory) are in the overlap area. The Weller property spring is largely reliant on rainfall and the consideration of the two operations is not expected to further impact this spring. However, a major impact is expected on the Gregory property's spring from the combined operations with the bulk of the reduction in spring flow attributable to Rindean with a minor reduction impact from the Somersby Fields Project.

1.3 IMPACTS ON THE SOMERSBY PUBLIC SCHOOL

There are some factual errors in many of the public submissions regarding the impact of the Somersby Fields Project on the Somersby Public School. The actual facts are as follows.

(a) The Project Site entrance is 700m in a direct line and approximately 1km by road from the Somersby Public School entrance.

(b) The processing plant will be 650m from the nearest Somersby Public School building.

(c) At the end of Stage 1, the closest sand extraction to the Somersby Public School will be 350m.

(d) Towards the end of the whole project, when sand is being extracted closest to the Somersby Public School, the shortest distance to the Somersby Public School building is 260m.

(e) It will be impossible for any person at the Somersby Public School boundary (or indeed <u>any</u> public area along any road) to see either the sand extraction area or the processing plant.

(f) The topography of the Project Site (even before any sand is removed) is lower than the Somersby Public School site and has on its westerly boundary a thick stand of trees that will not be affected by the Somersby Fields Project. A site inspection would be helpful in better understanding the relationship physically of the Somersby Public School and the Project Site.

There were 93 submissions referring to the Somersby Public School, which claimed to be concerned about impacts on the school, but did not give specific reasons for their concern. Our responses to the specific impacts stated in the submissions are as follows.

1.3.1 Noise

(26 Submissions Received)

The Somersby Fields Project will meet all noise criteria at the Somersby Public School throughout its entire operation. During all stages of the project, namely construction, establishment, Stage 1, Stage 2, as well as all traffic, trucks and mobile equipment operations, the project satisfies noise criteria at the Somersby Public School. There are no exceptions to this as far as the Somersby Public School is concerned.

Since the construction noise during the construction of the bund on the site nearest to the Somersby Public School would equal the construction noise criteria at the school, we have committed to construct this bund during school holidays (see Commitment 10.6).

1.3.2 Dust

(24 Submissions Received)

These submissions raised concerns about general dust and the risk of silicosis at the Somersby Public School.

1.3.2.1 General Dust

Under the "worst case" scenario, when equipment is working in Stage 2/2 (ie. the area closest to the Somersby Public School) including the sand removal activities, use of internal haul roads and plant operations, the consultants concluded that the project's impact on the Somersby Public School met every dust criteria – namely "incremental dust deposition", "incremental PM_{10} concentrations" and "incremental $PM_{2.5}$ concentrations", are all below the minimum standards required.

1.3.2.2 Silica

The *Environmental Assessment* (Page 4-99 – Section 4.4.7.4) states: "The principal health issue relevant to the Somersby Fields Project and the Somersby community relates to the concentration of respirable crystalline silica in the air, ie. particles of quartz <10μm in diameter". Many of the 24 submissions relating to dust at the Somersby Public School bore this out.

The consultants specifically addressed this issue and concluded:

- "The most notable outcome, …. is that the additional airborne respirable crystalline silica at the Somersby Public School attributable to the Somersby Fields Project would be 1.5% of the predicted existing background levels at the Somersby Public School." *(Page 4-99)*
- "Neither the Chrome REL or Silicosis Potency criteria are predicted to be exceeded by the project at …. the Somersby Public School. Rather, the actual levels are considerably lower than the criterion, often by a factor of 19." *(Page 4-100)*
- "It is considered that the risk of Silicosis as a result of operations of the Somersby Fields Project is negligible. This conclusion is consistent with the statement made by the World health Organisation that 'to date, there are no known adverse health effects associated with non-occupational exposure to quartz dust'". *(Page 4-100)*

We have committed to dust monitoring at an agreed intermediate location, between the Somersby Public School and Stage 1 during Stage 1 operations and about 260m from the closest activity in Stage 1 to replicate the closest distance between the classrooms at the Somersby Public School and the closest point on the Stage 2 sand removal (see Commitments 18.1 and 18.2.

1.3.3 Decline in Students / Possible School Closure

(7 Submissions Received)

A number of submissions stated that children would leave (or be removed from) the Somersby Public School if the project proceeded. This claim was also made at Maroota when the Dixon Sand Project was under consideration in 2002. A major difference between the two projects is that product trucks travel past Maroota School whereas they will not at Somersby.

Our consultants concluded that the viability of the school is not necessarily dependent upon the current parents, that school enrolments peak and trough in these schools and that "if, as appears to be the case in Maroota, future actual impacts and the community perceptions of these are less than anticipated, the school should continue to function along its typical fluctuating trajectory of growth, namely peaks and troughs" *(Page 4-148).*

1.3.4 Safety (Fencing)

(2 Submissions Received)

Top level sand benches created on the Project Site will not exceed 3m around the perimeter of the area of sand removal. The safety perimeter fence will be 2m and the gates at the site entrance will be locked outside approved operating hours.

1.4 DUST

(57 Submissions Received)

Of the submissions received, 46 referred only to general dust problems they expected from the project. However, our consultants concluded that every dust criteria would be met by the project at every residence that surrounds the Project Site. There were no exceptions to this compliance.

In addition, some specific dust issues were raised in submissions. A detailed response to these issues is provided in Section 2.3.5.3.

Horses

(5 Submissions Received)

The project is predicted to have minimal effect on dust levels at the properties around the Project Site. Dust monitors at five locations are proposed which surround the Project Site and provide the information necessary to monitor the actual outcomes.

We intend to re-establish / re-locate the deposited dust monitors if it is considered by the Panel that inadequate monitoring for impacts on surrounding residences exists (see Commitments 18.1 and 18.2). Section 2 contains a more detailed response on the impact of dust on horses.

Vegetables, Flowers and Poultry

(2, 2 and 1 Submissions Received respectively)

The nearest site involving these land uses is Reference "4 " (Coachwood Nurseries Pty Ltd) as per Page 4-81 or "R" in the assessments page. A deposited dust monitor is proposed for this site. The nearest site to "R" (which is closer to the Project Site) is "Q" with the next intervening site after "Q" being "S". The incremental concentration at "S" of dust deposition, PM_{10} 24 hour average, PM_{10} annual average under the worst-case scenario (Scenario 2) is 0.2, 0 and 0.6 respectively – all very low. It is reasonable to estimate the possible impacts at "R" as being significantly lower again.

1.5 TRAFFIC

(50 Submissions Received)

These submissions covered three aspects.

1. Noise and Safety near the Project Site (33 submissions).
2. Hours of operation (4 submissions).
3. Transport on the F3 (13 submissions).

Noise and Safety near the Project Site

Detailed noise studies have been completed on trucks travelling on Peats Ridge Road at two existing residences and the proposed residence at the Somersby Fields Research Station. In order to ensure all noise criteria are met, a maximum number of project truck movements allowable during each time period has been proposed (Page 4-76 – Table 4.26). As technology improves, truck movements may be adjusted to meet noise criteria at affected residences. Hence, the project's truck noise would satisfy DECC requirements. We have committed to require all trucks travelling to and from the Project Site between 5.00am 7.00am to satisfy rigorous noise standards (see Commitments 13.5 and 13.9).

Hours of Operation

The proposed hours of operation are consistent with those normally adopted by the extractive industry for operations on the Somersby Plateau and surrounding the Sydney metropolitan area.

The site entrance is approximately 800m from the Somersby Interchange with the F3. This length of road is essentially straight until the interchange. This road is at just over 10% of its capacity and the design of the site entrance proposed should address all safety needs.

Transport on the F3

The additional trucks on the F3, will, of course, by matched by a reduction in sand trucks from the Penrith Lakes into the Sydney market on the M4. The fact is that all roads into Sydney are at or near capacity, particularly during peak periods. Use of rail transport from Gosford is not practical nor is it cost-effective.

Rail transportation of sand gives rise to a series of complicated issues. Namely:

- A rail storage and loading facility at or near the sand deposit. A purpose-built facility will create a new set of environmental issues.
- Given that the Somersby Fields Project Site is only 75km from Sydney and adjacent to the F3, rail transport is not an economic alternative for such a short distance.
- A rail unloading, storage and truck loading facility in Sydney – again creating another set of environmental issues.

It is further noted that it remains our preference to despatch laden trucks early in the morning and of an evening to reduce the need to travel on the F3 during peak periods.

1.6 LIFESTYLE, STRESS AND GENERAL ENVIRONMENT

(32 Submissions Received)

These submissions are all general and subjective claiming detriment to lifestyle, stress or the general environment. Apart from people not wanting a sand extraction operation "in their backyard", there does not appear to be any reason on which this claim for detriment to lifestyle, stress or the general environment can be sustained based upon the technical assessment of the project.

In response to the issues raised, it should be noted that the project:

- cannot be seen from any public road or area;
- cannot be seen from the Somersby Public School;
- meets noise criteria at all residences except for one adjoining property;
- meets all dust criteria;
- has trucks avoiding all local roads, using only the major F3 freeway and 800m of Peats Ridge Road.
- uses no bore water;
- protects surface water supplies downstream; and
- improves surface water runoff.

Apart from people not wanting a sand extraction operation "in their backyard", there does not appear to be any reason on which this claim for detriment to lifestyle, stress or the general environment can be sustained.

We are unaware of current problems arising regarding "lifestyle, stress and the general environment" from the Hanson (formerly Pioneer) sand operation at Grants Road which involves an older processing technology and truck movements on Wisemans Ferry Road past Somersby Public School.

1.7 ALTERNATIVE SAND SOURCES

(26 Submissions Received)

The *Environmental Assessment* at Page A4-5 shows all the major potential fine sand resources that could possibly supply the Sydney and Central Coast markets. Brief comments are:

Reference	Location	Comment
A	Williamstown / Anna Bay	175km from Sydney –environmentally sensitive dune sand extraction. Would require use of rail and hence a special loading facility nearby. Hence, high transport cost.
B	Somersby Plateau	75km – an extension is being proposed at the Calga Sand Quarry, however, issues being experienced by the Somersby Fields Project are equally applicable at other Plateau sites.
C	Wrights / William Creek	100km – serious road problems and local environmental issues.
D	McDonald River	80km – serious road problems and local environmental issues.
E	Hawkesbury River	95km – serious road problems and local environmental issues.
F	Maroota	70km – road problems and local environmental issues.
G	Richmond Lowlands	60km – high environmental issues and impacts (long term) on fertile agricultural river flats.
H	Newnes	185km – although a 1Mtpa operation has already been approved, it has not commenced operations due to the high costs involving many product handlings and use of rail.
I	Marine Aggregates	30km – detailed assessment undertaken in the early 1990's but rejected by government following outcry re: effect on beaches / water quality and road transport from Sydney Harbour / Botany.
J	Marine Aggregates	35km – detailed assessment undertaken in the early 1990's but rejected by government following outcry re: effect on beaches / water quality and road transport from Sydney Harbour / Botany.
K	Port Hacking	25km – only limited quantities may be removed to maintain navigation channels.
L	Darkes Forest	50km – protected in Water Board Catchment.
M	Lake Illawarra	105km – issues relating to reed beds are likely to restrict / prevent extraction.
N	Marine Aggregates	115km – detailed assessment undertaken in the early 1990's but rejected by government following outcry re: effect on beaches / water quality and road transport from Sydney Harbour / Botany.
O	Southern Highlands	160km (via the F5) – various sources exist but traffic distances and environmental issues are considerable.

In short, there are few alternative sand resources that can economically supply the Sydney market and have fewer environmental impacts than the Somersby Fields Project, particularly as Sydney's past long term sources of sand are depleted.

1.8 ENFORCEMENT PROBLEMS

(8 Submissions Received)

All of these submissions are of a general nature. We believe the monitoring, reporting of results, consultative committee, and communications program proposed addresses these concerns. Furthermore, we remain committed to constructing a "best in class" fine sand operation which would meet all the standards and conditions set by the government and for which they can be proud.

1.9 FLORA AND FAUNA

(24 Submissions Received)

A supplementary flora and fauna report is being prepared to address various issues raised in the submission from the Department of Environment and Climate Change (DECC). A separate response document is being compiled to address the ecological issues raised. The public submissions in this area deal with the following.

(a) General Comments *(8 submissions)*

All of these were entirely general in nature.

(b) Somersby Mintbush *(8 submissions)*

We believe we have gone to great lengths to establish a Voluntary Conservation Area for this plant and we are committed to commission appropriate monitoring projects consistent with the Recovery Plan for it. Approximately 11% to 16% of the overall "Population 6" (30 to 40 plants) will be removed and translocated.

(c) Pigmy Possum *(3 submissions)*

(d) Red Crowned Toadlet *(2 submissions)*

These submissions stated the habitat for this and other fauna would be lost. However, there is no current evidence such fauna are actually present however.

1.10 NOISE

(22 Submissions Received)

All of the general noise submissions simply state noise will be a major problem. Apart from the Daniel's property, all noise criteria would be satisfied throughout the life of the project. At the Daniel's property, the predicted exceedances would occur for a brief period during the construction period and during some Stage 2 operations. Upon receipt of project approval, the Proponent intends to extend its offer (in good faith) to the Daniels to provide fair compensation for these exceedances.

With the proposed monitoring and the two-stage approach, we believe there will be a very robust process to ensure noise criteria are met.

1.11 OTHER SUBMISSIONS

1.11.1 Loss of Farm Land

(11 Submissions Received)

The submissions suggested of two types of farm land losses – the actual site and the downgrading of surrounding farm properties due to impacts from the Somersby Fields Project.

The Project Site is already degraded following removal of much of the top 1m to 2m by the Department of Main Roads in the 1970's.

The dust, surface water and groundwater impacts on all surrounding properties indicate there would be limited impacts that would in any way downgrade farm land. Importantly, with the exception of surface water issues, the adjoining DPI Research Station does not comment that the Somersby Fields Project could negatively impact the research work carried out at the station.

1.11.2 Depression of Land Values

(10 Submissions Received)

The Somersby Fields Project has had a profile in the community for at least seven years.

In early 2007, a nearby 33 acre property with an older style house was given a valuation of $1.75 million. The asking price for this same property in September 2007 was $2.0 million.

The Proponent sold the adjoining 44 acre airstrip property to the current owners in 2002 for $840 000. This property is currently on the market for $1.75 million.

Nearby properties were selling around $60 000 per hectare in 2006. Current prices are in excess of $100 000 per hectare.

As can be seen from these examples and from recent land sales, prices have risen sharply despite the "threat of a sand mine".

1.11.3 Difficulty in Enforcing Conditions

(8 Submissions Received)

We are committed to operate the Somersby Fields Project in a manner that is fully compliant with all conditional requirements. We would appreciate any potential concerns regarding any possible non-compliances being raised with us directly so that we can take appropriate action. We would be pleased to keep the interested land owners updated regarding the response to the issue raised.

1.11.4 Effects on Local Business

(6 Submissions Received)

Appendix 4 of the *Environmental Assessment* has outlined the employment benefits and additional purchases that would add to the immediate vicinity.

The submissions provided no evidence as to which local businesses would be adversely affected and how..

1.11.5 Too Many Quarries at Somersby

(5 Submissions Received)

The Somersby Plateau is a well recognised source of sand. Sand sources by nature will be concentrated in specific areas.

We firmly believe that the Somersby Fields Project will have minimal impact on the community. In 2001, Gosford and Wyong Councils recognised the appropriateness of the site for sand extraction when they (with the support of various State government agencies) specifically and deliberately rezoned the site.

The Gosford / Wyong LEP 2001 – CCPA was drafted and gazetted effectively to remove a conflict between areas identified as prime agricultural land within the then SREP 8 and areas with extractive resources of regional significance SREP 9(2) (Extractive Industry). SREP 8 was subsequently amended with the Project Site identified as permissible for extractive industries.

This recent change acknowledges the appropriateness of this site for extractive industries. A substantial proportion of the Somersby Plateau is not zoned in this way, which would ensure the farming / nature conservation land use remains dominant on the plateau.

1.11.6 Effect of Climate Change

(7 Submissions Received)

These submissions mention “climate change” with some quoting a possible 20% reduction in rainfall on the Australian East Coast in the long term.

Firstly, the project’s approval sought covers 18 years. As such, it is not a project for which long-term climate changes are directly relevant. However, it is acknowledged that after the Somersby Fields Project is completed (ie. beyond 18 years) the amount of annual drawdown in groundwater would be approximately 12ML/year. This is just under one third of the water licence that we hold.

1.11.7 Local Member Submissions

1. Marie Andrews – local member

Her objections related to:

- the proximity to Somersby Public School;
- groundwater;
- livelihoods under threat;
- relocation of Gosford Horticultural Institute to Somersby;
- increase in noise and traffic; and
- population growth.

All of these have been covered except "population growth" where Ms Andrews is concerned "to protect land west of the F3". The residual land use proposed would conform to the Gosford Council's zoning at the completion of the project.

2. John Della Bosca – Minister for Education and Training – Minister for the Central Coast

Mr Della Bosca shares the concerns of the community and his Department recommends a number of conditions regarding the Somersby Public School if the Somersby Fields Project is approved.

The concerns raised in Mr Della Bosca's correspondence are addressed in the detailed responses to the matters raised in the correspondence from the Department of Education and Training in Section 2 of this document.

1.11.8 Concerns re Computer Modelling

A number of submissions expressed concerns about the reliance placed upon computer modelling given their knowledge of circumstances where the results of computer modelling have not coincided with actual measurements. Detailed responses for various computer models are included in the detailed responses in Section 2.

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SECTION 2
DETAILED RESPONSE

*This section provides a detailed response to the various issues raised in the government agencies' and non-confidential public submissions. For the benefit of readers, each of the issues raised by the various government agencies is listed in **Appendix 1** together with a reference list indicating where each issue is addressed in the Environmental Assessment, Specialist Consultant Studies Compendium and this document.*

2.1 SURFACE WATER AND GROUNDWATER RESOURCES

2.1.1 Surface Water

2.1.1.1 Introduction

The written comments received during the exhibition period have been grouped into the following broad areas.

- Catchment areas.
- Existing conditions:
  - adopted rainfall and evaporation data;
  - estimated stormwater runoff;
  - estimated stormwater quality.
- Impacts on:
  - changes in catchment areas;
  - surface runoff yield;
  - surface water quality.

In preparing a response to each issue, reference has been made to comments from government agencies and the Somersby Action Group. These comments cover what are considered to be the key issues.

The surface water assessment was undertaken with considerable reliance placed upon mechanical modelling which attracted some critical comment in some submissions. Two models were used to estimate the effect of the Project on surface water runoff, including peak flood flows, and surface water quality. The models used were:

1. RAFTS – hydrological modelling software [storm event rainfall – runoff model]; and
2. MUSIC – continuous hydrological and water quality runoff modelling software.

RAFTS modelling software was used to characterise the catchments in order to estimate peak storm flows and storm event runoff volume. The model is recognised in "Australian Rainfall and Runoff" published by the Institution of Engineers [Australia]. The software is one of three commonly used programs for modelling and is widely adopted by the engineering profession.

MUSIC modelling software has in recent years become adopted as the industry standard model for characterising the volume and quality of surface stormwater. The model takes into account soil types and moisture holding capacity as well as evaporation. It is most commonly used to model runoff over extended periods using daily rainfall. It can, however, be used for smaller time steps, such as rainfall recorded at six minute intervals. The models seek to characterise the key natural processes / parameters and where possible are calibrated against observed data, and then verified against additional data sets.

Where no local and / or reliable observed data is available, it becomes necessary to use generic parameter values reported for the same or similar climatic, terrain and soil conditions as for the site of interest. Published generic data is derived from models of other catchments where reliable observations are available for calibrating and verifying the models.

In the case of the Somersby Fields Project, use was made of the available observed stream gauging data to "calibrate" the MUSIC model against the observed surface runoff volumes. The MUSIC model parameters were adjusted as necessary to match the observed data and within the context of published parameter values taken from a large number of modelled catchments where data was available to both calibrate and verify the models. This represents the best approach available to the study team.

To calibrate the RAFTS model, or any other storm event hydrological model, simultaneous rainfall and stream flow or flood level data is required. No local stream flow data was available, other than the data for Ourimbah Creek at Tuggerah. However, even this data could not be used because simultaneous continuous short duration recorded rainfall [i.e. rainfall recorded at intervals of less than 1 hour] were available. As a consequence, the modelling parameters adopted were considered representative of the local soil and topography and were based on values used for RAFTS models in other catchments where observed data were available.

The storm event rainfall used in the RAFTS model was taken from the most recent edition of "Australian Rainfall and Runoff" published by the Institution of Engineers Australia. This publication is the standard adopted by the engineering profession throughout Australia and represents the best available information.

2.1.1.2 Catchment Areas

Comment

The Site is within the Central Coast Water Supply Catchment area and the changes to the landform result in a 12ha reduction in the water catchment area and impacts on ground and surface water flows. (Gosford City Council)

The proposal has the potential to impact on groundwater levels and stream flows. Council is concerned that the proposal may have an adverse impact on water quality and flow regimes within Ourimbah Creek. (Wyong Shire Council)

Response

The Project Site lies within the headwater area of four catchments, namely:

1. Narara Creek;
2. Ourimbah Creek Tributary (Platypus Creek);
3. Robinsons Creek; and
4. Little Mooney Mooney Creek Tributary (Somersby Village Creek).

The areas within the Project Site that are estimated to drain to each of the catchments are listed in **Table 2.1** together with an estimate of the percentage of the catchment area taken approximately 1km downstream of the Project Site.

Table 2.1
Summary of Catchment Areas

Catchment	Catchment Area within Project Site	Percent of Catchment 1km downstream of Project Site	Percent of Total Catchment
Narara Ck[1]	23.10 ha	17.1%	1.8%
Ourimbah Ck Trib.	14.15 ha	18.6%	2.9%
Robinson Ck	1.6 ha	1.5%	0.5%
Little Mooney Mooney Ck Trib	3.40 ha	3.8%	2.0%

1. Narara Creek total catchment area estimated at Hanlan Street and upstream of the Fountain Creek confluence.

As a result of the project, the topography would be modified on a progressive basis with the final proposed topography resulting in an increase in the catchment draining to Narara Creek and a decrease in each of the other three catchments. The changes to each catchment are summarised in **Table 2.2**.

Both Robinson Creek and Little Mooney Mooney Creek are within the Upper Mooney Dam catchment. The total area of the two catchments that would be diverted towards Narara Creek catchment as a result of the project is 2.0ha. The total catchment area draining to the Upper Mooney Dam is estimated as 3 841ha. The area to be diverted therefore represents approximately 0.05% of the total catchment and as such is considered insignificant.

Table 2.2
Summary of Changes in Catchment Areas

Catchment	Pre-Development Site (ha)	Final Post Development Site (ha)	Change in Area (ha)	Percent Change in catchment area at an estimated 1km downstream of the Project Site	Percent Change in Total Catchment
Narara Creek (4 860 ha)	23.10	34.60	+11.5	+ 8.5%	+0.23%
Ourimbah Creek Tributary (440 ha)	14.15	4.70	- 9.5	- 12.5%	-2.16%
Robinsons Creek (600 ha)	1.6	0.03	- 1.3	- 1.2%	-0.21%
Little Mooney Mooney Creek Tributary (1 070 ha)	3.40	2.70	- 0.7	- 0.8%	-0.07%

The estimated average annual site runoff to Ourimbah Creek under existing conditions is 41.4ML. As a result of the Project, there would be an estimated reduction in the Ourimbah Creek catchment area of 9.5ha resulting in an estimated average annual runoff volume of 13.6ML. This is a decrease of 27.8ML annually and represents approximately 2.2% of the estimated total Ourimbah Creek average annual runoff of 1 180ML.

2.1.1.3 Rainfall, Evaporation, and Storm Runoff Yield

Comment

Comments in the Somersby Action Group submission and re-iterated by Dr Bell relating to surface water issues are summarised as follows.

1. *Difficulties associated with the spatial variability of rainfall across a catchment when based on single point rainfall data.*
2. *The simplification of complex natural systems when using mathematical models to simulate the natural system.*
3. *Large errors in calculated stream flows and extrapolation of stream flow gauging data often occur.*
4. *The period of rainfall from 1965 to 1989 was a relatively wet phase.*
5. *Historical rainfall is unreliable when used to predict future conditions in the context of global warming and climate change.*

Response

Issues relating to climate change (Point 5) are discussed separately in Section 2.1.1.6 of this document. The remaining issues are discussed below.

A: Rainfall and Evaporation

The Bureau of Meteorology Rainfall Station No. 61093 (Dog Trap Road, Ourimbah) is approximately 3km east of the Project Site and the record from this Station was adopted as representative of rainfall at the Project Site. The 30 year period from 1975 to 2005 was used for analysis as the average annual rainfall during this period is very close to the average annual rainfall for the complete record and included rainfall years that were among the 10% of wettest years and 10% of driest years.

Other rainfall stations are located at Peats Ridge and at the Agricultural Research Station adjacent to the Project Site.

The Peats Ridge Rainfall Gauge is located approximately 7.3km northwest of the Project Site. The rainfall recorded at this station is therefore not considered to be as representative of rainfall at the Project Site as the Ourimbah rain gauge.

Enquiries were made to the Manager of the adjacent Agricultural Research Station seeking to obtain historical records. We were informed verbally that the Research Station rain gauge was only used intermittently in conjunction with specific research projects and in any case it would be difficult to find the records.

Notwithstanding the recent drought that has been experienced, the rainfall record used for this study is the best we have available and the records used (1975 to 2005) included a multiple low rainfall years that occurred at the beginning of the recent drought.

Unless long term records are available at the exact project location, there will always be some uncertainty regarding spatial variability of rainfall.

The rainfall record used for the analysis includes part of the 1965 to 1989 period referred to by the Somersby Action Group but the records used also include drought years up to and including 2005. The average annual runoff volume (yield) is averaged over the complete 30 year period that includes the drought years and is therefore considered to be representative of the overall conditions. The average annual rainfall for the 30 year period adopted is 1378mm, this being very close to the annual average of 1377mm taken over the complete record.

The average annual rainfall at Ourimbah is 1377mm compared to 1264mm at Peats Ridge. The difference is less than 10% and therefore the spatial variation in total rainfall is not considered to be large. Further, the rainfall record for Peats Ridge is 24 years (1981~2005) compared to 52 years at Ourimbah (1953~2005). The long term average annual rainfall at Ourimbah is therefore considered likely to be more accurate and given that the station is closer to the Project Site, data from the Ourimbah gauge was adopted for this study.

The evaporation data used for the surface water study was obtained from the meteorological station at Peats Ridge (Station No. 61351). This is the closest evaporation station to the Project Site. No pan evaporation data is collected at the Ourimbah (Dog Trap Road) Station, and records at the Agricultural Research Station are intermittent and therefore would not have been representative, even if they had been available.

B: Storm Runoff Yield

The Model for Urban Stormwater Improvement Conceptualization (MUSIC Version 3.01) was used in this study to estimate the daily and annual volumes of runoff and the quality of the surface runoff the period 1975 to 2005.

The MUSIC model has become an "industry standard" model in recent years and is regularly used for estimating the volume and quality of surface water runoff.

The estimated average annual runoff from the Somersby Fields Project Site over the period analysed (1975 to 2005) to Narara Creek (Dam A), Ourimbah Creek Tributary, Robinson Creek and Little Mooney Mooney Creek Tributary is summarised in **Table 2.3**. For comparison, the estimated runoff to Narara Creek for the driest year and the wettest year in the period analysed are listed in **Table 2.4**.

Table 2.3
Estimated Average Annual Runoff from the Project Site under Existing Conditions

Average Site runoff to Dam A (Narara Ck)	67.2ML/yr
Spring water to Dam A	31.6ML/yr
Average Discharge to Dam A from Project Site	98.8ML/yr
Average Surface Water Discharge from Remainder of Catchment (beyond the Project Site)	88.2ML/yr
Average Total Discharge to Dam A	187ML/yr
Average Site runoff to Robinson Creek	4.7ML/yr
Average Site runoff to Little Mooney Mooney Creek Tributary	9.8ML/yr
Average Site runoff to Ourimbah Creek Tributary	41.4ML/yr

Table 2.4
Estimated Average Annual Runoff from the Project Site under Existing Conditions

	Station No. 61093 Dog Trap Road, Ourimbah
Site Runoff to Dam A (Narara Ck)	
Driest Rainfall Year (1980) 879mm of rain	2.0 ML/yr
Dry Rainfall Year (1993) 885mm of rain	14.4 ML/yr
Dry Rainfall Year (1994) 894mm of rain	19.8 ML/yr
Average Rainfall Year 2001 1381 mm of rain	58.5ML/yr
Wettest Rainfall Year (1990) 2164mm of rain	178.1ML/yr

The MUSIC model was calibrated as far as practicable using the only available stream gauging data. The only available stream gauge data is for Ourimbah Creek at Tuggerah (Station 211005). It is the only available data found during the study that corresponded to a known period of recorded rainfall. The calibration was made for the volumetric runoff coefficient used in the MUSIC model. This approach was considered superior to transposing data from gauged catchments in other areas and potentially subjected to different climatic conditions. Notwithstanding potential errors in the absolute values estimated, the accuracy of the estimated changes in runoff volumes before, during and on completion of the Project are considered to be reasonable estimates and of greater accuracy that the absolute values.

The exceptionally low volume of estimated runoff in 1980 is a consequence of the temporal distribution of rainfall throughout the year. Both 1993 and 1994 had very similar total rainfall (885mm and 894mm respectively) and yet the estimated total volume of runoff for these years was 14.4ML and 19.8ML respectively.

The average annual volume of runoff in **Table 2.3** is the average of the annual total for each of the 30 years analysed and includes a constant allowance for groundwater seepage.

Therefore, in conclusion, the risk of uncertainty in the estimated available volume of surface water over the duration of the Project has been reduced by basing the assessment on the average volume of runoff over the selected 30 year period. It is considered unrealistic to base the assessment on the worst case (driest rainfall year). Further comment is provided in Section 2.1.1.6 regarding potentially lower rainfall due to climate change.

C: Changes in Surface Runoff Yield

Comment

"……the project is unlikely to have any substantial effects on flows in the middle and lower reaches of the streams. However, the effects on flows, flood peaks and water quality in the upper reaches immediately downstream of the Project Site would be largely dependent on the availability and management of water on the site during excavation operations."

Response

The calibrated spreadsheet daily water balance model was used to estimate the daily storage volumes in the Dam A and the combined volume of Dams D, E, and F for each of the identified three year intervals during the planned 15 year life of the Project. Each of the 3 year intervals was analysed for the adopted 30 year period. Daily catchment runoff was generated using MUSIC and input into the water balance models. The results of the water balance assessment were analysed to prepare runoff frequency curves at the boundaries of the Project Site at three yearly intervals. The runoff – frequency curves are plotted in **Figures 2.1** to **2.4**.

The water balance modelling indicated that there would be noticeable changes in the runoff volume only for days when the estimated daily runoff was less than approximately 0.2ML (2.3L/sec). This is the worst case being at the Project Site boundary. In the case of the tributaries whose catchment areas would be reduced, all include paved surface areas (roads)

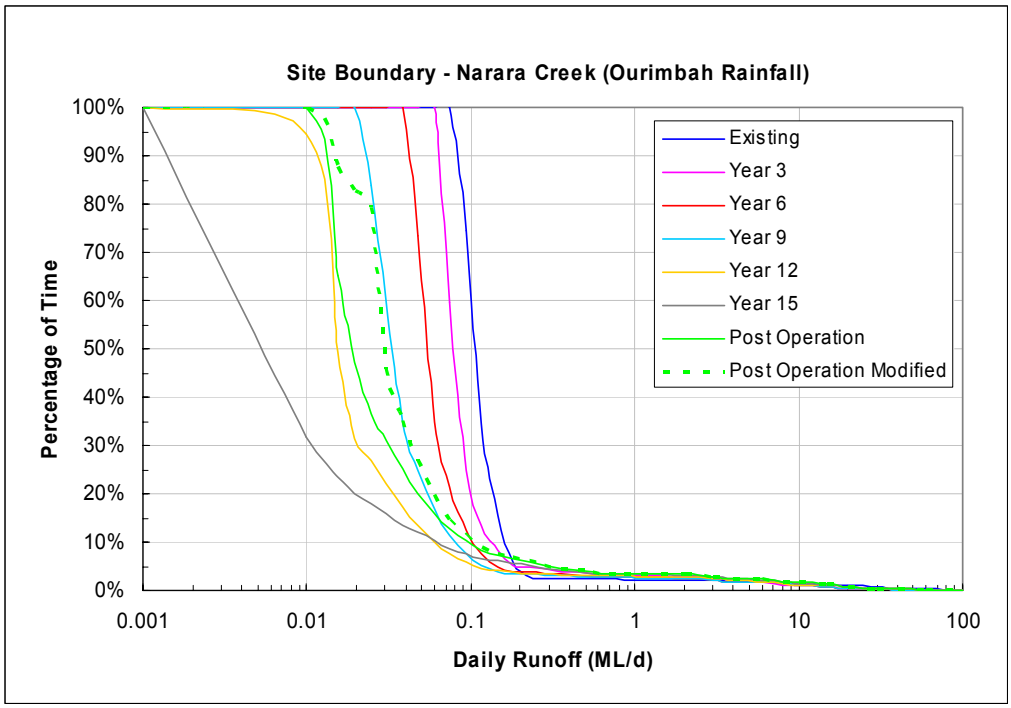

Figure 2.1 Surface Runoff-Frequency For Dam A (Narara Creek).

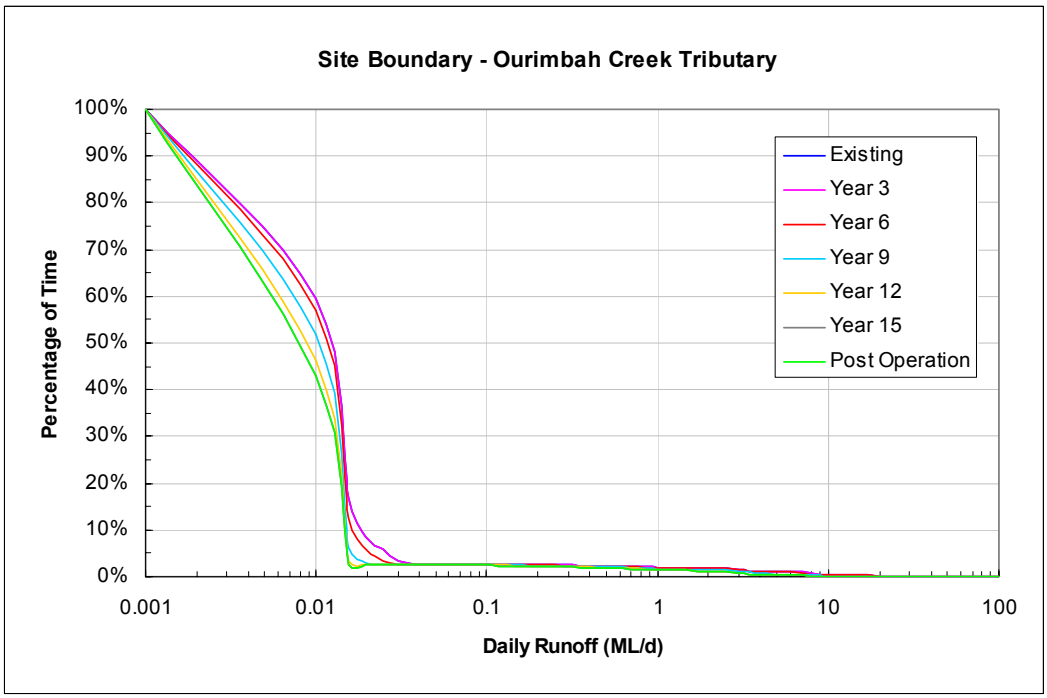

Figure 2.2 Surface Runoff-Frequency For Ourimbah Creek Tributary

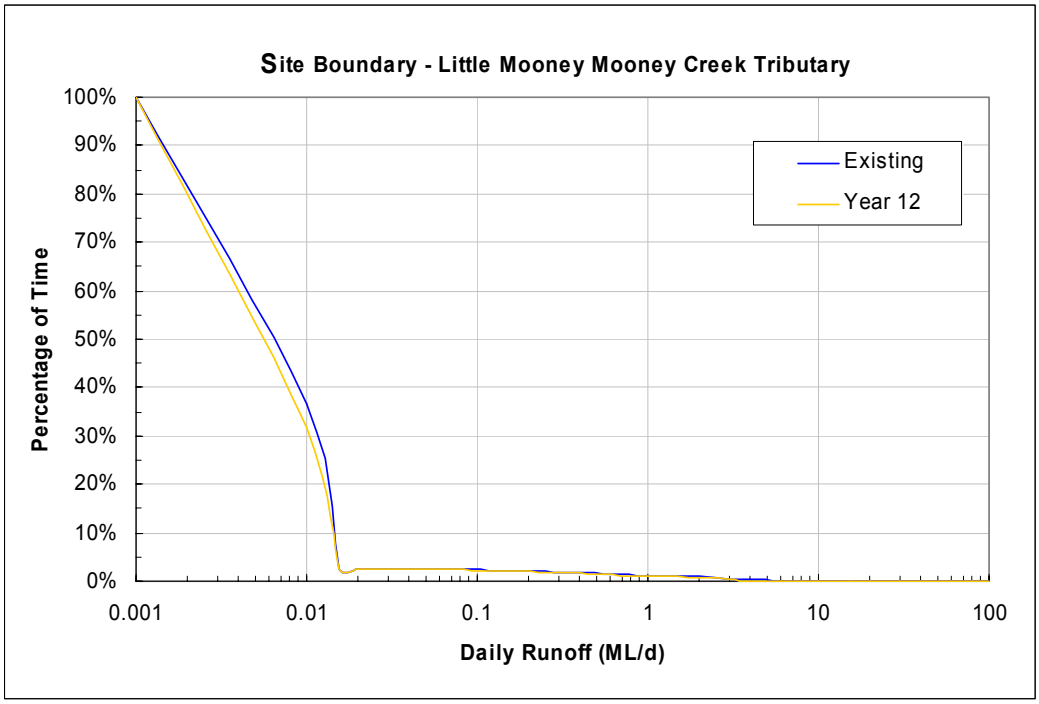

Figure 2.3 Surface Runoff-Frequency For Little Mooney Mooney Creek Tributary

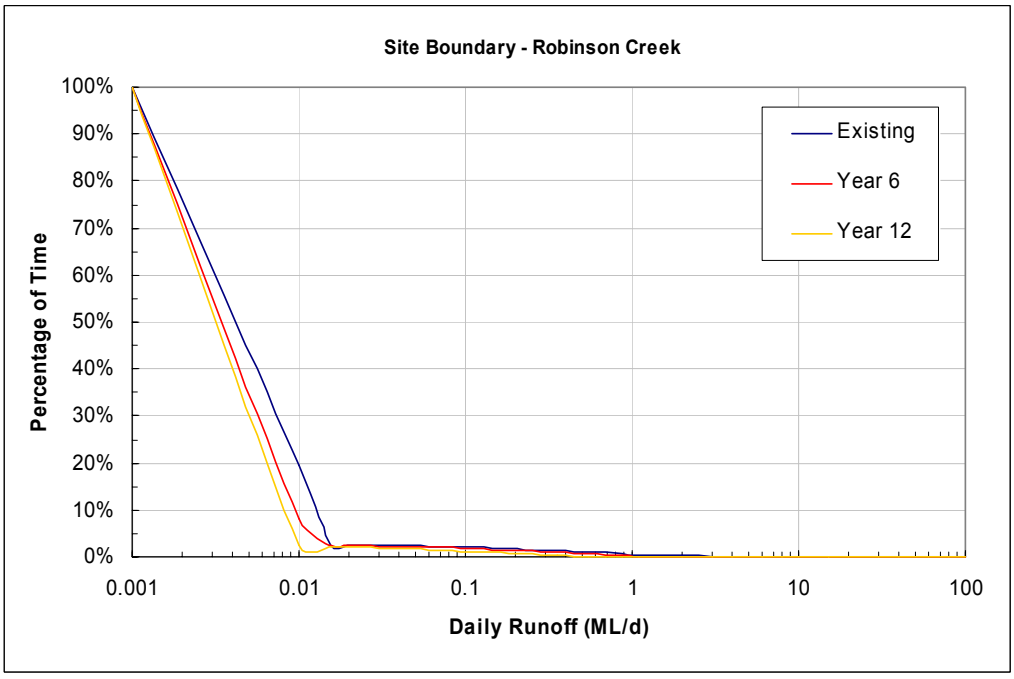

Figure 2.4 Surface Runoff-Frequency For Robinson Creek

adjacent to or near the Project Site. Under low flow conditions with low rainfall, the majority of the runoff occurring at the top of the catchments would be expected to come from the paved areas. Only minor contributions would come from the pervious areas within the Project Site and therefore on the downstream side of the roads surrounding the Project Site under very low rainfall conditions the surface runoff-frequency distribution during and following completion of the Project would be expected to closely match the existing distributions.

In the case of Narara Creek, the reduced surface runoff from the Project Site for low rainfall conditions is attributable to the proposed retention of the dams as water features within the post development Project Site.

Comment

The main water supply for irrigation on the DPI's Somersby Research Station is derived from shallow springs that are most likely fed from sandstone formations that will be affected by the proposed extraction. (DPI).

Response

Previous advice received from the Manager of the Somersby Agricultural Research Station was that future research was likely to be focused on more efficient use of water and therefore there would be less reliance placed on the water supply drawn from the existing dam. Notwithstanding this, the Project includes a low flow diversion to carry spring flow around Dam A so that there would be a regular flow entering the DPI dam.

2.1.1.4 Storm Runoff Quality

Comment

*"Large amounts of sediment will be released into the environment. The fine dust raised by the works will settle on surrounding properties and be washed down into the creeks." (*Somersby Action Group Para 7.2.4)

Response

MUSIC characterises stormwater quality through its use of event mean concentration (EMC) values for storm flow and base flow. The mean EMC and standard deviation for the EMC are input for each pollutant for storm flow and base flow conditions. The pollutant concentrations, including total suspended solids, vary for different land uses and the values adopted were representative of the conditions before, during and upon completion of the Project.

In the case of the area where stripping of the upper soil layers and laterite has previously occurred within the Project Site, the concentration of total suspended solids was assumed to be similar to the concentration for an agricultural land use (cropping) because of the thin grass cover. For the same area, Total Phosphorus and Total Nitrogen concentrations were assumed to be similar to the concentrations for the "Forest" land use category since the area is currently lying fallow.

The MUSIC model of existing conditions was run for daily rainfall obtained from Station No. 61093 (Dog Trap Road, Ourimbah). The estimated indicator pollutant loads due to storm runoff under existing conditions are summarised in **Table 2.5**.

Table 2.5
Estimated Average Annual Pollutant Exports from the Project Site under Existing Conditions

	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)
Site Runoff to Dam A (Narara Ck)	8,750	16.3	119
Site Runoff to Robinson Creek	1,100	2.97	21.5
Site Runoff to Little Mooney Mooney Creek Tributary	2,260	4.97	35.8
Site Runoff to Ourimbah Creek Tributary	7,970	11.6	95.4

Changes in Runoff Quality

The changes in runoff quality were estimated by modifying the land uses, and hence expected pollutant concentrations used in the MUSIC model. The estimated pollutant loads for the suspended solids, total phosphorus and total nitrogen at various stages of the Project are listed in **Table 2.6**.

Table 2.6
Estimated Average Annual Pollutant Exports from the Project Site

	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)
Existing condition			
Site boundary	15,600	33.2	302
End Year 3			
Dams D and E outflow	1,190	0.87	12.9
Sediment Dam outflow	449	0.81	12.3
Site boundary	11,700	23.1	231
End Year 6			
Dams D and E outflow	1,560	0.81	11.9
Sediment Dam outflow	639	0.74	11.5
Site boundary	11,500	23.3	231
End Year 9			
Dams D and E outflow	1,440	1	15.2
Sediment Dam outflow	690	0.9	14.7
Site boundary	12,300	24.2	229
End Year 12			
Dams D and E outflow	2,000	1.7	22.7
Sediment Dam outflow	1,090	1.55	22.1
Site boundary	12,700	25	254
End Year 15			
Dams D and E outflow	1,580	1.78	22.7
Sediment Dam outflow	926	1.6	22.1
Site boundary	12,100	25.2	240

At each stage of the project, the total pollutants exported from the Project Site would be lower than under existing conditions. The sediment dams have been sized in accordance the 4th edition of Managing Urban Stormwater Soils and Construction (the "Blue Book"). This is in accordance with the requirements of the DECC and the Department of Water and Energy (DWE).

Regardless of any uncertainty in pollutant concentrations, because of the controls proposed as part of the development, based on the modelling we would expect an improvement in the quality of runoff leaving the Project Site both during and at the completion of the Project.

In regard to airborne dust, the water balance modelling undertaken included an allowance for watering of active areas to reduce the risk of airborne dust leaving the Project Site. The allowance made was for 1.5 L/m^2 to be applied to internal unsealed roads 5 times per day when there was no rainfall. The application of dust suppression water would be reduced when rain occurred across the Project Site.

It is noted that the DECC has stated it is satisfied the surface water quality control measures proposed as part of the Project "*are likely to result in the quality of water discharged from the premises to be an improvement on existing conditions discharge water quality parameters*".

2.1.1.5 Peak Stormwater Runoff

Comment

*"Sand washed from the site together with the increased erosion caused by the increased rate of flow into Stony Creek will threaten to clog up the flood mitigation works installed by Gosford Council……..All future structures are to be designed to allow for storm event of 1 in 1000 year average return interval. This recognizes the expected increase in the frequency and intensity of extreme events as a result of climate change." (*Somersby Action Group Paragraph 7.2.5)

Response

To estimate peak runoff from the Project Site, an XP-RAFTS rainfall/runoff model was created for the Somersby Fields Project Site and the adjoining creek catchments. Estimates of the peak rate of runoff were made for the 100 yr ARI, 10 yr ARI, 2 yr ARI, and 1 yr ARI design flood events. **Table 2.7** summarizes the peak runoff from the Project Site for each design event and the peak flows for at the catchment outlets beyond the Project Site.

Table 2.7
Summary of Peak Runoff from the Project Site under Existing Conditions

Catchment	Peak Runoff (m^3/s)			
	100 yr ARI	10 yr ARI	2 yr ARI	1 yr ARI
Ourimbah Ck (Platypus Ck)	3.8	2.2	1.3	0.83
Narara Ck (Stony Ck)	10.6	6.4	3.7	2.6
Robinson Ck	0.54	0.31	0.17	0.12
Little Mooney Mooney Ck (Somersby Village Ck)	0.72	0.45	0.24	0.17

Rainfall data used to estimate the peak flows was based on the recommended procedure outlined in Australian Rainfall and Runoff. The continuing loss rainfall model was used within the XP-RAFTS rainfall – runoff model to estimate excess rainfall. The rainfall loss values adopted are considered typical for catchments of the type represented in the study area.

Changes in Peak Runoff

The Project would result in lower peak flood discharges for the Ourimbah Creek tributary, Little Mooney Mooney Creek Tributary, and Robinsons Creek. A higher peak flood discharge would occur in Narara Creek. The changes are summarised in **Table 2.8**.

Table 2.8
Comparison of 100 Year ARI Peak Runoff from the Project Site under Existing and Post Operation Conditions

Node No.	Existing Conditions (m^3/s)	Post Operation Conditions (m^3/s)
Ourimbah Ck Tributary	3.8	1.5
Narara Creek	10.6	13.7
Robinson Creek	0.54	0.14
Little Mooney Mooney Ck Tributary	0.72	0.60

The estimated increase in the 100 year discharge in Stony Creek (Narara Creek) is $3.1m^3/s$. The effect of this increase would gradually diminish as the catchment increases. The extra peak flow is an estimated 1.5% of the peak 100 year flow adopted at Hanlan Street by the then NSW Public works Department (Lower Narara Creek Flood Study, December 1988). Hanlan Street is within the rural residential area of the catchment and upstream of the main urban area.

As a result of the Project, within the Narara Creek catchment the flow regime for flows above approximately 0.1ML/day at the Project Site boundary would be almost unchanged (Refer **Figure 3.1**). Storm flows resulting in flows of less than 0.1ML/day would be expected to result from low rainfall events producing peak flows that are unlikely to appreciably affect the current rate of bed and bank erosion that is occurring within the catchment. Typically, a creek will eventually develop a channel that is capable of conveying the median peak flow. The median peak flow is close to the 2 year average recurrence interval event and any increase in peak flows would be either held or attenuated as a result of the proposed 14.3ML active flood storage planned for the Project Site.

The 14.3ML of active flood storage to be included in Dam F would be provided above the design full water level and is estimated as sufficient to cater for the 100 year flood.

Comment

"Groundwater seepage and overland stormwater flow which affect the road reserve shall be managed on site."

"Sediment control measures…….Landcom publication "Managing Urban Stormwater – Soils and Construction 4th Edition, March 2004, ……..." (Roads and Traffic Authority (RTA))

Response

The measures outlined in the EA include controls to restrict storm flow to no more than estimated existing values. The measures include 14.3ML of active flood storage volume in Dam F to limit the 100 year flow in Narara Creek to estimated existing peak flow. The remaining three catchments areas would be slightly reduced and therefore peak flows entering the road reserve would be also reduced.

2.1.1.6 Global Warming / Climate Change

Somersby Action Group (Section 9) and various public submissions make reference to climate change and changing rainfall patterns.

Response

There are very limited quantitative studies available that can predict likely rainfall patterns under climate change scenarios. However, all of the global circulation models predict an increase in the total level of precipitation (Lowe, 2005). Hennessy (2004) considered events from the 1 in 5 year event through to a 1 in 40 year event for the whole of NSW for a 1-day event duration and a 3-day event duration. Only limited information is available for durations shorter than 1 day.

For the south-east region, Hennessy (2004) found that by 2070 it is likely there will be increases in 1 day event rainfall (≈10%) during spring, summer, and autumn, and decreases during winter. In the case of 3 day events by 2070, a projected decrease in intensity was identified for coastal regions during autumn, winter and spring but an increase (≈20%) during summer.

A preliminary assessment of the impact of possible climate change was made by modifying the 30 year rainfall record adopted for the study and re-running the MUSIC model.

The rainfall record was modified by:

- reducing the number of rain days; and
- increasing the Summer rainfall, and decreasing the Autumn, Spring, and Winter rainfall to give an overall reduction in annual rainfall of 19%.

Based on the results of the preliminary sensitivity analysis, it is estimated that if these predictions are accurate there would be a reduction in surface runoff for each of the catchments as shown in **Table 2.9**. Comparatively, these reductions would typically represent less than 0.25% of runoff from the catchments feeding into Gosford's water supply dams.

Table 2.9
Estimated Annual Average Storm Runoff from the Project Site
Under Existing and Modified Climate Conditions

	Existing Climate	**Modified Climate (2070)**
Average site runoff to Dam A (Narara Creek/Stony Creek)	67.2 ML/yr	55.4 ML/yr
Average surface water runoff to Dam A from remainder of catchment beyond the Project Site	88.2 ML/yr	72.8 ML/yr
Total storm runoff Runoff to Dam A (excludes spring water)	155.4 ML/yr	128.2 ML/yr
Average site runoff to Robinson Creek	4.7 ML/yr	3.9 ML/yr
Average site runoff to Somersby Village Creek (tributary of Little Mooney Mooney Ck)	9.8 ML/yr	8.1 ML/yr
Average site runoff to Ourimbah Creek Tributary (Platypus Creek)	41.4 ML/yr	34.2 ML/yr

2.1.1.7 Local Government Policies

It is recognised at the outset that whilst the provisions of local government policies can be considered in the determination of Part 3A applications under the *Environmental Planning and Assessment Act 1979*, the provision of the *Environmental Planning and Assessment Act 1979* prevail.

Comment

Gosford City Council recommended that the Project comply with Council's D6.41 "Water Supply Catchment Area Development Policy".

Response

It is noted that the objectives of Council's policy "are to ensure land use and development within Water Supply Catchment Areas are of a standard that have zero impact on the **quality** of the Central Coast Water Supply". It is noted from EA Figure 4.7 and 4.8, and the plans for the project, that no sediment-laden water will be discharged from the Project Site into the catchment of Mangrove Dam that will cause a reduction in water quality.

Notwithstanding the above, the project has been designed to have least impact on the surrounding drainage network and water quality. In fact, its location within the headwaters of four creek systems on a local ridge line will minimise impacts on the overall surrounding creek network.

Comment

Wyong Council requested that reference is made to Council's Policy Manual – W1 Water Catchment Areas Development.

Response

This policy identifies that it is a Council requirement to prohibit extractive industries from the Ourimbah Creek Catchment (within Wyong Local Government Area) "to reduce the potential threats to the **quality** of the Central Coast water supply by restricting land use in the Wyong supply Catchment area". It is noted the Project Site lies outside the Wyong Local Government Area. As for the Gosford City Council Policy, the emphasis of the Wyong policy is placed upon quality – which will not be affected by the Project.

2.1.1.8 Licencing for Dams D and E

Comment

DWE maintains Dams "D" and "E" do not fulfil the exemption clarification as set out in the Harvestable Rights Order under Section 54 of the Water Management Act 2000 (WMA).

Response

The Proponent respectfully believes that Dams "D" and "E" are exempt from the WMA given their important role in the reduction of suspended solids concentration in runoff from site – see Part 1 of the Specialist Consultant Studies Compendium Section 6.5.3.

2.1.2 Groundwater

2.1.2.1 Water Sharing Plan

Comment

DWE commented that the Proponent must comply with the requirements of the Kulnura Mangrove Mountain Groundwater Sources Water Sharing Plan (WSP).

Response

Telephone discussions with Mark Mignanelli, Manager Major Projects with DWE on 31 January 2008 established that he was satisfied with the coverage of this issue in the Groundwater Assessment (Table 17).

2.1.2.2 Water Licence Reductions during Drought Years

Comment

The DWE commented that the Proponent must be made aware that under a drought scenario there may be reductions in available water determinations for a water source. As such, the current WAL volume may not be adequate to address the necessary variation in available water determinations.

Failure to adequately consider water shortage management scenarios as set out in the provisions of the WSP may result in either the Proponent having to purchase more entitlement on the water market in order to meet the necessary legal entitlements for the appropriate accounting of water used by the quarry or temporary closure of the quarry based on an inability to take the water.

Response

The expected maximum groundwater make within the void during operations is 30ML per year. Following rehabilitation, the expected groundwater make would be 12ML per year. SFP currently hold a WAL for 37ML per year which is 20% in excess of the maximum requirement and 300% in excess of the long term requirement. In the event drought restrictions are imposed on water access, the SFP operations are able to manage up to a 20% reduction during operations without further management requirements. If drought restrictions were imposed in excess of this (during the operating period) SFP would need to purchase additional WAL from the market. The WAL is far in excess of the expected water make for the final landform. SFP would also consider any benefits to the community that could be achieved during drought periods through re-use of excess water on adjacent sites.

2.1.2.3 Water Security at DPI Research Station

Comment

The main water supply for irrigation on the DPI's Somersby Research Station is derived from shallow springs that are most likely fed from sandstone formations that will be affected by the proposed extraction.

The NSW DPI is concerned that this will have a significant impact on water security for its operations at Somersby. Section 8 of the EA discussed possible impacts on groundwater to surrounding lands, however makes no mention of the impacts on the NSW DPI operations.

Response

This impact on this spring was evaluated and is presented in Section 8.3.4 of the Groundwater Impact Assessment. It is further noted that the DPI Dam also receives overflow from surface runoff into Dam A. It is calculated that the existing level of surface inflow to Dam A is approximately 187ML/yr, reducing by up to 29% during the project life and in fact increasing to 226ML/yr beyond the end of the project life. Further comment is provided in the Surface Water Assessment (Section 7.7) regarding the provision of environmental flows to the DPI Dam. The Proponent has committed not to reduce the availability of water flowing into the DPI Dam. In fact, the Proponent purchased adjoining land and sought covenants on the land to ensure the long term availability of water for the DPI (see Commitment 9.1).

2.1.2.4 Agreement with DPI re: Mitigation Measures

Comment

The NSW DPI believes that the proposed works may have a significant impact on the viability of the existing and proposed expanded operations at Somersby. Based on the information available in the EA, the Department objects to the proposal until the impacts are more fully investigated and appropriate mitigating measures have been agreed between the Department and the Proponent.

Response

The Proponent has given the DPI an assurance that the base flow of water to its Research Station from Dam A will continue. A special diversion pipe to achieve this outcome has been designed for Dam A (see Commitment 9.1).

2.1.2.5 Water Losses to Water Supply Catchments

Comment

Gosford City Council comments that the report states a groundwater inflow due to active sand removal area of 107 ML/yr (Year 15). Most of this groundwater would be diverted to surface water flows in Narara Creek Catchment, further reducing flow to the water supply catchments. A high proportion of this water currently finds its way into the water supply catchment streams – Ourimbah Creek, Little Mooney Creek and Robinson Creek.

Response

The most likely predicted figure for seepage to the void is 30ML/yr, not 107ML/yr. Council incorrectly used units of ML/yr compared with m^3/day (see Groundwater Assessment – Table 13). The groundwater contribution would be proportionally lost from the catchments of Robinson, Little Mooney Mooney, Ourimbah and Narara Creek catchments with the majority from the latter catchment. The significance of this loss in terms of catchment size and contribution will be minimal. In the long term, water will be redirected to the system as surface water and through the recovered groundwater regime.

2.1.2.6 Groundwater Monitoring During Project Life

Comment

Gosford City Council requested that various groundwater bores on site be re-drilled and monitored to record the saturated water thickness and to provide alternative sources.

Response

The specific bores referred to by Council are owned by SFP and are used for monitoring not pumping. The bores are not proposed for monitoring so will not require reinstallation. Rather, a more comprehensive groundwater monitoring program is proposed (see Commitments 18.1 and 18.2). Further, the Proponent has committed to deepen or replace existing bores where the reduction in saturated thickness attributed to the project exceeds 10%.

2.1.2.7 Impacts on Surrounding Horticultural Enterprises

Comment

NSW DPI has some major concerns with the proposed Somersby Fields Sand Quarry regarding the impact on water resources on surrounding horticultural users, particularly two nurseries, a market garden and the NSW DPI Somersby Research Station.

Response

The impact on these groundwater users has been evaluated as negligible and within seasonally observed variations. Table 11 of the Groundwater Assessment provides the predicted reductions in saturated thickness.

2.1.2.8 Water for NSW DPI During a Dry Year

Comment

NSW DPI requests that conditions are applied which mitigate any loss of groundwater to local agricultural enterprises with potential for bore water yield decrease, and which identify requirements for pumping surface water to provide water flows to the Somersby Research Station dam during a dry year.

Response

Mitigation measures for <u>any</u> groundwater user that is impacted by the sand extraction operations have been included. These include deepening bores to reach established groundwater resources lower in the aquifer system.

2.1.2.9 Long Term Groundwater Seepage

Comment

The DPI notes that current groundwater seepage into the Proponent's Dam A has been calculated to be 31.6ML/year. This seepage is an important component of water supply to the NSW DPI dam. Will the final landform profile as noted in Figure 5.12 (page 4-44) continue to provide groundwater seepage of 31.6ML/year?

Response

It is unlikely that the groundwater seepage will recover completely. The predicted long term void inflow is 12ML/yr which would be diverted to Dam A. The remainder will be by spring contribution, which is difficult to determine. Given the overall long term decline in water table it is not expected that springs will fully recover. In order to ensure substantial long term flows into the DPI Dam, the Proponent will incorporate a low-flow diversion to carry spring flow from the southwest of the Project Site directly to the DPI (see Commitment 9.1). As discussed in Section 2.1.2.4 flow of this spring water would be achieved as a result of the covenant on the subject land imposed when the land was in the Proponent's ownership.

2.1.2.10 Groundwater Monitoring for Horticultural Enterprises

Comment

The NSW DPI requested that the monitoring of groundwater impacts should include major agricultural businesses near the 1km radius – particularly those businesses on the following lots.

Lot 346, DP 755227 – Cut Flowers (850m from extraction boundary) (ie. GW057494)
Lot 148 DP 755227 – Cut Flowers (750m from extraction boundary) (Not known)
Lot 3 DP500942 – Market Garden (750m from extraction boundary) (ie. GW047154)
Lot 1 DP 420166 – Coachwood Nurseries (850m from extraction boundaries, ie. GW101077)

Response

The Proponent's list of proposed monitoring bore locations (see below) includes three of the four requested bores (underlined) i.e. except the bore on Lot 148, DP 755227. Available records do not identify a registered bore on this lot. If a bore exists on this property, it will be included in the monitoring program.

023091	044721	<u>057494</u>	075012	105682
033461	<u>047154</u>	064808	<u>101077</u>	Stapleton Bore (Unregistered)
038238	052771	065610	105681	"Woodlands" Bore (to be installed)

2.1.2.11 Accuracy of Water-related Data

Comment

(a) *NSW DPI claims that Groundwater Works GW075012 and GW057452 do not appear on Figure 4.9 but do appear in Table 4.8.*

(b) *Dam D is not referred to in EA Figure 2.15 (drawn from Figure 12 of the surface water assessment).*

Response

(a) GW075012 is located on **Figure 4.9** but is incorrectly labelled as GW075102 and GW05742 is located on **Figure 4.9** 1km south of the Project Site.

(b) Dam D has been incorrectly labelled Dam F. Notwithstanding this incorrect notation, the water balance remains correct as the combined storage capacity of Dams D and E is 39.1 (as listed in EA Section 4.2.7.2.3).

2.1.2.12 Somersby Public School Bore

Comment

The Department of Education and Training records that the Proponent acknowledges that the school's water bore will be impacted by this proposal to the extent of a 13% loss in "available drawdown" and "proposes to make good any losses". The extent of the compensatory action in order to ensure the school is not disadvantaged must be clarified through a written undertaking by the Proponent.

Northern Sydney Central Coast NSW Health notes that the groundwater modelling predicts some impact on local groundwater reserves which is not likely to be reversible. The modelling particularly notes a likely impact on the bores located at the nearby school and residences. The Unit is aware that the school utilises groundwater for toilet flushing and so has concerns that an adequate water supply is maintained for such purposes.

Response

The Somersby Fields Partnership has committed that if the project receives approval, it would commission drillers to either deepen the existing bore at Somersby Public School or drill a new bore that would provide a secure long-term source of groundwater. The school bore is recorded to be installed to 46m which is relatively shallow. Surrounding bores are up to 120m deep and indicate that good water quality and yield can be achieved through bore deepening or new bore construction. A written undertaking has been provided within the EA (see Commitment 8.5).

2.1.2.13 Groundwater Modelling for 18 years

Comment

Northern Sydney Central Coast NSW Health expresses a view it appears that the modelling covers up to year 15 of the project's operation. It is noted that the Proponent is seeking approval for up to 18 years operation. The Unit urges consideration of possible impacts on groundwater reserves beyond year 15.

Response

Modelling has been undertaken for the final landform at Year 15 (assuming maximum production is achieved in all years). No variation in water level is expected if the operations take until Year 18 to complete due to annual production levels being lower than the maximum level of 450 000tpa.

2.1.2.14 Protocols to Establish Impacts on Surrounding Bores

Comment

Northern Sydney Central Coast NSW Health commented that the Proponent has undertaken to make good any reduction in groundwater supply, while it is unclear how property owners could establish whether such effects were related to the project. Realistic assessment and response protocols are required to ensure that project related impacts are not attributed to other influences such as drought.

Response

Monitoring of four bores on the Project Site (using automatic water level recorders) and a total of 15 bores surrounding the Project Site will be undertaken throughout operations to assess if groundwater variations are consistent with model predictions and/or steadily decreasing trends. The monitoring results from the monitoring bores on the Project Site will be used to ascertain impacts on bores beyond the boundary of the Project Site. A baseline survey of representative bores within 800m of the site for water level and yield will be undertaken to determine conditions prior to the commencement of operations. In order to ascertain whether an impact is attributable to the sand removal operations, the Proponent will review all groundwater levels, including those on the Project Site and the variations observed in the surrounding bores, the stage of the operations and the predicted impact at that stage and seasonal conditions. Bores that are considered to be impacted by the operations will be those that show a decreasing water level trend that is consistent with other monitoring locations, the stage of operations and model predictions.

2.1.2.15 Likelihood of Obtaining Replacement Groundwater Supplies

Comment

The Somersby Public School P&C questions why an assessment of strata fracturing and intersection of water bearing zones has not been carried out at either the school or any other affected property at the time of assessment. It seems that these properties, together with the school, will be impacted on and yet there is a question as to whether deepening bores will produce a new source of water for the school (and surrounding properties), to rely on. There is anecdotal evidence to suggest that redrilling even in very close proximity, can lead to substantially lower or nil results.

Response

The Hawkesbury Sandstone unit is a massive highly fractured unit. Inclusion of fracturing (that may or may not be present in certain locations) may actually act to make the model less accurate. The permeability adopted is a macro permeability that represents the macro (ie. fractured) and micro (unfractured) permeability of the strata. For a large scale model, such as required for this proposal, this is the most suitable approach for modelling the inherent variability within the model domain.

Redrilling of production bores needs to be undertaken to ensure intersection of a suitable water bearing strata. As such, a bore may need to be deepened in the order of 20 to 40m to reach a suitable layer. The bore at the Somersby School is 46m in depth, which is comparatively shallow. Bores up to 120m surround the school and produce suitable yields of good quality water.

2.1.2.16 Contingency for School Bore

Comment

The Somersby Public School P&C Association also asked that if the modelling relied upon by Somersby Fields is incorrect and deepening of bores doesn't result in yield being returned, what are the options available to the school and surrounding properties going to be? This should be answered in the EA but it isn't.

And if the modelling is incorrect – then what?

Response

Furthermore, there is a very high confidence level that deepening the school bore will intersect further groundwater supplies thereby maintaining the supply of bore water for the school.

The Proponent has also committed to the school that in all circumstances, the water supply would be maintained to the school. The Proponent is fully committed to monitoring the water supply to the school and has made a formal commitment to that effect.

2.1.2.17 Performance Bond for School Bore

Comment

The Somersby Public School P&C Association questions that "if this mine is given consent (and it is stressed that it shouldn't), one of the many conditions should be the Proponents pay a bond to the Department of Education to cover the cost of replacing the lost ground water resources. This bond should be enough to cover the cost of and the installation of additional water tanks, provision of water and the associated plumbing costs to link up to the existing reticulation system. The bond should be enough to cover the increase in cost for a period of up to a minimum of 25 years and a maximum of 509 years. The bond should cover all affected properties, not just the school.

Response

The Proponent has committed to deepen or replace the School's bore following the receipt of project approval many years ahead of the predicted reduction in groundwater levels in the school bore. Hence, it would not be necessary to impose any performance bond on the Somersby Fields Project.

2.1.2.18 Issues Raised by Larry Cook and Associates

The following comments and their responses relate to a range of issues raised by Larry Cook and Associates following their review of the Groundwater Assessment on behalf of various Somersby residents.

Comment 1 – Typographical Error

In Section 4.4, RCA refers to the range of yields for Mangrove Mountain bores noted by Mike Williams (DWE). RCA document 10 to 15 L/s. Should it read 1.0 to 1.5 L/s? No problem. Likely to be a 'typo' and only noted here for completeness. We are not aware of any individual bore yields of this magnitude in the district.

Response

Yes, this is a typographical error.

Comment 2 – Groundwater Model Parameters

Increased permeability values and different storage coefficients applied to cells in the model located along the interpreted surface traces of lineaments may allow increased recharge amounts to be inputted into the model so that the global recharge amount could approximate the recharge rates used in the Merrick Model. The implication is that the prediction of any potential impacts may be different than those predictions in the present RCA model.

Response

The sandstone unit is a massive fractured unit. Modelling has been undertaken to assess macro properties of permeability. Evaluation of specific fracture zones is not applicable to a large scale model. The approach adopted for the SFP site has been adopted in the Merrick Model.

Comment 3 – Predicted Impacts

The proposed sand mine will not in our view impact on the groundwater resources recently developed by the Gosford-Wyong Joint Water Authority. The main groundwater resources exploited by the Authority on the coastal strip are hosted by the Terrigal Formation, which directly underlies the Hawkesbury Sandstone. However, RCA were not aware of three deep, low-yield bores in the Somersby area that extract small flows from deep aquifers hosted by the lower part of the Hawkesbury Sandstone.

The closest town water production bore to the proposed sand mine is located 3.8km distant from the Site at the Council owned Balance Tanks on Reservoir Road. The two other production bores are located within the Council owned Somersby Water Treatment Works Precinct approximately 8.0km south of the proposed mine.

Response

The extent of impact of the project is no more than 1.5km from the site boundaries. As such, evaluation of the town water supply bore is not required.

Comment 4 – Springs on Cahill, Weller and Hawker Properties

Although we have not been able to verify this assertion because of time constraints and it is possible that RCA are correct in their interpretation, it is interesting to note that:

Spring 4 on the Cahill property is at an elevation of about 272m AHD and yet the water level in the 'hardrock' bore is at an elevation of 258.lm AHD.

Spring 5 on the Weller property is also at an elevation of about 272m AHD and yet the 'hardrock' bore adjacent to the spring has a recently measured water level elevation of 261.1m AHD.

Spring 7 on the Hawker property (beneath dam) is at an elevation of about 270m AHD and water level in the bore is at an elevation of 249.6m AHD.

Response

Point noted. These springs may well be contact springs and as such are not related to groundwater. If this is the case, the impact from the proposed Somersby operations is likely to be reduced.

Comment 5 – Springs on "Woodlands" and Ross Property

Although RCA has documented the Weller Spring (Spring 5), there appears to be no reference to the wetland (hanging swamp) immediately upslope and to the east-northeast on the eastern side of Wisemans Ferry Road. This wetland is located on the 'top' blocks on 'Woodlands" immediately south of the Site near the southwest corner. This wetland and others in the local area identified under SREP 8 are shown in Figure 10. RCA does not appear to have documented what in our view is the link between this water feature and the identified SREP 8 wetland east of Wisemans Ferry Road.

A small part of the SREP 8 wetland is located on the Ross Property due south of the central part of this Site.

The wetland on the Woodlands property is one of the largest identified in the area.
The wetland is an identified wetland under SREP 8 and shown in SREP 8 plans, and on Figure 10.

Response

The hanging swamp variant is expected to be impacted similarly to the Weller Spring (Spring 5), ie. through the reduction in the area of the catchment and the reduction in infiltration. The hanging swamp on the "Woodlands" property is likely supported by a rainfall dependent contact spring based on an elevation of between 268m and 278m. Approximately 10% of the infiltration catchment to the hanging swamp is located on the Project Site and will be lost during sand removal operations. Whilst a direct correlation between infiltration and spring contribution cannot be made due to other factors such as soil properties, it is a reasonable assumption that a similar loss in spring flow will be observed. Some contribution from a true groundwater fed spring may occur to the hanging swamp area. Impacts to the true groundwater table in this area are expected to be 1m to 2m and within the range of seasonal variation (observed to be up to 4m).

Comment 6 – Lowest levels of Extraction

The final elevation of the base of the proposed excavation is documented at approximately 230m AHD Groundwater Assessment (page 2-44). The implication is that the source of groundwater for the wetland and indeed additional downstream wetlands on 'Woodlands' due west of Wisemans Ferry Road will be likely disrupted and at least partly removed.

However, the depth of sand excavation reported in the EA summary and on Page 2-10 of the RCA report is approximately 10m near the eastern end of the Site and about 20m in the western end.

The present (pre-development) surface elevations range from approximately 250m AHD in the eastern part of the proposed extraction footprint to between 274m and 286m AHD in the western part of the footprint.

Response

The depth of sand removal to 230m AHD would occur in Stage 1/1 in a small area that is later developed as surface water dams. Groundwater modelling has incorporated extraction to the final extraction depth for each stage.

Comment 7 – Baseflow Contribution to Robinsons Creek

It is noted that the elevation of the lower part of the wetland on 'Woodlands" is at approximately 260m AHD. The implication is that whether or not the spring system is perched, partly perched or a water table spring, the depth of sand removal will at some time during the project life likely intercept a significant part of the shallow groundwater flowing to the south-southwest through 'Woodlands'. The predicted impact may commence in the early stages of sand removal, perhaps by stages 1/4 and 1/5 (Figure 2).

The wetland forms the headwaters of Robinson Creek in the Mooney Mooney Creek Catchment. Robinson Creek routes water from the wetland westward through 'Woodlands' to Mooney Mooney Dam about 3km west o the Site. It is noted that Robinson Creek is one of three important contributors of water to the dam which is an important component of the Gosford Wyong Joint Water Authority. The other two drainages are Mooney Mooney Creek and Little Mooney Mooney Creek.

Response

The baseflow contribution loss to Robinson Creek from a reduction in groundwater at the site and surrounding areas is estimated to be <6ML per year. This represents <1% of the Robinson Creek catchments contribution and is considered insignificant.

Comment 8 – Spring System on the Ross Property

The spring system on the northern central part of the Ross property approximately 100m due south of the central southern boundary of the Site (Figure 10) is not listed in RCA Table 5 nor is it described in RCA Section 4.7. Although the two discharge points both labelled Spring A

are shown on RCA Figure 3 (page 2-15) and clearly associated with the same sandstone statigraphic unit (272m AHD), there is no reference to the southern extension. An impact on the northern part of this spring system by the removal of sand is predicted by the RCA groundwater computer model.

It is our view that the Ross spring (Spring A) should be listed in RCA Table 5 and an evaluation given as it is one of the spring systems immediately surrounding the Site and could likely be impacted by the proposed removal of sand from the Site.

Response

This spring system on the Ross property is discussed as part of the spring flow contribution to Dam A – see Groundwater Assessment – Section 8.3.3.

Comment 9 – Reductions in Groundwater Flows from Ross and "Woodlands" Spring

The flow from the northern extension of Spring A is predicted by RCA to decrease by about 50% Groundwater Assessment (page 2-69). It is our view that the flow in the southern extension of Spring A located on the Ross property will be significantly impacted by the proposed sand removal.

It is also our view that there would be a reduction in flow in the SREP 8 wetland on 'Woodlands' south of the Site. This is consistent with RCA's prediction that Spring 5 (Weller) at the western end of the SREP8 wetland will experience a moderate to significant loss in flow.

Response

RCA agrees with this view and whilst losses are expected, these are predicted to be less than approximately 10ML/year. The Proponent is committed to restoring spring losses with supplementary bore supply or re-establishment of springs where possible. For spring loss to the DPI bore (Ross property spring) the loss in overall contribution to the DPI water supply from this spring would be minor. Surface water make up to the DPI dam is to be maintained by the Proponent during operations from surface water at the Project Site. The long term groundwater and surface water contribution to the DPI dam would be greater than the current contribution. Spring loss on the "Woodlands" property is expected to be seasonal and approximately 10% based on a loss in the surface area of the infiltration catchment.

Comment 10 – Long Term Monitoring

It is noted that at this stage RCA have not nominated the registered bores that will, or should be, monitored. Regardless of potential access issues, it is our view that a short list of registered bores proposed for long term monitoring should be developed with the proviso that any monitoring is not necessarily limited to those registered bores on the list. This should safeguard those registered bore owners that may be genuinely affected by the proposed development but not at this stage regarded as being at risk of any impact.

We also concur with the proposed location of the four (4) newly proposed on site water level monitoring bores. However, it is our view that one additional new monitoring bore should be included in the monitoring network. The locations of the four new monitoring bores proposed by RCA and the location of the proposed new monitoring bore are shown in Figure 13.

The proposed site is located on 'Woodlands' approximately 80m south of the southern boundary of the Site and is designed to monitor any water level impacts from proposed sand mining that may occur in the identified wetland that supplies water to the Robinsons Creek system.

Response

Yes, the list of bores to be monitored (see Response 2.1.2.10) will be provided for confirmation by the Panel, including the bore recommended on the "Woodlands" property (subject to landowner approval).

Comment 11 – Groundwater Quality Monitoring

Monthly field pH and EC testing is proposed in the five new bores at monthly intervals in line with water level data logger downloads - supported.

Annual water quality sampling and testing is endorsed although a list of analytes and tests should be formulated prior to any development consent.

Response

All recommendations for monitoring, reporting and data management will be incorporated in the groundwater monitoring plan prepared prior to commencement of works at the site. The analytes tested would be as follows.

- pH.
- Ion Balance.
- Benzene.
- Ethylbenzene.
- Heavy Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn).
- Electrical Conductivity (EC).
- Total Petroleum Hydrocarbons (TPH).
- Toluene.
- Xylenes (BTEX).
- Polycyclic Aromatic Hydrocarbons (PAH).

As with all monitoring, it will be important to regularly review that only meaningful data is being collected. Where and when necessary, the monitoring program should be revised in consultation with relevant government agencies.

Comment 12 – Reporting Protocols and Data Management

It is our view that a protocol for statutory and in house reporting and data management should be developed and reviewed prior to any commencement of the project.

Response

The Proponent supports the need for clear concise protocols. Such protocols would be incorporated in the groundwater monitoring plan.

Comment 13 – Success of Deepening Bores

Deepening of bores will not restore water supply. Reference to the Merrick Report that states that deepening bores will have little effect on the yield of the bore.

Response

The Merrick report has been mis-quoted here. The report states that interbedded bands of low yielding and high yielding sandstones are present within the structure. Discussions with Dr Merrick have confirmed that there is significant potential for water-bearing zones to be intercepted within the deeper strata.

Comment 14 – Long term Drought Conditions and/or Climate Change

A number of public submissions raised the issue of the implications of a long term drought or climate change upon groundwater resources beneath the Project Site.

Response

Long term rainfall reductions will result in a depression of the water table from reduced infiltration. The reduction in the water table elevation will reduce the impact from the sand extraction operations as the depth of extraction below the water table will be reduced.

Comment 15 – Reduction in Baseflow from Groundwater to the Creeks

Some submissions referred to the likely reduction in groundwater baseflow to the surrounding creeks as a result of the sand removal operations.

Response

The loss in baseflow to the creek system from the proposal is predicted to be <1% of the total groundwater and surface water contribution to the system.

2.2 NOISE

2.2.1 Introduction

The following responses address each of the issues raised by the Department of Environment and Climate Change (DECC).

2.2.2 Existing Ambient Noise Monitoring

Comment

It is noted from the Noise Impact Assessment (NIA) presented within the EA that unattended ambient noise monitoring was undertaken at the sites identified as O-SN1, H-SN2, B-SN3, Y-SN4 and I-SN6. Attended monitoring was also undertaken at the five unattended sites and one additional location identified as R-SN5.

Although located geographically quite close to each other, there are significant variations in the results between locations SN-3 and SN-4, and SN-2 and SN-6. Additionally several locations showed a trend of higher background noise levels in the evening/night periods than the corresponding daytime period perhaps indicating interference i.e. insects or frogs. Accordingly for the purposes of determining criteria, DECC considers it appropriate that a conservative approach be adopted and for assessment purposes has used SN-4 for locations generally east of the site and location SN2 for locations generally west of the site, with the exception of Locations O-Somersby Public School and N-B&L Daniel which are both represented by O-SN1.

Response

The Department of Environment and Climate Change's (DECC's) *"Application Notes - NSW Industrial Noise Policy"* (dated 10 October 2006) state that:

> *"it is generally recommended that the intrusive noise level for evening be set no greater than the intrusive noise level for daytime. The intrusive noise level for night-time should be no greater than the intrusive noise level for day or evening. Alternative approaches to these recommendations may be adopted if appropriately justified."*

Experience in conducting environmental noise monitoring reveals that daytime $L_{A90(15minute)}$ noise levels are often lower than the evening and night-time levels. Typically, insect activity and unstable conditions prevail during the spring, summer and autumn evening periods, thereby increasing the background noise levels. During the night-time period however, prevailing stable atmospheric conditions tend to increase the noise level contributions from distant traffic and other noise sources. The Noise Assessment background noise monitoring results are consistent with these observations.

The intrusive noise criteria presented in the Noise Assessment have been reviewed and determined to be appropriate for the Project as higher evening and night-time noise levels are a feature of the subject area at some receiver locations. Therefore, the Rating Background Noise level (RBL) plus 5dB(A) intrusive criterion is appropriate for assessing the $L_{Aeq(15minute)}$ intrusive noise emissions from the Project at the nominated receivers.

In order to cater for the increase in evening and night-time background noise levels due to enhanced noise propagation from surrounding noise sources, it is appropriate to limit the Project's noise emission contributions via the amenity criterion.

Further, it is noteworthy that the ambient $L_{Aeq(period)}$ noise levels reported in the Noise Assessment reduce progressively for the daytime, evening and night-time period at all monitoring locations.

Comment

There is some question as to whether background noise monitoring at location SN1 adequately characterises Location N, as it is likely that SN1 was affected by 'school noise' to a larger extent than would be experienced at Location N. It would be preferable for additional long term background noise monitoring to be undertaken at receiver Location N. This is considered important as Location N is predicted to receive the greatest noise impacts, and depending on the assessment criteria may be impacted by noise at leaves that DECC would not normally consider licensing to.

Response

The traffic on Peats Ridge Road is a dominant contributor to the background noise levels at Location O and Location N, refer to the attended noise surveys in Table A4 and the Peats Ridge Road traffic noise levels for Location B (similar but further offset than Location N) in Table 9. Also, Location N would be significantly more affected by the traffic noise on the nearby Wisemans Ferry Road than Location B (refer to Table A4).

More importantly, and in support of the above comments, reference was made to the RBL previously established at Location N (B & L Daniel) by VIPAC Engineers & Scientists (VIPAC).

In their study (Somersby Sand Extraction Operation, March 2001), background noise monitoring was conducted over a 9 day period at Location N. The RBLs established at Location N for the daytime, evening and night-time periods were 43dB(A), 41dB(A) and 42dB(A) (rounded) respectively.

On this basis, and given that the daytime RBLs at Location O and Location B were 40dB(A) and 41dB(A) respectively, the RBLs and resulting Project Specific Noise Assessment Criteria presented in the Noise Assessment of the EA are considered appropriate and justified.

2.2.3 Project Specific Noise Levels and Consent Limits

Comment

DECC does not concur with the PSNLs recommended in Table 12 of the NIA because DECC does not fully concur with the existing ambient noise monitoring results from which they were established (see above). DECC has adopted a conservative approach and used the lowest ambient noise monitoring results for locations east and west of the centreline of the development respectively with the exception of the Somersby Public School and Location N. The ambient noise monitoring results for SN-1 have been used to inform criteria for Somersby Public School (construction criteria) and a dual criteria has been derived for Location N that is based on SN2 and SN1.

Table 1 below summarises the criteria considered appropriate by DECC. The PSNLs are established from the intrusive criterion for all locations except the Somersby Public School that is determined from Table 2.1 in the EPA's Industrial Noise Policy (INP) considering a 10dB(A) difference between outside to inside noise levels. It should be noted that the PSNLs recommended in the NIA relied on the amenity criteria for the evening and night period at locations B, E and I due to unusually high evening/night time RBLs recorded at some monitoring locations.

Table 1: Project Specific Noise Levels (PSNLs) determined by DECC

Residential Location	$L_{Aeq,15minutes\ dB(A)}$		
	Day	***Evening***	***Night***
B. Department of Primary Industries	*43*	*42*	*37*
E. I. Scott	*43*	*42*	*37*
H. R&S Weller	*39*	*39*	*35*
I. Thompson & Jarvis	*39*	*39*	*35*
N. B&L Daniel	*39/45(1)*	*39/38(1)*	*35/35(1)*
O. Somersby PS	$L_{Aeq,1hr}$ *45 DB(A)*	*NA*	*NA*
R. Coachwood Nurseries Pty Ltd	*39*	*39*	*35*
S. D Studds	*43*	*42*	*37*
V. L&N Douglas	*43*	*42*	*37*
Y. C&R Sultana	*43*	*42*	*37*
Notes: (1) criteria based on SN2 / SN1			

In terms of construction noise criteria, the NIA has adopted an $L_{A10,15minute}$ criteria of background noise plus 10dB(A) on the basis that the construction period will not exceed 26wks. Whilst DECC accepts this approach, the actual levels have been adjusted by DECC in line with the approach outlined above for operation noise criteria.

Response

Refer to the response given for Issue 2.1. Further, in relation to the Project Specific Noise Levels for Locations B, E and I, these have been determined strictly in accordance with the procedures contained in the INP and therefore continued reliance should be placed on the levels presented in the Noise Assessment.

2.2.4 Sleep Disturbance Criteria

Comment

The NIA references the current DECC screening level assessment criteria (i.e. $L_{A1(1minute)}$ < RBL plus 15dB) and purports to present criteria based on this approach in Table 20 in the NIA. However the criteria referenced in Table 20 does not reflect the RBL plus 15dB screening criteria approach and DECC is unable to determine how the criteria was established.

Response

An error has been identified in the Sleep Disturbance Noise Criteria calculations. The 15dB(A) margin for initial screening was being added to the night-time project specific noise levels rather than the RBLs. The corrected Table 20 of the Noise Assessment is presented below.

Table 20 - Corrected
Predicted Night-time Loading and Transportation and Sleep Disturbance Impacts

Location	Predicted $L_{A1(60second)}$ Noise Level Night-time Transport Prevailing Temperature Inversion	$L_{A1(60second)}$ Night-time Sleep Disturbance Noise Criteria (RBL + 15 dB(A)
B Department of Primary Industries	<43	50
E I. Scott	<40	50
H R. & S. Weller	<29	45
I Thompson & Jarvis	<28	50
N B. & L. Daniel	<44	45
O Somersby Public School	N/A	N/A
R Coachwood Nurseries Pty. Ltd.	<36	47
S D. Studds	<46	47
V L. & N. Douglass	<44	47
Y C. & R. Sultana	<43	47
Note 1: Northeastern and western earth mounds included in calculation Note 2: Shaded cells indicate levels above criteria		

Review of the data presented in the corrected Table 20 indicates compliance with the respective sleep disturbance criteria at all the nominated residences.

2.2.5 Predicted Noise Levels and Impacts

Comment re: Site Establishment and Construction

Table 15 in the NIA presents the predicted noise levels associated with site establishment and construction. The Table notes that the effect of the 'north eastern noise barrier is included in the calculations' for the various scenarios. However, the construction noise impacts associated with the actual construction of the eastern noise barrier have not been assessed.
On the basis of the information presented, DECC has determined that significant exceedances of the criteria predicted for Location N (regardless of the applicable criteria). Additionally, construction of the north eastern noise bund is likely to result in elevated noise levels for receivers B, V & Y (and nearby residences). Minor exceedances of the construction noise criteria are predicted for the Somersby Public School during the construction of the far western bund, however NAU notes that this construction stage will be scheduled for a school holiday period.

Construction noise impacts will need to be effectively managed and requirements for the preparation of a Construction Noise Management Plan should be included in any instrument of approval.

Response

As stated in Section 6.1 of the Noise Assessment, "*During the establishment of the far-western earth mound, the $L_{A10(15minute)}$ noise emissions from the bulldozer working in this area may be up to 9dB(A) higher than the associated criterion at one location only, namely Location N (B. & L. Daniel).*" As discussed in Section 1.10, the Proponent intends to extend its offer (in good faith) with the Daniels to provide fair compensation for these exceedances.

Further, in relation to the construction of the northeastern noise barrier, it should be noted that this structure would effectively be a fence, erected most likely with a post hole digger and a small crane to lift the fence panels into place. It will not involve any earthworks as envisaged in the comment. This activity is therefore not likely "*to result in elevated noise levels for receivers B, V and Y (and nearby residences).*"

There are no construction noise exceedances predicted for the Somersby Public School.

Notwithstanding the compliance, the proponent has undertaken to construct the far western bund wall during school holidays.

Comment re: Operation

From the predicted noise levels, a marginal to significant exceedance is predicted for daytime operations at Receiver Location N depending on the criteria adopted. This highlights the need for additional long term ambient noise monitoring to be undertaken at Receiver Location N to establish the applicable criteria.

It is likely that noise impacts at Receiver Location N will exceed levels that DECC would normally consider licensing to. All other locations are predicted to satisfy the relevant assessment criteria for operational aspects of the proposal.

Response

Reference to the noise modelling results presented in Sections 6.2, 6.3, 6.4 and 6.5 of the Noise Assessment "*indicates that the predicted daytime, evening and night-time noise emissions during Stage 1 would comply with the relevant noise assessment criteria at all the surrounding receivers under both calm and adverse weather conditions.*" Further, that "*compliance is also predicted at all the surrounding receivers during Stage 2 operations, except at Location N (B & L Daniel) when surface operations are underway during daytime operations only. Compliance at Location N would occur later in Stage 2 when deeper sand removal operations are underway*."

Comment re: Cumulative Noise Impacts

The NIA presents an assessment of cumulative noise impacts associated with the combined operation of the Rindean Sand Quarry and the proposal. The amenity criteria inherently considers cumulative noise impacts, and therefore this aspect of the assessment is considered superfluous.

Response

Comment noted.

Comment re: Sleep Disturbance Impacts

Sleep disturbance impacts are predicted to satisfy the DECC screening level assessment criteria.

Response

Comment noted. Refer also to the response in Section 2.2.4.

2.2.6 Off-site Transportation Noise

Comment

Off-site noise issues from the conveyance of product on Peats Ridge Road has been assessed to receiver locations B, V and Y. The NIA indicates that existing and predicted noise levels at these properties have been established on the basis of a computer model calibrated by roadside noise measurements and traffic counts.

The assessment criteria was established using the DECC Environmental Criteria for Road Traffic Noise (ECRTN) for a collector road and is $L_{Aeq,1hour}$ 60dB(A) daytime and $L_{Aeq,1hr}$ 55dB(A) night time. The ECRTN indicates that where existing noise levels exceed the relevant criteria that, where 'feasible and reasonable', existing noise levels should be mitigated to meet the noise criteria, but in all cases traffic arising from the development should not increase existing noise levels by more than 2dB(A). The ECRTN further indicates that; "if the existing noise level is below the criteria but within 2dB of the criteria, then the 2dB allowance may be applied to the existing noise level".

The existing noise levels exceed the relevant criteria at location V during the early morning between 6am to 7am (56.6dB). The existing noise levels are below, but within 2dB of the criteria at location V between 5am to 6am (53.8dB), morning peak between 8am to 9am (58.2dB) and afternoon peak between 3pm to 4pm (59.1dB).

The NIA adopts criteria that exceeds the base criteria in the ECRTN for location V for the early morning assessment (5am to 7am) and for the morning and afternoon peaks. The assessment does not however assess whether noise levels can be reduced to meet the criteria as required by the ECRTN before the 2dB increase can be applied.

The early morning truck movements are predicted to result in up to a 3.6dB exceedance of the base criteria applicable to a collector road. DECC recommends that the need for early morning truck movements, and or alternatives be considered. In any regard if approval of the development in its current form is considered, the consent should include restrictions on movement numbers outlined in the EA.

Daytime truck movements are predicted to result in a minor exceedance of the applicable criteria i.e. 1dB. Evening movements are predicted to satisfy the relevant criteria.

Response

It is clearly stated in the ECTRN in Section 2 The Criteria, "*Where noise levels are already exceeded",* that:

> "*New industrial, commercial or residential developments that generate additional traffic on existing roads are likely to provide limited potential for noise control, because such developments are not usually linked to road improvements. The criteria recognise the difficulties in these cases by specifying that any road traffic noise increase should be limited to 2 dB above existing levels before the development takes place, where it is shown that meeting the criteria is not feasible and reasonable."*

In terms of the screening process for the assessment of the degree of traffic noise impacts and the need for mitigation, the following represents the current approach taken by the RTA, as applied to the subject project. This approach is fully in accordance with the RTA's ENMM.

The RTA's screening procedure is based on the appropriate ECRTN criteria and the predicted future traffic noise levels.

Time	B - Somersby		Residence V		Residence Y	
	Does the Future Traffic Noise Level Exceed the ECRTN Base Criterion	Is there an Exceedance of the 2 dB(A) Allowable Goal	Does the Future Traffic Noise Level Exceed the ECRTN Base Criterion	Is there an Exceedance of the 2 dB(A) Allowable Goal	Does the Future Traffic Noise Level Exceed the ECRTN Base Criterion	Is there an Exceedance of the 2 dB(A) Allowable Goal
5.00 am to 6.00 am	No	No	Yes	No	No	No
6.00 am to 7.00 am	No	No	Yes	No	No	No
8.00 am to 9.00 am	No	No	No	No	No	No
3.00 pm to 4.00 am	No	No	Yes	No	No	No
6.00 pm to 7.00 pm	No	No	No	No	No	No
7.00 pm to 8.00 pm	No	No	No	No	No	No
8.00 pm to 9.00 pm	No	No	No	No	No	No
9.00 pm to 10.00 pm	No	No	No	No	No	No

Review of the above table indicates the following, in relation to Residence V.

Between 5.00 am to 6.00 am the predicted noise level is less than 1dB(A) above the base criterion and the allowance goal is not exceeded. On this basis, it is considered unreasonable to require noise reduction because of the insignificant change in noise level and the marginal exceedance of the based criterion. No further investigation of noise controls is required.

Between 6.00 am to 7.00 am the predicted noise level is 3dB(A) above the base criterion and the allowance goal is not exceeded. On this basis, it is considered unreasonable to require noise reduction because the levels are not acute and there will not be a noticeable change in noise level. No further investigation of noise controls is required.

Between 3.00 pm to 4.00 pm the noise levels is less than 1dB(A) above the base criterion and the allowance goal is not exceeded. On this basis, it is considered unreasonable to require noise reduction because of the insignificant change in noise level and the marginal exceedance of the base criterion. No further investigation of noise controls is required.

Further, given the limited potential for the subject proposal to provide noise control for the traffic on Peats Ridge Road, the allowable 2 dB increase in the existing traffic noise is justified.

Also, advances have been made, and continue to be made, in relation to reducing truck noise emissions. On another recent quarry related project, extensive measurements were taken of relatively new laden and unladen truck passbys. The proponent for the subject project will ensure the use of similar trucks to those measured during the 5.00 am to 7.00 am period. Applying these truck measurements to the traffic noise model used in the Noise Assessment for Residence V in Table 9 (6.00 am to 7.00 am period) results in an increase in the predicted existing $L_{Aeq(1hour)}$ traffic noise level (of 56.6dB(A)) of only 0.4dB(A), for an additional 22 quarry related truck movements during that hour.

The resulting future traffic noise level at Residence V (of 57.0dB(A)) for that early morning hour is 1.6dB(A) lower than the level presented in Table 24 of the EA. This in turn is therefore, also 1.6dB(A) lower than the nominated criterion.

Notwithstanding the above, given the definitions of the respective roads presented in the ECTRN, it could be strongly argued that Peats Ridge Road, Somersby should be classified as a "sub-arterial road" rather than a "collector" road, as used in the Noise Assessment.

The ECTRN defines a collector road as "*a road situated in a built-up area that collects local traffic leaving a locality and connects to a sub-arterial road."* whereas the potentially more appropriate sub-arterial roads definition is "*roads handling through-traffic, with characteristically heavy and continuous traffic flows during peak periods. Through-traffic is traffic passing through a locality bound for another locality."*

The associated sub-arterial traffic noise criteria would be 60dB(A) $L_{Aeq(15hour)}$ daytime and 55dB(A) $L_{Aeq(9hour)}$ night-time. Based on the traffic count data used in the Noise Assessment, the existing $L_{Aeq(15hour)}$ daytime and $L_{Aeq(9hour)}$ night-time traffic noise levels are 57.1dB(A) and 51.7dB(A) respectively at Residence V.

Using the traffic noise levels used in the traffic noise assessment, the allowable additional project-related truck movements are an average of 40 per hour (for 15 hours) during the daytime and an average of 14 per hour (for 9 hours) during the night-time to comply with the criteria of 60 db(A) $L_{Aeq(15hour)}$ daytime and 55 db(A) $L_{Aeq(9hour)}$ night-time.

The equivalent allowable additional project-related truck movements based on the recent truck noise measurements are an average of 238 per hour during the daytime and an average of 82 per hour during the night-time. Compared to the above allowable truck movement numbers, those presented in Table 24 of the Noise Assessment are extremely conservative.

2.2.7 Recommended Conditions of Approval

Comment

DECC's recommended noise limits have not considered Location N as DECC does not concur with the criteria presented in the NIA for assessment Location N. DECC is of the opinion that additional ambient noise monitoring should be undertaken at Location N to more appropriately characterise the existing acoustic environment and hence derive assessment criteria.

In the absence of additional monitoring, and on the basis of conservative assessment criteria, the noise levels predicted for Location N exceed levels that DECC would normally consider licensing to. In these situations DECC relies on the consent to manage the noise impacts.

Response

Refer to the response to Issue 2.1 where noise monitoring data for Location N is presented.

2.2.8 Validity of the Computer Noise Model

Comment

Some public submissions expressed concern regarding the validity of the computer model used to predict noise levels (albeit in a general sense only.

Response

The noise model used in noise level predictions is advocated by the NSW DECC, ie. SoundPLAN.

In relation to SoundPLAN, the noise model used for the construction and operational noise level predictions in the EA, it is stated in Section 5 of the Noise Assessment that, "The computer model was prepared using the SoundPLAN V6.3's Industrial Module, a commercial software system developed by Braunstein and Berndt GmbH in Germany. The software allows the use of various internationally recognised noise prediction algorithms. The CONCAWE algorithm, suitable for the assessment of large-scale industrial and resource extraction projects, has been selected for this assessment as it also enables meteorological influences to be assessed.

The noise modelling takes into account source sound level emissions and locations, screening effects, receiver locations, meteorological effects, ground topography and noise attenuation due to spherical spreading and atmospheric absorption. Ground contours and site topographical data were provided by R.W. Corkery & Co. Pty. Limited.

From a comprehensive comparison of noise model predicted and measured noise levels presented in a paper entitled "The propagation of noise from petroleum and petrochemical complexes to neighbouring communities", the mean differences over a range of meteorology categories (Categories 2 to 6) ranged from 0dB(A) to 0.6dB(A).

2.3 AIR QUALITY AND HEALTH ISSUES

2.3.1 Introduction

This section presents a response addressing a range of air quality and health related issues raised in submissions from the Northern Sydney Central Coast Area Health Service and various public submissions. The Proponent has revised some commitments (Section 3) to provide the assurances necessary to safeguard public health.

2.3.2 Inflated Background During Monitoring Period

Comment

Somersby Action Group and various public submissions made comment that the background particulate monitoring (dust deposition and PM_{10}) was not valid, since monitoring was conducted during a period of high dust generating activity (drought conditions prior to and during roadworks, etc.).

Response

Unlike noise criteria, air quality goals generally do not refer to allowable increases above background conditions. Rather, the assessment criteria, being largely health related, represent a finite value, incorporating both background and increment, above which impacts are considered to be unacceptable.

Thus, in the event that the background air quality for a given airshed is over-estimated, this ensures that there is a lesser amount of "incremental" increase from a given proposal that will be deemed acceptable.

In other words, the higher the stated background, the lower the permissible impact of a given proposed development.

It is therefore considered to be a valid approach to provide a conservatively high estimation of background air quality in the interests of environmental protection.

Notwithstanding the above, it is noted that monitoring of dust deposition and 24-hour PM_{10} was continued beyond the publication of the Air Quality Assessment (up to November 2007).

Results of all dust deposition monitoring conducted to date are presented in **Figure 2.5**. This data set retains the data exclusions described within the Air Quality Assessment. Additionally, a single anomalously high value (17.8 g/m^2/month) has been excluded from the latter data set (SD-4, May 2007).

Inspection of **Figure 2.5** does not indicate that dust deposition during the period September 2005 – October 2006 (as reported in the Air Quality Assessment) is significantly greater than during the subsequent monitoring period.

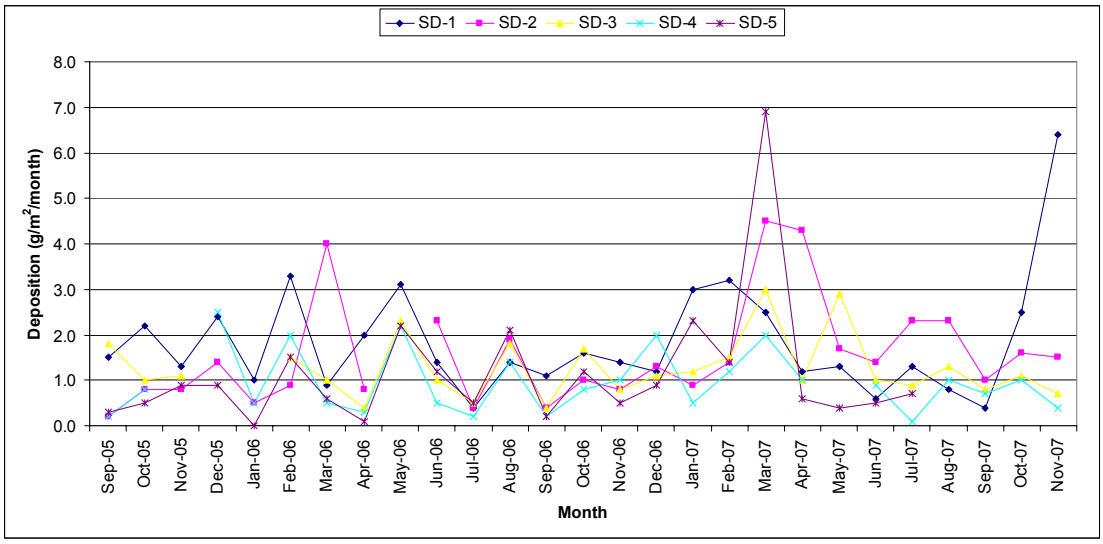

Figure 2.5 Dust Deposition Gauge Results September 2005 – November 2007

Analysis of the full dust deposition gauge data set indicates that average dust deposition rates are in fact slightly greater in the period following the publication of the Air Quality Assessment. However, as all average deposition rates are at or below 2.0 g/m^2/month, it is noted that this does not impact upon the governing criterion for dust deposition, namely a permissible incremental increase of up to 2.0 g/m^2/month (annual average).

Results of all PM_{10} monitoring conducted to date are presented in **Figure 2.6**.

Inspection of **Figure 2.6** indicates that PM_{10} concentrations recorded during the period September 2005 – October 2006 (as reported in the Air Quality Assessment) may be viewed as higher than those recorded after this period, particularly in the month of December 2005.

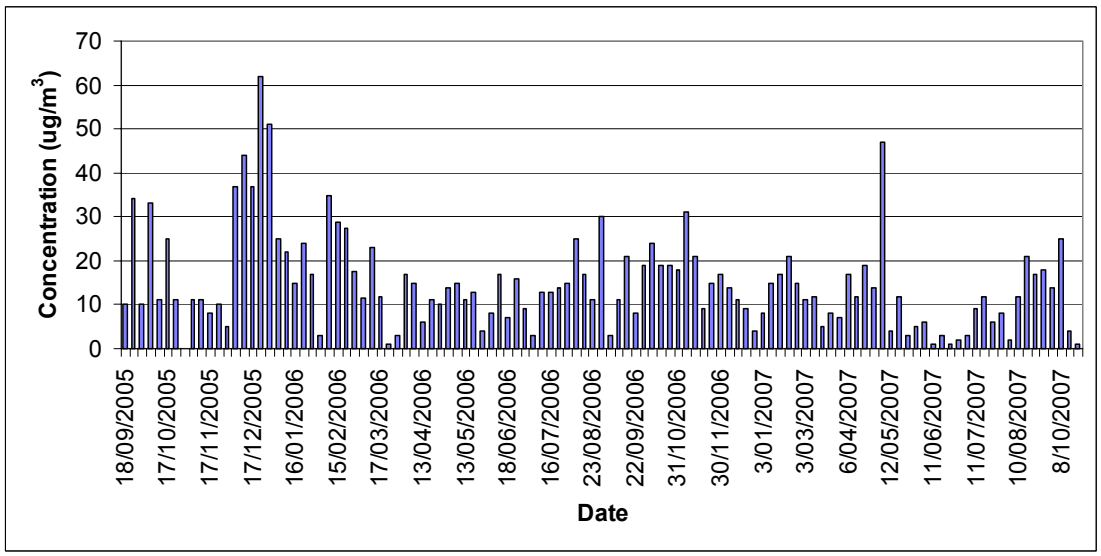

Figure 2.6 24-hour Average PM_{10} Results September 2005 – November 2007

Analysis of the dust deposition gauge data set for the period September 2005 to November 2007 indicates that the average PM_{10} concentrations recorded after publication of the Air Quality Assessment is 13µg/m^3, compared to 18µg/m^3 reported within this document. However, as noted above, the use of lower values within the background data set would favour an increase in permissible particulate impacts from the project.

2.3.3 Operational Issues

2.3.3.1 Quantification of Ripping and Crushing Activities

Comment

Somersby Action Group comment that ripping activities have not been incorporated within the atmospheric dispersion modelling exercise, and that the crushing plant will only be partially enclosed.

Response

A dozer would be used for ripping activities. Dust generation associated with dozer activities has been included in both modelling scenarios.

It is clarified that all screening and crushing components of the sand wash plant will be completely enclosed. It is noted that while the sand wash plant would be an enclosed process, the same measure is not deemed necessary for the mortar sand plant. As a result of the comparatively low annual throughput and limited operating hours, combined with high moisture content of the feed materials, particulate emissions from the mortar sand plant are anticipated to be insignificant.

2.3.3.2 Dust Emissions from Stockpiling of Filter Cake

Comment

Somersby Action Group raised the ability of filter cake stockpiles, derived from sand washing, to generate dust, particularly in the finer dust fraction.

Response

Observations from operational sand washing plants using belt filter presses are that the residual filter cake comprises clay and silt with a high moisture content (of the order of 30%). This material dries out to form a hard crust that is resistant to wind erosion. A significant proportion of the filter cake moisture content is retained below this crustal layer.

2.3.3.3 Sand Moisture Content

Comment

The Somersby Action Group queried the ability of the inherent moisture content of the sand (estimated to be 8 %) to contribute to the overall control of dust.

Response

Emission factors (typically expressed as kg of particulate generated per tonne of material worked) have been derived from equations contained within the National Pollutant Inventory document, Emission Estimation Technique Manual for Mining, Version 2.3, (EETMM) (Environment Australia, 2001).

These equations have been derived through peer-reviewed field studies conducted within the United States and Australia and acknowledge that the moisture content of a material will typically influence its ability to generate dust.

A comparison of calculated emission factors derived using dry material (nominally 2% moisture content) compared to the material in situ (estimated to be of the order of 8%) has been conducted. This exercise indicates that particulate emission rates corresponding to the use of excavators, dozers, front end loaders, and transfer and conveying may be expected to be 80% lower for material containing 8% moisture than for dry material.

2.3.4 PM_{10} Levels

2.3.4.1 Introduction

Prior to responding to the specific issues relating to PM_{10} dust levels, these introductory comments have been compiled to explain in layman's terms (as far as possible) how the project's impacts upon local air quality have been assessed.

The assessment effectively involves a four stage process.

Stage 1: Establishing what the existing PM_{10} dust levels are, and using these levels to define the existing air quality – this is undertaken using available PM_{10} monitoring data.

Stage 2: Based upon the results of the existing air quality monitoring data, determining the relevant PM_{10} criteria or more specifically the acceptable incremental increase in PM_{10} dust levels that the project can safely generate.

Stage 3: Predicting the likely quantities of PM_{10} dust to be generated by the project, i.e. assuming the adoption of standard or site-specific dust control measures and one or more ways to operate known as operational scenarios.

Stage 4: Assessing the impact of the dust generated by comparing the predicted project-related PM_{10} dust levels to the background or existing dust levels.

The discussions in this section with respect to PM_{10} dust levels attributable to the Somersby Fields Project focuses upon the PM_{10} levels throughout a 24 hour period as this is the principal parameter raised in submissions. The **annual** PM_{10} levels were predicted to be comparatively minor with incremental increases attributable to the project ranging between 3% and 8% of the DECC Annual Goal of 30µg/m^3 (in the worst case).

An overview of the approach to each stage as it relates to the Somersby Fields Project is set out as follows.

Stage 1: Existing Air Quality Assessment

The air quality assessment undertaken for inclusion in the *Environmental Assessment* for the Somersby Fields Project drew together the existing available data on PM_{10} levels compiled:

(i) by the Proponent from a monitor positioned within Somersby Fields Project (Data set period September 2005 – October 2006[1]); and

(ii) from data assembled from a DECC – operated site at Richmond in Western Sydney about 70km from Somersby. (Data set period January 2003 – October 2007).

The Somersby data was collected in accordance with DECC protocols that require 24 hour PM_{10} samples to be collected every 6 days whereas the Richmond data had been collected every day, thereby providing a continuous record of PM_{10} levels at Richmond.

A comparison of the two data sets is presented in **Table 2.10**.

Table 2.10
Comparative Results for 24 hour PM_{10} Levels at Somersby and Richmond

	Percentage of Results in Nominated Range					
	0 – 10 (µg/m^3)	10 – 20 (µg/m^3)	20 – 30 (µg/m^3)	30 – 40 (µg/m^3)	40 – 50 (µg/m^3)	<50 (µg/m^3)
Somersby	33%	44%	14%	6%	2%	2%
Richmond	16%	53%	23%	6%	1%	1%

The following conclusions can be drawn from a review of these comparisons.

- A higher percentage of low PM_{10} concentrations (between 0 and 20 µg/m^3) were recorded at Somersby than at Richmond;
- A similar fluctuating pattern at both monitoring locations was recorded over the direct comparison period.
- The percentage of days on which PM_{10} levels exceed 40µg/m^3 at both sites was comparatively negligible. Two percent of days per year represents 7 days each year when the 40µg/m^3 level is exceeded.

[1] The monitoring of PM_{10} levels at Somersby Public School continued until November 2007 – hence, in excess of 2 years of background data is available.

Stage 2: Setting Impact Assessment Criteria

It is the requirement of the DECC that the assessment criteria for the Somersby Fields Project is based upon the use of a near maximum level of PM_{10} experienced based upon, wherever possible, continuous PM_{10} data. This requirement meant that the project was assessed against Richmond data, which is considered to provide a conservatively high estimation of the PM_{10} dust levels in the Somersby area. A number of the public submissions state that fact which is clearly supported by data in **Table 2.10**.

For the purposes of assessing PM_{10} levels attributable to the project-related activities, an inventory of dust-generating sources was compiled.

The DECC's approach to setting PM_{10} criteria is to identify "background" levels that occur on the near worst "natural" day of the year without the proposed activity and then establishing whether the PM_{10} dust generated by the new activity combined with the worst "natural" days exceed the overall health criteria for PM_{10} 24 hours of 50µg/m^3.

A review of **Table 2.10** establishes that the number of days each year that currently have "natural" high PM_{10} levels are comparatively low i.e. about 7 days per year. Therefore, it needs to be kept in context that the approach for impact assessment required by the DECC focuses upon those few days each year when the "natural" PM_{10} dust levels are high and approaching the 40µg/m^3 level.

Stage 3: Predicting Project-related PM10 Dust Levels

In order to predict the 24 hour PM_{10} dust levels attributable to the project, it is necessary to identify one or more typical operating scenarios that identify where items of mobile earthmoving equipment and static plant are operating. Further, it is necessary to identify the level of controls at each dust source e.g. the extent of enclosure around the crushing component or frequency of road watering. The creation of such scenarios, together with adoption of industry-recognised dust emission estimations for each item of equipment or activity, enables a computer model to be used (in conjunction with the relevant meteorological data) to predict PM_{10} dust levels at various locations surrounding the Project Site.

For impact assessment purposes, the most appropriate weather data for inclusion in the computer model is a full year of hourly observations most relevant to the Project Site. In this instance, a meteorological input file was generated synthetically using CSIRO software, while referencing the closest representative Bureau of Meteorology weather station at Mangrove Mountain.

The computer modelling provides a contour plot of the 24 hour PM_{10} dust levels surrounding the Project Site. These levels are then added to each worst case "natural" day for each day to depict the overall combined 24 hour PM_{10} levels – the levels to be experienced at surrounding residences and Somersby Public School.

Stage 4: Assessing Impact Levels

The DECC requires that 24 hour PM_{10} impacts be determined focusing on the worst days of the year to ensure the health of the surrounding community is not compromised on those days. Conversely, this approach recognises that on most other days of the year, the combined "natural" background level and the contribution from the project would be lower, and often very much lower than the 24 hour PM_{10} DECC goal of 50µg/m^3.

The results of the impact assessment are typically displayed as contour plots such as those presented on Figure 4.20 of the *Environmental Assessment*. These plots display the maximum predicted <u>total</u> PM_{10} dust levels, which in the current assessment are invariably dominated by high background levels and comparatively low contributions from the project. It is noteworthy, that even on the days when the higher PM_{10} dust levels are predicted to occur on the Project Site, the background values are typically twice these values.

It is therefore fundamental that operations such as extractive industries that generate dust need to manage the level of dust on those days when "natural" PM_{10} background levels are high. This is addressed in the following responses.

2.3.4.2 Predicted Maximum PM_{10} Concentrations

Maximum Predicted Incremental 24-hour Average PM_{10} Levels

Comment

The DECC requested that a table be provided detailing the maximum predicted incremental 24-hour average PM_{10} at each sensitive receptor (i.e. due to the project operation only).

Response

Table 2.11 and **Table 2.12** present the five highest incremental increase concentrations in 24-hour average PM_{10} predicted at each of the surrounding receptors attributable to the Somersby Fields Project.

The tables indicate that the worst-case predicted incremental PM_{10} (24-hour) concentration will occur at Receptor T (Fischer Residence) during Scenario 1 operations (9.1 µg/m^3), and at Receptor N (Daniel Residence) during Scenario 2 operations (14.6 µg/m^3). These levels represent 18% and 29% respectively of the permissible 24 hour PM_{10} emissions.

Table 2.11
Five-Highest Predicted Incremental 24-Hour PM_{10} Concentrations – Scenario 1 Operations

Receptor ID	PM_{10} - 24-Hour Average (µg/m^3)				
	1st (Date)	2nd (Date)	3rd (Date)	4th (Date)	5th (Date)
B	5.1 (14/05/2004)	4.4 (05/07/2004)	4.4 (11/08/2004)	3.9 (28/05/2004)	3.8 (10/08/2004)
F	5.1 (09/09/2004)	3.8 (10/06/2004)	3.3 (04/07/2004)	3.1 (02/06/2004)	3.1 (12/07/2004)
I	9.0 (07/04/2004)	6.6 (04/02/2004)	6.4 (28/04/2004)	6.0 (27/04/2004)	5.7 (10/07/2004)
M	6.3 (25/08/2004)	4.8 (18/08/2004)	4.6 (19/10/2004)	4.4 (22/05/2004)	4.4 (22/03/2004)
N	7.4 (18/04/2004)	6.4 (13/04/2004)	6.4 (19/10/2004)	6.1 (18/08/2004)	6.0 (30/08/2004)
O	4.2 (18/04/2004)	4.0 (02/03/2004)	3.5 (13/04/2004)	3.5 (19/10/2004)	3.3 (30/08/2004)
S	5.9 (16/12/2004)	5.4 (29/04/2004)	5.3 (10/07/2004)	5.2 (20/07/2004)	5.0 (09/04/2004)
T	9.1 (26/01/2004)	9.0 (21/04/2004)	7.6 (20/07/2004)	7.4 (28/03/2004)	7.3 (20/04/2004)
U	7.0 (17/06/2004)	5.5 (18/10/2004)	5.4 (12/05/2004)	4.3 (13/05/2004)	4.1 (15/12/2004)
V	7.3 (27/05/2004)	6.3 (04/06/2004)	5.7 (27/03/2004)	5.1 (22/04/2004)	5.1 (28/07/2004)
Y	5.0 (27/05/2004)	4.8 (04/06/2004)	3.2 (18/07/2004)	3.2 (05/07/2004)	3.1 (22/04/2004)
Source: Modelling Conducted by Heggies Pty Ltd, 2008					

Table 2.12
Five-Highest Predicted Incremental 24-Hour PM_{10} Concentrations – Scenario 2 Operations

ID	PM_{10} - 24-Hour Average (µg/m^3)				
	1st (Date)	2nd (Date)	3rd (Date)	4th (Date)	5th (Date)
B	4.9 (14/05/2004)	3.9 (05/07/2004)	3.7 (30/05/2004)	3.7 (11/08/2004)	3.3 (28/05/2004)
F	4.2 (09/09/2004)	3.7 (10/06/2004)	3.5 (17/07/2004)	3.4 (12/07/2004)	3.2 (02/06/2004)
I	12.9 (07/04/2004)	6.3 (13/11/2004)	6.2 (04/02/2004)	6.0 (28/04/2004)	5.9 (18/09/2004)
M	10.0 (25/08/2004)	9.1 (18/08/2004)	8.7 (19/10/2004)	8.0 (22/05/2004)	7.6 (30/08/2004)
N	14.6 (21/07/2004)	14.3 (13/04/2004)	13.4 (18/04/2004)	13.3 (02/03/2004)	13.0 (03/03/2004)
O	7.5 (21/07/2004)	5.8 (02/03/2004)	5.8 (14/07/2004)	5.6 (19/10/2004)	5.5 (11/06/2004)
S	4.9 (10/07/2004)	4.8 (20/07/2004)	4.4 (29/04/2004)	4.1 (09/04/2004)	4.1 (22/04/2004)
T	7.5 (26/01/2004)	6.4 (20/04/2004)	5.8 (20/07/2004)	5.4 (28/03/2004)	5.2 (22/04/2004)
U	5.0 (17/06/2004)	4.4 (12/05/2004)	4.0 (18/10/2004)	3.7 (18/07/2004)	3.6 (13/05/2004)
V	6.2 (04/06/2004)	5.5 (27/05/2004)	4.2 (27/03/2004)	4.2 (18/07/2004)	4.1 (22/04/2004)
Y	4.3 (04/06/2004)	3.7 (27/05/2004)	3.1 (05/07/2004)	2.7 (18/07/2004)	2.6 (14/05/2004)
Source: Modelling Conducted by Heggies Pty Ltd, 2008					

2.3.4.3 PM_{10} Concentrations >10µg/m^3

Comment 1

"…Modelling indicates that PM_{10} impacts for scenario 2 are of greater concern, with approximately 20 days per year expected to have an incremental exposure of 10µg/m^3 or more. Incremental exposure of this magnitude may manifest as increased respiratory symptoms, particularly in children."

Response

Air quality modelling of PM_{10} has indicated compliance of the project with both NSW DECC air quality goals (50µg/m^3) and the Commonwealth's NEPM air quality objectives (50µg/m^3 with five exceedances allowed per year).

Exposure to PM_{10} levels of 10 µg/m^3 or more has been reported in the literature to cause increased respiratory symptoms, especially in children and in people already suffering from asthma. Symptoms reported in the literature are often very mild eg, an occasional cough. However, during periods of elevated concentrations well above 50µg/m^3, symptoms can be quite severe. Periods of elevated concentrations occur occasionally during the year on high pollution days especially when such days are accompanied by extended stable weather conditions or during natural events like bushfires.

Upon review of the health impact assessment, it is apparent that Table 4 (Part 4: Health Impact Assessment, page 4-29) contains erroneous data with regard to incremental 24-hour average PM_{10} concentrations. As can be seen in the correctly reproduced Table (below), the maximum predicted incremental 24-hour average PM_{10} concentrations range from 7.5µg/m^3 to 14.6µg/m^3 (Scenario 2). It is also noted that the predicted annual average PM_{10} concentrations presented in the original Table 4 were correct, and therefore the risk calculations for potential chronic silica and PM_{10} exposure are not affected.

Table 4 (Corrected): Maximum Incremental Increase in PM_{10} Concentrations

	Scenario 1	Scenario 2	Scenario 3
24-hour average PM_{10}	**9.2µg/m^3** (Residence T)	**14.6µg/m^3** (Residence N)	**7.5µg/m^3** (Somersby Public School)
Annual average PM_{10}	1.0µg/m^3 (Residence N)	2.5µg/m^3 (Residence N)	0.9µg/m^3 (Somersby Public School)

The Proponent agrees with the view that the project should encompass a robust and flexible monitoring program and a management plan which allows for response mechanisms related to the current predictions and future monitoring results of the operation.

The Proponent acknowledges that it is preferable to ensure that the incremental PM_{10} concentration attributable to its activities on the Project Site does not impact adversely on the surrounding residential receptors or the Somersby Public School. Therefore, the Proponent is prepared to commit to establishing a protocol that would restrict its activities when the recorded concentration of PM_{10} dust over an agreed period from the continuous monitor is above 40µg/m^3, ie. a level of 10µg/m^3 below the DECC 50µg/m^3 24 hour PM_{10} goal. This would involve curtailing sand removal operations, raw feed transportation, crushing and mortar sand processing during those periods when the continuous PM_{10} dust level throughout an agreed period exceeds 40µg/m^3. Activities such as sand washing and product despatch would be able to continue given their comparatively low contribution to overall dust levels.

Reference to **Table 2.10** identifies that the existing "natural" 24 hour PM_{10} dust levels are typically less than 20µg/m^3 for 75% of the year. Hence on those days, the combined dust from "natural" sources and the project would be less than or close to the existing average 24 hour PM_{10} levels.

2.3.5 Silica Component of PM_{10} Dust

2.3.5.1 Establishing the Silica Component of PM_{10}

Comment

"…The EA presents an analysis of risk based on estimates of the crystalline silica component of PM_{10} and indicates that the incremental exposure to silica is unlikely to result in adverse impacts in the community. We recommend that the assumptions used in the EA are verified by monitoring prior to works commencing, and during construction and operations phases of the project".

Response

The Proponent agrees with this approach and will undertake ongoing air quality monitoring, including for PM_{10} and silica, at the most sensitive receptors (Somersby Public School and Residence N) or an alternative intermediate location during the life of the project. In addition, to verify the estimated silica concentration in the PM_{10} component of dust emissions, monitoring for silica in PM_{10} component of the dust will be undertaken prior to commencement of site operations, utilising the existing monitoring equipment at Somersby Public School and the continuous monitoring equipment. This actual background silica concentration can then be used to provide a more accurate estimation of health impacts due to potential silica exposure. An ongoing silica monitoring regime could be set up as follows.

- Carry out routine monitoring for PM_{10} at sensitive receptors or an intermediate location taking into account the locations of the activities on site.
- Carry out representative sampling within the soil / sand at the Project Site to establish the % component of silica associated with the respirable fraction of the material.
- Infer a respirable crystalline silica level from the routine PM_{10} monitoring on the basis of the soil / sand sampling results.
- On a routine basis, validate the assumed respirable silica concentrations by undertaking laboratory analysis of the exposed filters from the PM_{10} monitoring.

The Proponent is committed to a comprehensive monitoring program to demonstrate beyond doubt that its activities are not adversely affecting the health of its employees and the surrounding community. It is the Proponent's preference that the monitoring program involves the following.

1. A regular silica personal sampling program for the site-based workforce. It remains the Proponent's contention that while the site-based work force is exposed to acceptable levels of silica, the levels of silica in the surrounding environment would be at a level not to cause any health risks.
2. During Stage 1 operations, a continuous PM_{10} recorder (eg TEOM) would be placed at an intermediate location between the Stage 1 activities and the Daniel residence and Somersby Public School. It is proposed that the intermediate location be close to the western boundary of the Project Site within the Project Site itself but in a location / elevation agreed upon by technical experts with NSW Health and the DECC. An appropriate PM_{10} trigger concentration would be determined in correspondence with NSW Health and the DECC. .
3. During Stage 2 operations, or during the latter stages of Stage 1 operations, the location of the continuous PM_{10} recorder would be reviewed, again in consultation with technical experts with NSW Health and the DECC, to ensure it is appropriately monitoring PM_{10} dust levels.
4. The Proponent is committed to a program of deposited dust monitoring to ensure that deposited dust levels attributable to Project Site activities at surrounding residences and agricultural / horticultural enterprises are within the DECC criteria, namely an annual average of $4g/m^2$/month.

5. A comprehensive meteorological station would be installed to provide relevant ambient weather conditions to assist with the interpretation of all dust monitoring results.

2.3.5.2 Health-related Issues Regarding Silica and PM_{10}

Comment

The main health-related issues raised by the Somersby local community were concerns regarding the adverse effects of silica that may be contained within emissions due to site activities, as well as concerns regarding the effects on respiratory symptoms and asthma due to the predicted increase in dust.

A response to both issues raised is set out below.

Response

Silica

As stated in the Health Impact Assessment, it is well documented that long-term exposure to respirable crystalline silica is associated with respiratory disease, including silicosis and lung cancer. The vast majority of studies that demonstrate this association are of occupational exposures – that is, exposures to silica that are far in excess of those predicted to occur at off-site locations due to site operations. There are some case reports of silicosis occurring in the non-occupational setting, although these are very few and are generally in individuals who live in arid, developing countries and are exposed to significant concentrations of dust and sand. Even though, as the community has pointed out in their submissions, the composition of sand is similar around the world, exposure situations are markedly different in different environments. Therefore the few case studies of non-occupational silicosis cannot be generalised to the situation at Somersby.

However, to confirm this low risk of adverse health impacts due to potential silica exposure resulting from site operations, the monitoring regime suggested above for silica would be carried out at relevant sensitive sites (eg Somersby Public School) or at an alternative intermediate location, so that the actual background level of respirable crystalline silica can be used rather than the estimate from ad hoc sand sampling.

PM_{10}

Concerns that have been raised by the Somersby local community regarding respiratory symptoms resulting from increased exposure to PM_{10} and the opportunity to address these concerns via the environmental assessment and community response process.

The current air quality modelling indicates that during the modelling period on a limited number of occasions, and only at two adjoining residences, there were incremental increases in 24-hour average PM_{10} concentrations greater than 10µg/m^3 during Stage 2/2 of the project (Modelling Scenario 2).

It should also be noted that during the modelling period, an increment greater than 10µg/m^3 was not predicted to occur at the Somersby Public School.

In this instance, controls used to suppress dust emissions during site operations would be closely monitored, strictly enforced, and reviewed on a regular basis, (eg via ongoing and continuous monitoring for PM_{10} and associated silica measurements). An air quality management plan would also be developed to provide efficient response protocols in the event of any exceedances of regulatory PM_{10} concentrations. In any event, the Proponent is committed to curtail the higher dust generating activities on those days when PM_{10} dust levels recorded at the Continuous PM_{10} recorder exceed 40µg/m^3 (see Commitment 2.12).

2.3.5.3 Impacts of Respirable Dust / Crystalline Silica

Comment

The Federation of Parents and Citizens' Associations of NSW , Somersby Action Group and numerous public submissions make reference to silicosis and related health issues.

One submission provided in relation to environmental exposure to crystalline silica states:

> *"Epidemiological and clinical studies of occupationally exposed cohorts comprise most of the human exposure data associated with crystalline silica. Occasionally there have been case reports of pulmonary ailments suggestive of silicosis or fibrotic lesions related to ambient dust exposure; most of these reports have been from underdeveloped arid portions of the world and are lacking control patients or specific silica dust exposure assessments. Many of these reports also do not differentiate clearly between outdoor occupational exposures and ambient background environments."*

Response

The literature presented in the submissions relates to impacts on nomadic Bedouin in the Negev Desert, Himalayan villages in India, and Minghua / Saudi Arabian Desert dwellers.

California has developed a chronic reference exposure level (REL) (noncancer effects) in ambient air for crystalline silica of 3 µg/m^3. A chronic REL is an airborne level of a chemical at or below which no adverse health effects are anticipated in individuals indefinitely exposed to that level. This REL is meant to be applied only to particles of crystalline silica (quartz, cristobalite, tridymite), of respirable size, as defined by the occupational hygiene methods described by ACGIH (2004)/ISO (1995) which has a 50% cut-point at 4µm particle aerodynamic diameter. This occupational definition of respirable differs from the environmental definition of respirable, which is PM_{10}.

The above value has been adopted in Victoria, and is expressed as an annual average value, looked at as $PM_{2.5}$ size fraction.

The Air Quality and Health Risk Assessment reports state that:

- approximately 20% of the PM_{10} size fraction from fugitive dust from road, soil and construction is likely to constitute $PM_{2.5}$;

- the estimated crystalline silica (as quartz) content of the PM_{10} fraction of the material at the Project Site (determined by cyclosizing and X-ray diffraction analysis) is 4%; and
- maximum incremental increase in annual PM_{10} concentrations (attributable to mining activities) at closest sensitive receptors is predicted to be of the order of 2.5µg/m^3.

A simple calculation based on the above information indicates that impacts of mine-derived crystalline silica may be expected to be of the order of 0.02 µg/m^3 at the nearest sensitive receptor as an annual average. This value represents less than 1% of the California/Victorian criterion of 3 µg/m^3 (annual average).

2.3.6 Dust-related Impacts

2.3.6.1 Introduction

A number of submissions raised a range of dust-related issues, the most relevant of which are addressed in the following subsections.

2.3.6.2 Dust Impacts on Plants

Comment

Somersby Action Group raised concerns regarding the impact of dust deposition potentially interfering with plant metabolism, obscuring light transmission to greenhouses, and reducing the saleability of farm produce.

Response

This issue is addressed within Section 4.4.2 and Section 6.1 of the Air Quality Assessment document.

The impacts of dust on vegetation are dependent on the rate of dust deposition and the chemical composition of the dust. There have been very few recent studies conducted regarding the vegetative impacts of dust deposition and there is no single minimum dust deposition rate at which impacts are experienced given the variation of the chemical composition of dusts and the variable sensitivity of plant species to this factor.

Plant communities are not explicitly considered as sensitive receptors by the DECC, except in relation to impacts of hydrogen fluoride where the sensitivity of grapevines and stone fruit species to this compound is considered relevant. However, the NSW Government typically mandate within operational conditions of consent for extractive industries that an incremental dust deposition criterion of 2g/m^2/month (expressed as an annual average) should not be exceeded on more than 25% of any privately-owned land.

In the absence of more applicable criteria, the above criterion may be regarded as a highly conservative indicator of potential impacts on vegetation. The current assessment predicts that the project will be in compliance with the above. Finally it is noted that dust generated by the proposal is anticipated to be effectively chemically inert.

The nuisance dust criterion was developed following experimental studies that indicate that dust deposition may become visibly noticeable when deposition rates are greater than 4g/m^2/month (NERDDC, 1988). Thus, the above criterion may be regarded as approximately half the amount of dust that may be required to be deposited for a visible impact to be detected on most surfaces.

Thus, compliance with the above criterion indicates that visible dust impacts are not predicted to occur. This includes visible impacts affecting the aesthetic quality of merchandise from commercial nurseries or farms, or that may hinder greenhouse light transmission.

2.3.6.3 Dust Impacts on Water Tanks

Comment

Submissions from NSW Health, Somersby Action Group and various individuals raised concerns regarding the impact of dust deposition on rainwater tanks located on nearby resident's roofs.

Response

This issue is addressed within Section 6.1 of the Air Quality Assessment document.

Total mean monthly dust deposition (incremental) associated with the Project is predicted to be less than 1.2g/m^2/month, at all the nearest non-project related residences, for both modelling scenarios. As noted above, such changes in deposition rates are likely to be undetectable through visual inspection alone.

In view of the predicted incremental dust deposition rates at the nearest residences, and given that any deposited material should be assumed to be chemically inert, it is not anticipated that dust deposition on roofs will significantly impact the water supply obtained from rainwater tanks.

All rainwater tanks in the Somersby area are currently accumulating in the order of approximately 2.7kg of dust per year based on a roof surface area of 300m^2, an average of 1.5g/m^2/month, and an assumed 50% inflow of dust into the tank following rainfall. Deposited dust attributed to the project would add less than this quantity of dust entering the various water tanks – typically varying from 0.4kg to 0.7kg (Stage 1) and 0.4kg to 2.2kg (Stage 2). Given the dust from the project (consistent with existing natural levels) would have an aerodynamic diameter to enable it to fall from the air, it would likewise fall to the base of the tank as is the current case.

Minimisation of any deposited dust from the project that may land on roofs can be achieved through standard first flush techniques recommended for use of rainwater tanks.

There is evidence that the first flush of water in a rain event washes the roof catchment and hence may contain higher than average amounts of accumulated dust, bird and animal droppings, leaves and other debris. First flush devices prevent the first portion of roof run-off from entering the tank and will reduce the amounts of accumulated material on roofs from being washed into tanks. The use of these devices is recommended by NSW Health for all roof tanks irrespective of whether there is a quarry in the vicinity.

2.3.6.4 Dust Impacts on Animals

Comment

Some public submissions expressed that horses are vulnerable to the effects of breathing dust, and that dust may adversely impact other animals.

Response

It is considered that the prediction that human health criteria would be met (as in the current Air Quality Assessment) is sufficient to safeguard the health of other animal species. Furthermore, veterinary advice from Dr Evan Hunt (formerly Associate Professor of Veterinary Science at the University of Sydney – Orange Campus) is that horses possess comparatively large nasal passages, which are typically moist and able to remove dust from the air being breathed. Dust is commonly inhaled by horses in training yards, on racetracks and in natural conditions in drier areas of the State – without adverse impact.

2.3.7 Comprehensive Air Quality Monitoring

Comment

NSW Health, Somersby Action Group and various public submissions.

A submission from the Northern Sydney Central Coast Area Health Service recommends a robust monitoring and response mechanism be developed, both for the construction and operation phases of the development. Specifically, the submission recommends the deployment of a Tapered Element Oscillating Microbalance (TEOM) instrument at the Somersby Public School or similar receptor.

Additionally, concerns were raised as to what criteria would be set to control dust levels and to ensure that concentrations do not exceed those stated in the Environmental Assessment. It has also been queried as to what remedial action would be taken in the event of high particulate levels being observed.

Response

It is standard practice that an Operation Phase Dust Management Plan be developed for approved extractive industries, while ongoing monitoring and corrective action in the event of non-compliance have been addressed within Section 8 and Section 9 of the Air Quality Assessment, these concepts are typically developed further for site-specific activities within a Dust Management Plan document.

A Dust Management Plan prepared for the Somersby Fields Project would provide both proactive and reactive dust management procedures, and should document plans for corrective action where the air quality monitoring identifies that particulate concentrations are approaching the relevant trigger levels.

In this instance, the site manager would need to:

- identify the activities that were occurring at the time of the elevated monitoring data (employing continuous, real-time monitoring techniques);
- review work procedures and environmental controls in place for this activity; and
- implement an alternative method to more adequately control dust generation.

The corrective action may involve supplementary monitoring to identify the source of the elevated dust levels, and/or may involve modification of work procedures, techniques or programmes to avoid any recurrence or minimise its adverse effects.

Many precedents exist (e.g. Dixon Sands, Maroota) whereby Dust Management Plans, coupled with real-time continuous monitoring techniques with instantaneous alarms/notifications can achieve acceptable air quality outcomes at adjacent sensitive receptors.

Comment

"Monitoring and enforcement should the project proceed, comprehensive monitoring of … air quality … will be required".

Response

PM_{10} would be monitored during critical stages of the project (eg by a continuous method, such as TEOM) at the most sensitive receptors or an alternative intermediate location. This monitoring would be reviewed at a frequency determined by the DECC and the Area Health Service and continued accordingly.

An Air Quality Management Plan would be developed that incorporates both proactive and reactive management, including stop-work and increased dust suppression measures in response to increasing PM_{10} concentrations, as well as a mechanism to notify the school and the local community of PM_{10} levels, both on a regular basis and if the levels increase.

Each of the monitoring programs outlined in response to Comment 2 would be adopted and documented in the Air Quality Management Plan.

2.4 TRANSPORTATION ISSUES

Issues relating to transportation were raised by the RTA, Gosford City Council, DPI and various non-confidential public submissions.

2.4.1 Intersection Design

Comment

Both Gosford City Council and the RTA provide comments on the adequacy of the intersection design at the Project Site entrance.

Response

The RTA contends it is not prepared for the 80/100 speed advisory sign adjoining the Project Site on Peats Ridge Road to be relocated in the order of 150m to allow the intersection to be designed to an 80kph standard, ie. with respect to the vehicle acceleration and deceleration distances. An intersection design reflecting the recently released Austroads Standards could be achieved for a 100kph speed limit on the section of Peats Ridge Road between the site entrance and the Somersby Interchange. The Proponent has committed in its Statement of Commitments (Commitment 13.3) to submit the subject design for the intersection to both the RTA and Gosford City Council for approval following receipt of project approval from the Minister.

A component of the site entrance intersection would be a "truck unfriendly" tight radius on the kerb and / or with bollards / barriers that would prevent any truck from turning left onto Peats Ridge Road. Such a design, together with signposting re-inforcing instruction for truck drivers would facilitate a left hand manoeuvre only for light vehicles. This design would be the means to satisfy the RTA's concerns.

The intersection design would also be adjusted to shorten the east-bound right-turn bay to satisfy Council's requirements. The acceleration lane to accommodate laden trucks travelling eastward would be constructed in accordance with Austroads Guide to Traffic Practice – Part 5 Intersections at Grade, 2005.

2.4.2 Timing for Intersection Construction

Comment

Gosford City Council makes regular references in its submission to the completion of the site entrance intersection "prior to the commencement of quarrying operations".

Response

It is respectfully requested that the Council's recommendation for intersection works to be completed "prior to the commencement of quarrying operations" be set aside in favour of allowing limited works to be carried out on site, namely erection / construction of acoustic bunds and barriers and relevant erosion and sediment control works, limited clearing and

excavation of material from Stage 1/1 and preliminary work on the site of the processing plant. In the event of any mud-tracking onto Peats Ridge Road during the construction of the intersection, a vacuum / sweeper would be used to remove any material tracked onto the road surface. The critical factor as the Proponent has assessed the timing for the intersection construction relates to the need for the intersection to be fully completed prior to the despatch of any sand products.

2.4.3 Start / Finish Times for Trucks

Comment

DPI states that a "5:00am start time would mean that local trucks could be travelling by residents from 4:30am". Furthermore, DPI questions "how are start and finish times monitored?"

Response

The Proponent will require a Code of Practice to be signed by all truck drivers travelling to and from the Somersby Fields Project Site. A component of the code will be a requirement that no truck enters Peats Ridge Road (from the F3) before 5:00am, which will avoid any queuing outside the site entrance and the creation of noise (attributable to those trucks) at residences adjoining Peats Ridge Road before 5:00am.

Automated weighbridge records would be available for scrutiny / reporting to verify the time when the first and last trucks depart from the Project Site.

2.5 OTHER ISSUES

2.5.1 Economic Issues

Comment

Gosford City Council notes that the EA outlines the benefits of the Somersby Fields Project but not the economic costs

Response

The economic benefits are invariably more tangible to identify given the lack of credible costs available for environmental impacts. Nevertheless, the Proponent's commitment to limit environmental impacts to a level considered acceptable should certainly outweigh the adverse impacts arising from the project.

Comment

Gosford City Council also raises that the EA does not consider the economic impacts of the reduced water availability.

Response

It should be noted that the Proponent has given written undertakings to each potentially affected landowner with a bore or spring where an adverse impact is predicted to occur. The undertaking would ensure that the respective landowners do not experience any reduction in water availability. Hence, they would not experience any economic impacts.

From the perspective of reduced groundwater seepage, the proportion of water not recovered for a water supply would be negligible compared to the overall catchment contribution. Hence, the economic impacts of this reductions would also be negligible.

2.5.2 School Viability and Social Impacts

Comment

The Department of Education and Training quotes a survey from the School P & C Association identifying "the possible withdrawal of over 50% of students". Further, the reference is made to the potential social impacts that would arise if the project proceeds.

Response

The Proponent remains confident that in the event the project is approved, the Community will recognise, as has been the case at Maroota that the claims promoted by the Somersby Action Group were overstated, misleading or wrong. The Proponent is committed to operate the project as a "best-practice" operation and hence cause negligible adverse impacts in the local community.

It would indeed be most disappointing if the misinformation promoted in the local community is the basis for a noticeable reduction in school enrolments with the related flow-on effects to teachers, classrooms etc. The Proponent believes that the comprehensive monitoring programs will clearly provide a level of data to provide assurances to the Department, P & C, teachers, parents and students that the operation is operating in accordance with best practice with negligible adverse impacts on the surrounding community.

2.5.3 Operational Issues

Comment

The DPI raised the following three operational issues.

(i) Is there provision to contain leachate from mulching piles?

Response

It is the Proponent's intention to stockpile mulched vegetation for comparatively short periods either until it is used on site or sold off site (EA – Page 2-16). With such intentions, it is likely that there would be minimal quantities of leachate generated. In any event, the mulch stockpiles would be located in an area upslope from Dams D & E and isolated from run-on water to minimise the quantity of leachate that could be generated and flow into Dams D & E.

(ii) How will dust from sand stockpiles be managed?

Response

The washed sand stockpiles will comprise largely sand grains with negligible (<2% of particles finer than 75μm). In any event, the sand stockpile would contain between 5% and 15% moisture that would minimise the potential for dust lift-off.

Similarly, the mortar sand stockpiles would also contain moisture, typically 5% - 10%, which would similarly contain the finer particles to the stockpile area itself, even under high wind conditions.

Notwithstanding the above, it should be noted that the wind blown sand, even under high speed gusty winds, would only be blown comparatively short distances. Furthermore, the stockpiles would be located near the centre of the Project Site surrounded by perimeter vegetation.

(iii) What is the trigger for dust suppression procedures on unsealed roads?

Response

Dust suppression on unsealed roads would occur principally on a regular basis using a site-based water truck with the frequency of passes typically occurring in response to visual observations by the water tanker driver, site operators or site management. It would be common (and best) practice for roads used during the daytime period to be watered at the end of each day's operation to lay the dust on the unsealed roads in case the wind speed increases during the evening / night.

Further to these practices, the Proponent would be prepared, if demonstrated to be necessary, to install a sprinkler system on the highly-trafficked areas if it is demonstrated that the frequency of road watering using the water truck is insufficient. Such a system would be linked to an on-site anaemometer to activate the sprinkler system above a designated wind speed.

2.5.4 Response to Suggested Conditions

This subsection incorporates responses to a range of conditions recommended by various agencies and the Somersby Action Group.

2.5.4.1 Gosford City Council

Each of the seventy conditions suggested by Gosford City Council has been reviewed. In many cases, the Proponent accepts the condition or the intent of the condition with the exception of those listed below.

1. It is the Proponent's preference that the development be carried out "generally in accordance with the *Environmental Assessment* etc".
2. Delete in favour of Condition 52 which more appropriately refers to work halting "in the immediate vicinity" of the identified artefactual material.
4. Delete in favour of Condition 23, which more appropriately relates to lighting.
5. The required documentation should be approved by Council "prior to the commencement of the subject road works". This will allow the commencement of certain activities on site during the period of the site entrance intersection construction.
8. This condition is not required given the assessment has already been conducted by Cardno (NSW) Pty Limited.
9. It is preferable that the condition specifies the dilapidation report relates to works within the public road reserve.
10. Remove this condition as it is not relevant to the project.

18(a) The Proponent maintains it is appropriate for the hours of operation to be consistent with those in the *Environmental Assessment* and which have been demonstrated to achieve relevant noise criteria. It is preferable to reduce the number of truck movements on the F3 between 7:00am and 6:00pm.

25. It is inappropriate for the impervious bund wall to be erected "prior to the commencement on the extraction of material from the site". Rather, alternative measures would be adopted to achieve the same level of protection during the site establishment phase until the more permanent facility is constructed in the nominated location.

29 to 38. These conditions will be redundant following the assessment of the determination of the project application and *Environmental Assessment*.

41. This condition should specify "during works involving the removal of a hollow-bearing tree, a suitably qualified …". It is inappropriate to refer to the release of an occupation certificate with respect to this matter.

46 and 47. The requested tree works are inappropriate for an extractive industry and more appropriate to an individual suburban lot – please remove.

48. Remove entirely – duplicates Condition 42.
49. An appropriate method of control / management of topsoil includes revegetation.
50. Delete in favour of Condition 21.
51. The requested tree works are inappropriate for an extractive industry and more appropriate to an individual suburban lot – please remove.
54. Please specify prior to commencement of works "within 20m of the boundary of the Voluntary Conservation Area".

55. It is more appropriate for "The applicant to ensure and record on a monthly basis …".

56. It would be inappropriate to erect a barb wire safety fence around the perimeter of the sand extraction area. Reliance should be placed upon the boundary fencing and the regular placement of identifying markers on the boundary of the extraction area.

57. This conditional requirement should specify the commencement of any earthworks "within 20m of a recorded hollow-bearing tree" rather than reference to "on site".

59. Delete – this requirement is duplicated in Condition 62.

60. The requested tree works are inappropriate for an extractive industry and more appropriate to an individual suburban lot – please remove.

63. Reference to "tailings dams" should be removed. It is indeed an environmental improvement that the Somersby Fields Project will not include any tailings dams.

64(a) The preferred width of the first bench is no less than 3m.

64(b) The proposed maximum height for the subsequent benches and widths should be retained at 10m in height and 3m in width – this is a requirement consistent with the safety expectations required by the Mines Inspection Act and to be incorporated in the Safety Management Plan for the site.

64(c) Reference to the excavation being seen from the road should be removed as this will not be possible.

66. The basis for review of the payment to Council every two years should be specified in the condition eg. CPI etc.

67. Council's condition relating to noise should be removed entirely with reliance placed on the conditions specified by the DECC. It is clearly inappropriate to refer to a maximum noise level of 35dB(A) (no descriptor offered) as noise monitoring at the school has already established that the L_{A90} and L_{Aeq} noise levels are already 41dB(A) and 55dB(A) respectively during the day.

69 and 70. Council's request for ongoing monitoring of bores within the proposed area of sand removal is not supported. Rather, the recommendation by RCA Australia (with the addition of a further monitoring bore consistent with Larry Cook's recommendation) would be a more appropriate approach to monitoring. It is noted that a number of the groundwater bores referred to in Council's Recommended Conditions 69 and 70 would in fact be removed during the life of the sand removal process.

2.5.4.2 Department of Education and Training

The submission from the Department of Education and Training included six issues that the Department would like to see framed into conditions, if the project is approved. Each of the suggested conditions and the Proponent's response is set out below.

1. *Dust emission readings to be conducted twice daily on the school grounds and to be funded by the company proposing the development.*

The Proponent accepts the need for frequent monitoring to be undertaken at the school or at an agreed intermediate location to demonstrate that air quality at the school is acceptable. In this regard, the Proponent has accepted the recommendation of the Northern Sydney Central Coat Area Health Service for PM_{10} to be measured continuously (see Commitment 11.12).

2. *A similar monitoring regime to be implemented for noise levels.*

The Proponent is committed to ensure noise contributions from its activities do not exceed those in the project approval and Environment Protection Licence. It is difficult to provide meaningful continuous noise measurements that identify the contribution from the Project Site. It has already been established that the L_{Aeq} noise level at the school typically varies from 55dB(A) to 67dB(A). Hence, noise measurements at the school are unlikely to identify the maximum contribution of 45dB(A) from the Somersby Fields Project.

In the event the project is approved, it is proposed that a noise monitoring regime is prepared in consultation with the DECC, Area Health Service and Somersby Public School that accurately identifies the noise contribution from the Somersby Fields Site. This regime would be incorporated in the Noise Management Plan for the operation.

3. *Though any increase in dust and noise levels is not supported, dust or noise readings above the Environment Protection Authority's guidelines must result in immediate cessation of work on the site.*

The Proponent accepts that it is fundamental that in the rare event either dust or noise monitoring results identify either an exceedance or a near exceedance that site activities would be curtailed.

4. *That the company fund any remedial work at the school as a consequence of changes to the water table. Such proposed remediation needs to be outlined and clarified through a written undertaking by the Proponent.*

The Somersby Fields Partnership in its response (Section 1.2.3 – Point 2) and in Commitment 8.5, has committed to the deepening of the existing school bore after the receipt of project approval – to ensure that the school has continuity of its existing groundwater supplies, irrespective of the impacts of the project.

5. *Any breach of the agreed route for truck movements to result in immediate withdrawal of approval.*

The Proponent is able to commit to the construction of an intersection that will physically prevent all heavy vehicles turning left out of the site (see Commitments 13.1 and 13.2).

6. *Counselling services be provided to the school to support any student where there is a recognisable adverse impact from the approval and implementation of this proposal. Also, similar services be provided to prepare students for any changes associated with the proposal, with the Proponent working co-operatively with the school community.*

The Proponent has openly expressed its commitment to work co-operatively with the school community in the event the project proceeds (see Commitment 20.9). The Proponent is clearly of the view that its approach to the operation of the project and its staged operation will soon be recognised by the school community to be appropriate and that the perceptions promoted by a number of the school community during the period up until approval are unfounded. It is recognised that the period within which to achieve this recognition may vary for different persons within the community and therefore the Proponent is prepared to meet as regularly as necessary with the school community to discuss issues of interest.

In addition to the conditional requirements outlined above, the Department of Education and Training also sought:

> *"…….. an assurance that the Proponent will be required to accept responsibility for remediation of any adverse effects attributed to the proposed industry and an assurance as to the unlikelihood of any long term risk to both people and property."*

The Proponent's response to this comment is as follows.

It is necessary and appropriate that both State and Local Government Agencies nominate all the standards / criteria that need to be satisfied by the Proponent in its operation of the Somersby Fields Project. It is therefore necessary for the Proponent to monitor all relevant parameters to demonstrate compliance with the nominated standards / criteria. Failure to comply with the nominated standards / criteria could lead to closure of the site until the relevant issue is rectified.

2.5.4.3 New South Wales Health

The Northern Sydney Central Coast Area Health Service recommends a range of monitoring and related measures that should be embodied into the conditions of the project approval should the project be approved.

The Proponent has reviewed the recommended conditions and supports the approach to each issue raised. The Proponent has reviewed its draft Statement of Commitments as presented in the *Environmental Assessment* and has amended the commitments to reflect, where not already addressed, the Area Health Services' requests.

The Proponent's commitments relating to air quality, health and monitoring are presented in Section 3 (Table 2 – Sections 11, 12 and 18).

2.5.4.4 Department of Environment and Climate Change

The Proponent has reviewed the recommended conditions by the Department of Environment and Climate Change – recognising that in most cases the nominated conditions will be reflected in the Environment Protection Licence for the project. The Proponent accepts most of the conditions, however, offers the following comments with respect to those that are not accepted in full or in part.

7. It is requested that reference to the monitoring of "total suspended particles" be removed from the condition, as the need to monitor this parameter is less important compared with the PM_{10} levels. The use of a continuous / real time PM_{10} monitor (eg. TEOM) is considered sufficient to monitor the air quality impacts of the project.

8. At this stage, it is considered sufficient for one real time recorder to be used, in conjunction with one high volume sampler. The exact location(s) of the monitors would be established in conjunction with technical experts of the DECC and Area Health Service.

9.1 The proposed operational noise limits are not supported. Based upon the fact that the noise assessment conducted by Heggies Pty Ltd has been undertaken fully in accordance with the Industrial Noise Policy, it is respectfully suggested that the operational noise limits should be those presented in *Environmental Assessment* Table 4.20.

9.5 It remains the Proponent's preference for construction works to be carried out between 7:00am and 6:00pm of a Saturday. This will be particularly relevant to ensure commitments such as constructing the far-western bund wall during the school holiday period is concerned.

9.7(e) It is again respectfully requested that the construction noise criteria nominated in the draft conditions be amended to reflect those presented in Table 4.20.

13 & 14 Further commentary on these recommended conditions will be provided with the response to ecological issues.

2.5.4.5 Somersby Action Group

The Somersby Action Group refers to seven conditional requirements that should be considered in the event the project is approved. The following comments are provided in relation to the issues raised for each suggested condition.

1. Policing of Conditions

The Proponent expects its operations will be policed by relevant government agencies in a coordinated manner albeit that each authority has its individual requirements. The Proponent would welcome authorised officers onto the Project Site to discuss the site's activities and performance.

Clearly, given the level of interest in the local community, the frequency of visits by representatives of the various agencies will refect this interest and their assessment of environmental performance on site.

2. Bond / Trust Fund

The matter of a performance bond is a matter for the Minister to assess. The Proponent expects its operation, should it be approved, be considered in a consistent manner with other extractive industries approved by the Minister.

No reliance should be placed on the Group's statement regarding "the erosion of filter cake for decades" – that will not occur.

3. System of Penalties

The Proponent expects its operation will be scrutinised by the Department of Planning principally through its Compliance Manager in the same manner as other extractive industries approved by the Minister.

4. Monitors to be installed

Responses to each of the suggested monitoring regimes are set out below.

(i) Deposited dust monitors capable of providing daily readings are not available, nor practical. Deposited dust is a contributor to assessing amenity – over time. The air quality fraternity (public / private) and Australian Standards support the use of monthly monitoring for deposited dust.

(ii) The deployment of five continuous PM_{10} (fine dust) monitors would be excessive.

(iii) Noise monitors providing instantaneous noise levels at five locations would be impractical and no value given that the monitors would detect numerous other noise sources that have already been shown to be higher than those predicted from the Project Site. For example, the existing daytime background noise levels at Somersby Public School and four surrounding residences are as follows.

	Background Noise (L_{A90})	**Average Noise (L_{Aeq})**
Somersby Public School	41 dB(A)	55 dB(A)
Weller Residence	34 dB(A)	47 dB(A)
DPI	41 dB(A)	52 dB(A)
Sultana Residence	38 dB(A)	52 dB(A)
B & J Thompson Residence	36 dB(A)	54 dB(A)

The existing L_{Aeq} noise level at all sites is already 6dB(A) to 9dB(A) higher than the maximum levels required to be satisfied by the Proponent's operation. Therefore, the use of continuous noise monitors would serve no purpose.

(iv) The use of a truck barcode system as suggested would be superfluous as reliance would be better placed on the automated weighbridge records that record truck registration number, quantity of sand on each truck and the exact time the truck leaves the weighbridge. For some extractive industries, the supply of a summary of this data is often sought in conditions.

(v) A comprehensive groundwater monitoring program is already proposed for bores on site and surrounding the Project Site.

5. Monitoring Data to be Published

A realistic, practical system of publishing monitoring data will be implemented in a manner established in consultation with the DoP, DECC, Area Health Service and Department of Education and Training. The selected system will be outlined in the various monitoring and management plans prepared for the project.

6. Replacement of Lost Water

The Proponent has already made commitments to a number of surrounding landowners regarding the deepening or replacement of existing bores. Further commitments will be provided.

7. Temperature Inversions

An on-site meteorological station will be used to establish the presence of temperature inversions.

2.5.4.6 Department of Primary Industries

The Proponent acknowledges the conditional requirement of the Department of Primary Industries to provide annual production data in accordance with the prescribed requirements.

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SECTION 3
STATEMENT OF COMMITMENTS

The Proponent has compiled this section as an update of the draft Statement of Commitments that was included in the May 2007 Environmental Assessment. The updated statement incorporates both new and modified commitments, prepared in response to the submissions reviewed by the Proponent.

Table 3.1
Statement of Commitments for Site Operations and Management

Desired Outcome	Action		Timing
1. Area of Activities			
All approved activities are undertaken in the area(s) nominated on the approved plans and figures.	1.1	The boundaries of the areas of sand removal will be surveyed and permanent markers placed at 50m intervals. Each marker will be numbered and its location recorded on the site layout plan.	Prior to any vegetation clearing within the sand removal areas.
	1.2	The locations of all security fencing and the far-western earth mound will be surveyed.	Prior to fence and earth mound construction.
	1.3	The centre line of the site access road will be surveyed and pegged.	Prior to construction of the site access road.
	1.4	The boundary of the processing area will be surveyed and pegged at 50m intervals.	Prior to the clearing of the processing area.
	1.5	The boundary of the Voluntary Conservation Area will be surveyed and pegged at 25m intervals to enable protective fencing to be erected.	Prior to any clearing activities on site.
2. Operating Hours – Site Establishment and Construction			
Construction activities managed in accordance with the approved operating hours.	2.1	Earthmoving Activities: 7:00am to 6:00pm Monday to Saturday.	Continuous.
	2.2	Non-audible maintenance and equipment installation: 6:00am to 10:00pm Monday to Saturday.	Continuous.
	2.3	Construct the far-western earth mound and acoustic barrier during proclaimed school holidays only (see also Item 10.6).	Establishment of operations.

Table 3.1 (Cont'd)
Statement of Commitments for Site Operations and Management

Desired Outcome	Action		Timing
3. Operating Hours – Operations			
Operating hours of work managed in accordance with the approved consent conditions.	3.1	Sand removal and processing: 7:00am to 6:00pm Monday to Saturday.	Continuous
	3.2	Product transportation: 5:00am to 10:00pm Monday to Friday; 5:00am to 4:00pm Saturday.	Continuous
	3.3	Non-audible maintenance: 5:00am to 10:00pm Monday to Saturday.	Continuous
4. Workforce Competencies and Training			
All employees and contractors are trained and assessed as competent to undertake those activities influencing the environment.	4.1	All employees and contractors will be required to demonstrate competency for any task undertaken on site.	Prior to commencement of activity.
	4.2	In the event that the required level of competency has not been achieved, training would be provided or sought.	Following an assessment of competency.
5. Waste Management			
Manage fuel and oils on site to prevent leakage and soil contamination.	5.1	Install and maintain appropriately sized and designed bunds around all oil / fuel storages on site unless double-lined tanks are used.	During construction phase.
	5.2	Install concrete floors on all maintenance areas.	During construction phase.
	5.3	Collect all used oils in one location and employ a specialist collection / recycling contractor for such products.	Continuous.
Minimise general waste and recycle wherever possible.	5.4	Install separate containers for the collection of recyclable items and employ a recognised licenced recycling contractor for collection.	Continuous.
	5.5	Employ a licensed waste collection contractor for all general waste / garbage at least on a weekly basis.	Continuous.
6. Bushfire Management			
Manage the Project Site in a manner that minimises the risk of creating a bushfire or allowing a bushfire to travel through the site.	6.1	Install on site pumping facilities and appropriate hoses from Dam A for use in bushfire fighting.	During construction phase.
	6.2	Ensure that the Somersby Bushfire Brigade visits the site each year to be fully aware of water storage on site and access, if required for fire-fighting purposes.	Annually.
	6.3	Allow water in all dams to be used for bush fire fighting efforts.	Continuous.
	6.4	Ensure there is a permanent cleared zone around the processing plant and that all on-site mobile equipment are fitted with fire extinguishers maintained to the manufacturer's specifications.	During construction phase and ongoing.
	6.5	Ensure the entire site is a "No Smoking" area.	Continuous.
	6.6	Require, as a condition of employment, that there be "No Smoking" by employees, during employment hours and while on or in Company property.	As each person is employed.

Table 3.1 (Cont'd)
Statement of Commitments for Site Operations and Management

Desired Outcome	Action		Timing
6. Bushfire Management (Cont'd)			
Fulfil obligations re: flora and fauna management without increasing the risk of bushfires.	6.7	Construct and maintain a service vehicle accessway generally around the perimeter of the site.	As required.
	6.8	All fallen and lopped native trees will be placed on the ground within the fauna and flora conservation areas.	As required.
7. Documentation			
All operational procedures are documented to ensure consistency in implementation throughout the project life.	7.1	Operational procedures will be prepared for each site activity that could potentially impact upon the local environment.	All procedures would be compiled prior to the commencement of the nominated activity.
A systematic set of documents is in place to guide the planning and implementation of all necessary environmental strategies.	7.2	An environmental management strategy will be prepared to record the set of documents required throughout the life of the project and the trigger points for their preparation.	Prior to the commencement of site activities.
All operational procedures relevant to site establishment and construction activities are prepared.	7.3	Procedures manuals will be prepared relating to: – Protection of Threatened Species; – Vegetation Clearing; – Soil Stripping and Stockpiling; – Operation of Earthmoving Equipment; – Installation of Sediment Controls; – Revegetation Activities; – Hydrocarbon Management; and – Environmental Monitoring.	Prior to commencement of nominated activity.
All operational procedures relevant to site operations and product transportation are in place.	7.4	Procedures manuals will be prepared relating to: – Site Security; – Operation of the Wash Plant; – Operation of the Mortar Sand Plant; – Operation of the Filter Press; – Placement of dewatered clay fines; – Rehabilitation; – Operation and Maintenance of the Wheel Wash Facility; – Fire fighting; – First aid; – Environmental Monitoring; and – Driver's Code of Conduct. – Maintenance, monitoring and data collection in relation to all environmental monitoring equipment.	Prior to commencement of nominated activity. Each manual would be reviewed and updated biennially.
An annual report is prepared for government agencies and the community.	7.5	The annual environmental management report will report on the activities and environmental monitoring conducted during the reporting period and the planned activities and environmental monitoring for the ensuing 12 months.	Submitted within 2 months of the completion of the reporting period.

Table 3.1 (Cont'd)
Statement of Commitments for Site Operations and Management

Desired Outcome	Action		Timing
7. Documentation (Cont'd)			
Annual production data is provided to the Mineral Resources Division of the Department of Primary Industries.	7.6	Data recording the quantity and value of construction materials produced on site will be compiled on the form supplied.	Annually
A biannual newsletter regarding the project's progress and performance.	7.7	Compile a summary of each annual environmental management report for circulation as a newsletter to the local community.	Prepare and circulate at the time when the annual report is prepared and 6 months thereafter.
	7.8	A similar summary document will be prepared for the intermediate 6 month period.	
	7.9	Each newsletter will be circulated to interested surrounding residents and posted on the Proponent's web site.	
All insurance aspects.	7.10	Ensure all necessary insurance cover is in place.	Commencement and continuous.

Table 3.2
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
8. Groundwater			
Ongoing monitoring of groundwater throughout the life of the project and effective communication of results to land owners within 1km of the Project Site.	8.1	Install, maintain and monitor four permanent groundwater monitoring wells generally at the locations shown on **Figure B**.	As part of the construction phase.
	8.2	Establish baseline data for 15 representative bores on properties surrounding the project site.	Prior to the commencement of sand removal.
	8.3	Provide all monitoring results to interested land owners within 1km of the Project Site together with a comparison of groundwater levels and those predicted on the groundwater computer model developed by RCA Australia (see Commitment 18.2).	Annually
	8.4	Communicate with any land owner who could be affected by the monitored groundwater saturation thickness if it is more than 10% below the level forecast in the groundwater computer model.	As required.
Existing registered bores demonstrated to be affected by the project (see 8.6) are either deepened or re-drilled to provide a water supply comparable or better than from the existing bore.	8.5	Maintain a water supply to Somersby Public School by providing an improved / deeper bore for the Department of Education and Training (or other agreed arrangements) to address the reduction of the saturated groundwater thickness at the bore on the Somersby School property. Other arrangements could include the supply of water from the Somersby Fields Site.	Before construction phase commences.
	8.6	Land owners whose registered bores are shown by monitoring to experience a reduction in saturated thickness of more than 10%, as a result of the project, will have their groundwater bore deepened and /or re-drilled.	Progressively.
Alternative sources of water are provided to those land owners with spring water flows that are adversely affected by the project.	8.7	Provide alternative water supply arrangements with all such land owners or other nominated compensation.	Written undertakings have already been provided to six land owners. The alternative water supply would be provided when monitoring results indicate that project activities have commenced influencing the integrity of the nominated spring.
Manage the impact of the project on groundwater and in a manner that minimises the effect on other land owners.	8.8	Participate actively in the Somersby Plateau Cumulative Impacts Consultative Committee.	Continuous
Note: Full details of all groundwater monitoring to be undertaken will be included in the Groundwater Management Plan for the project.			

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
8. Groundwater (Cont'd)			
	8.9	Ensure final landform and revegetation is planned so that the long term predicted groundwater levels are achieved as soon as possible.	Continuous
9. Surface Water			
Maintain low flows beyond Dam A into the DPI Dam.	9.1	Construct a weir and install an overflow pipe to direct small surface flows around Dam A.	During the site establishment period.
Record baseline water quality.	9.2	Monitoring will include: Measurement of pH, EC, TSS, major cations/anions at representative surface water occurrences.	Prior to commencement of site establishment and construction.
Record water quality during site establishment and construction.	9.3	Monitoring will include: Measurement of pH, EC, TSS, Oil and Grease at overflow from Dam A.	Monthly / events.
Record water quality during life of operations.	9.4	Monitoring will include: Surface Water Quality: Measure pH, EC, TSS, Oil and Grease from overflow from Dam A.	Quarterly / events.
10. Noise			
Project is designed to minimise noise impact on all adjoining land owners.	10.1	On-site acoustic barriers and earth mounds will be constructed as per Appendix E of Part 7 of the *Specialist Consultant Studies Compendium*.	Far-western and Northeastern barriers - during the early stages of the construction phase. Mid-western barrier – prior to Stage 1/7.
	10.2	Enclose and operate the wash plant within a building.	In the early stages of construction phase.
	10.3	Use alternative warning systems to reversing alarms on all on-site mobile plant.	Continuous
	10.4	Ensure that the best available technology and best management practices are used to minimise adverse acoustical impacts.	Continuous
Construction phase will be planned and timed to minimise noise impacts on neighbours.	10.5	Acoustic barriers and earth mounds will be among the first items to be constructed.	During construction phase.
	10.6	Construction of the far-western earth mound nearest to Somersby Public School will be conducted during proclaimed school holidays.	During construction phase.
Noise monitoring will be undertaken and the results reported to neighbours.	10.7	Noise monitoring will be undertaken at those locations recommended in Part 7 of the *Specialist Consultant* Studies *Compendium* or as adjusted by the Environment Protection Licence or project approval.	At intervals agreed with DEC.

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
10. Noise (Cont'd)			
Noise monitoring will be undertaken and the results reported to neighbours.	10.8	Provide results of noise monitoring to neighbours.	Quarterly (if no exceedance) Within 1 week (if exceedance)
	10.9	Noise monitoring results will be included in the reports to the School Principal and the Parents and Citizens Association as per 10.7.	Monthly.
A 24-hour telephone number will be available to receive any noise complaints. These complaints will be answered quickly with the results of relevant noise monitoring made available to the complainant.	10.10	Complaints on noise will be logged and managed in the manner recommended in Sections9.5.2 and 9.5.3 of Part 7 of the *Specialist Consultant* Studies *Compendium*.	Continuous
Negotiated agreements will be in place with the neighbours who may be impacted by noise in excess of the noise criteria assessment levels.	10.11	Seek to finalise undertakings with B&L Daniel (Location N)	Before the commencement of Stage 2.
Record parameters of the local environment being affected during site establishment and construction.	10.12	Monitoring will include: Record $L_{Aeq\ (15\ minute)}$ noise levels from operations at Sites SN-1 to SN-4 or at any other site nominated in the project approval or Environment Protection Licence.	Related to activity.
Employees and contractors will be sensitive to the noise impacts on neighbours.	10.13	All hours of work will be strictly within approved limits (i.e. mobile plant / truck engines will not be started before these nominated hours).	Continuous
	10.14	Reversing alarms will not be fitted to any equipment used on site.	Continuous
	10.15	Induction of staff will highlight noise management responsibilities of every employee / contractor.	As required.
Record parameters of the local environment being affected by the operation.	10.16	Monitoring will include: Record $L_{Aeq\ (15\ minute)}$ noise levels from operations and $L_{Aeq\ (1\ hour)}$ from transport operations.	Quarterly for first 2 years (subject to review after 2 years) / related to activity.
11. Air Quality			
Operate in a manner that ensures all air quality standards in the Environment Protection Licence are fully met.	11.1	Seal those roads on site that are to be used by delivery trucks and light vehicles (see **Figure A**).	During the construction phase.
	11.2	Keep sealed roads clean and water all other on-site access ways up to five times per day, as required.	Operational Days (subject to weather).
	11.3	Water stockpiles and exposed sandy areas to minimise dust.	As required.
	11.4	Minimise area of exposed ground.	Continuous.
	11.5	Progressively rehabilitate / stabilise available areas of disturbance.	Continuous
	11.6	Enclose processing plant for washing and screening within a building.	During construction phase.

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
11. Air Quality (Cont'd)			
Ensure the impact on air quality at the Somersby Public School is minimised and remains better than any threshold level established by the DECC.	11.7	Report the air quality monitoring results to the School Principal and the Parents and Citizens Association.	Monthly.
	11.8	Provide access for the School Principal and the Parents and Citizens Association to the Proponent's air quality consultants.	6 monthly (if requested).
	11.9	Develop an early warning alert reporting system with the School Principal and the Parents and Citizens Association for the air quality monitored at or near the School which identifies periods when the 24 hour PM_{10} dust levels attributable to "natural" and potentially the project-related contribution is >40µg/m^3.	As needed.
	11.10	Based on the most up-to-date experience and reported scientific results, re-run the air quality model (adjusted if necessary) reporting the results to the School Principal and the Parents and Citizens Association as shown.	Once during construction phase. Annually in Stage 1. Every 6 months in Stage 2.
	11.11	Report the re-runs of the model to the NSW Department of Planning.	As above.
Undertake continuous monitoring to confirm that the nominated air quality goals are being met by the project.	11.12	Monitoring will include: – Maintaining existing deposited dust gauges at Sites SD-1 to SD-5 (see **Figure B**) or at other approved locations and PM_{10} monitor at an agreed site (subject to periodic review for relevance). – Establish a continuous PM_{10} dust monitor (such as a TEOM monitor) at the Somersby Public School or an alternative agreed location. – On-site meteorological monitoring will be undertaken to record relevant parameters.	Deposited dust – monthly. PM_{10} – continuous. Continuous.
	11.13	Maintain a register of air quality concerns and record action taken.	As required
Ensure immediate land owners are aware of results of dust monitors.	11.14	Provide the results of dust and meteorological monitoring to the owners of properties where dust monitors are installed.	Quarterly.
12. Health Issues			
Ensure the pupils and staff at Somersby Public School experience only negligible changes in silica exposure.	12.1	Monitor dust (PM_{10}) prior to the commencement of sand extraction to establish continuous background levels for PM_{10} and silica.	For a period of one month at least one month prior to the commencement of sand removal activities.
	12.2	Monitor dust (PM_{10}) and if PM_{10} concentrations measured at the PM_{10} continuous monitor exceeds 40µg/m^3 throughout the agreed period, the major dust generating activities on site will be curtailed until the PM_{10} dust level has reduced to a level less than 40µg/m^3 for a period of > 30 minutes.	PM_{10} –continuously.

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
12. Health Issues (Cont'd)			
Ensure the pupils and staff at Somersby Public School experience only negligible changes in silica exposure.	12.3	Analyse PM_{10} samples from a high-volume sampler to establish the concentration of silica in the dust collected at the PM_{10} monitoring location.	Initially monthly for 12 months – subject to review and consultation with NSW Health.
	12.4	Provide a silicosis and health impact report each year to the School Principal and the Parents and Citizens Association.	Annually.
Surrounding land owners are kept informed annually regarding monitored dust levels.	12.5	Undertake an annual review of 24 hour average PM_{10} levels and deposited dust levels and relate to deposited dust levels at other sites.	Annually.
Ensure all site employees and contractors are fully protected against the risk of respirable silica.	12.6	Monitor occupational respirable silica regularly on site with the frequency to be determined by the results obtained and discussions with WorkCover.	Continuous
	12.7	If the results exceed the NOHSC standard of 0.1mg/m^3 TWA, immediately cease operations until the exposure can be managed and reduced via isolation of the employee from the source, engineering controls, administrative controls and personal protective equipment or a combination of all of these actions.	As required.
13. Traffic and Transport			
Somersby Public School staff and pupils are not affected by traffic from the project and in a way that endangers their safety.	13.1	Construct the entrance to the Project Site in accordance with the RTA-approved design that will prevent trucks from turning left when exiting the Project Site.	From the start of construction (with temporary arrangements until permanent arrangements constructed).
	13.2	Require all trucks without exception to travel to and from the site entrance to the F3 directly on Peats Ridge Road.	From start of construction and throughout the entire project.
	13.3	Require all truck drivers to sign contracts that they will be dismissed if they break any road rule while driving on Peats Ridge Road or any Somersby local road – particularly in the event they disobey Action 13.2.	On engagement of each driver.
Trucks enter and exit site (on Peats Ridge Road) without incidents and have the minimum effect on traffic flow.	13.4	Construct the site entrance intersection in Peats Ridge Road as per Figure 12 in report (Cardno (NSW) Pty Ltd – Part 8 of the Specialist Consultant Studies Compendium).	At the start of the construction phase.
	13.5	Instruct drivers on need to enter Peats Ridge Road traffic flow safely when a gap in traffic exists.	On engagement of each driver.

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
13. Traffic and Transport (Cont'd)			
Truck noise is confirmed to be approved hours of operation and is measured and does not breach noise consent standard. (See also Actions 10.13 to 10.15).	13.6	Ensure all truck drivers do not exit the F3 onto Peats Ridge Road prior to 5:00am (re-inforced in the Code of Conduct).	On engagement of each driver.
	13.7	Ensure all drivers are aware of all relevant approval conditions for the project and enforce those conditions.	On engagement of each driver.
	13.8	Provide a 24-hour telephone number for complaints re: trucks and truck noise.	Continuous.
	13.9	Require drivers to avoid the use of compression braking on Peats Ridge Road.	Continuous.
	13.10	Limit truck movements during early morning and late evenings to maximum levels specified in Section 2.7.4 of the *Environmental Assessment* or to levels required to meet noise criteria at affected residences.	Continuous.
	13.11	Establish a register to record complaints and note remedial action taken.	Continuous.
Environmental impact of trucks is minimal and does not breach approval standards.	13.12	Ensure wheel wash is always clean, effective and used by all trucks.	Continuous.
	13.13	Ensure trucks are well maintained to minimise exhaust emissions.	Continuous.
Best practice traffic and transport management is used both on-site and off-site.	13.14	Implement all recommendations by Traffic Specialist Consultant (Cardno (NSW) Pty Ltd) on Tables 14 and 15 of their report (Part 8 of the Specialist Consultant Studies Compendium).	Continuous.
14. Flora Management			
The Proponent will ensure that its operations are carried out in a manner that provides the best safeguards for flora.	14.1	Only disturb/clear vegetation in the area of sand removal for the next 12 months.	Each clearing campaign.
	14.2	Transfer topsoil, wherever possible, directly onto final rehabilitation areas in order to maximise seed stock retention.	Soil removal campaigns.
	14.3	Collect seeds from felled vegetation for future revegetation programs.	Each clearing program (subject to appropriate season).
	14.4	Undertake a program of weed control.	Continuous
	14.5	Remove all pine trees and exotic grasses on the Project Site and progressively replace with mixed Eucalypt woodland species.	During Stages 1 and 2.
Long-term retention and protection for the majority of the population of *Prostanthera junonis* on the Project Site.	14.6	Finalise and establish a Voluntary Conservation Area along the Peats Ridge Road boundary as shown in **Figure A**.	At the start of construction period.
	14.7	Translocate as many as possible of the *Prostanthera junonis* plants from the sand removal area to the Voluntary Conservation Area or eastern and western fauna / flora corridors.	As clearing extends into area of isolated *Prostanthera junonis.*

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
14. Flora Management (Cont'd)			
Long-term retention and protection for the majority of the population of *Prostanthera junonis* on the Project Site.	14.8	Support appropriate monitoring research projects consistent with the Recovery Plan for *Prostanthera junonis.*	Continuous
	14.9	Improve the habitat on site by removing pine trees, exotic grasses and weeds from the buffer areas surrounding the area of sand removal.	During Stage 1 and Stage 2.
Long-term retention and protection of Black Eyed Susan *(Tetratheca glandulosa)* on the Project Site	14.10	Extend the Voluntary Conservation Area to cover the area in which the Black Eyed Susan is located.	At the start of the construction phase.
Long-term retention and protection of valuable native trees and bushland along the eastern boundary of the Project Site.	14.11	Provide a 30m wide buffer zone along the eastern boundary of the Project Site (see **Figure A**). This buffer zone coincides with the area with some archaeological sensitivity and would be preserved within Voluntary Conservation Area.	At the start of the construction phase.
	14.12	Inform all contractors and employees about the various buffer zones and that they are not to be entered except for specific operational purposes.	Continuous
Long term protection of areas of enhanced native vegetation and native revegetation.	14.13	Place a Section 88B covenant over the areas nominated on **Figure 2.16**.	At the completion of all rehabilitation activities.
15. Fauna Management			
Protect natural habitat and threatened species on the site and retain maximum natural vegetation.	15.1	Retain and augment the buffer strip between the Project Site and Peats Ridge Road.	Continuous
	15.2	Retain the natural habitat on the eastern boundary of the Project Site.	Continuous
	15.3	Preserve the main area of *Prostanthera junonis* via a Voluntary Conservation Agreement.	Continuous
	15.4	Rehabilitate the site sensitively.	Progressively throughout project life
	15.5	Minimise all sediment to the headwaters of four creeks on the site.	Continuous
	15.6	Remove the exotic pines beyond the sand removal area in the southwestern corner of the Project Site.	Progressively throughout Project Life.
Retain the natural habitat on the eastern side of the Project Site.	15.7	Protect and enhance existing vegetation to create the eastern fauna / flora corridor.	Progressive / continuous.
	15.8	Exclude employees and contractors from entering this area except for specific operational purposes.	Continuous
	15.9	Retain all native trees and the diverse fauna in the area east of Dam A.	Continuous
Retain remnant vegetation on the western side of the Project Site and replace exotic vegetation with native vegetation.	15.10	Progressively remove all Radiata Pine and weeds from western side of Project Site to create the western fauna corridor.	Progressive / continuous.
	15.11	Transfer biomass and topsoil from sand removal areas to corridor.	Progressive / continuous.

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action		Timing
15. Fauna Management (Cont'd)			
Protection of habitat for native animals is well managed.	15.12	Ensure honey bee hives are prohibited and removed from the site.	Continuous
	15.13	Avoid using *Gambusia holbrooki* in all dams / water storage for the control of mosquito breeding.	Continuous
	15.14	Wherever possible, place felled and fallen native timbers on rehabilitated areas as logs and ground cover habitats and refuges for native fauna.	Continuous
	15.15	Only remove vegetation in the areas of sand removal / operations / stockpiling / transport and do so in a timely manner to expose the least possible area at any point of time.	Continuous
	15.16	Relocate hollow logs from the areas of sand removal to undisturbed areas.	Continuous
	15.17	Ensure the two fauna corridors (eastern and western end) are always fenced.	Continuous
Site is rehabilitated in a manner consistent with the habitat protection for native animals	15.18	Rehabilitate the site on a progressive basis throughout the life of the project.	Continuous
	15.19	Use seed stock from local trees that are consistent with the composition of the original local vegetation community in site rehabilitation.	Continuous
16. Visual			
It is not impossible for people to see sand removal / processing activities from the west (Somersby Public School); north (Peats Ridge Road) or east (Somersby Field Station).	16.1	Maintain the buffer zone on all these boundaries.	Continuous
	16.2	Design the entrance road with a curve so it is not possible to see the operation from the site entrance.	During construction phase.
	16.3	Work with Gosford City Council on the road reserve of Peats Ridge Road to maintain its health and density.	Continuous.
Apart from the exposure caused by the airstrip, maintain an adequate buffer zone to the south to prevent visual sighting of the operations.	16.4	Maintain the buffer zones as required on the southern boundary.	Continuous.
	16.5	Replant a 15m wide screen of native vegetation on the Ross property immediately south of the Project Site.	During Year 1 of operations.
	16.6	Replant promptly the area of pine trees near Wisemans Ferry Road on this boundary when they are removed, for replanting with natives.	As required.
17. Soils and Land Capability			
Soil material on site is used effectively in rehabilitation.	17.1	Strip areas required in the manner recommended in Part 11 of the Specialist Consultant Studies Compendium and store / re-use soils as per this report.	During each campaign.

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action	Timing
	18. Environmental Monitoring	
Record parameters of the local environment during site establishment and construction.	18.1 Monitoring will include:	
	• Surface Water Quality:- Measure pH, EC, TSS, Oil and Grease at overflow from Dam A.	Prior to activity / monthly / events.
	• Groundwater Levels	Automatic Water Level Recorder on four site piezometers. Quarterly in bores measured manually on adjoining properties.
	• Groundwater Quality	
	– Field pH and EC in the four on-site piezometers.	Monthly
	– Full set of analytes in the four on-site piezometers.	Annually
	• Noise: Record $L_{Aeq\ (15\ minute)}$ from operations at Sites SN-1 to SN-4 260m from Somersby Public School (Stage 1) or at other sites nominated in the project approval or Environment Protection Licence.	Related to activity (in consultation with Somersby Public School.
	• Deposited Dust – Re-establish deposited dust gauges at Sites SD-1 to SD-5 260m from Somersby Public School (Stage 1) or at other sites nominated in the project approval or Environment Protection Licence (see **Figure B**).	Monthly.
	• PM_{10} – Establish a continuous PM_{10} monitor in an agreed location at or near the Somersby Public School.	Continuous measurements.
Record parameters of the local environment being affected during operations.	18.2 Monitoring will include:	
	• Surface Water Quality: Measure pH, EC, TSS, Oil and Grease from overflow from Dam A.	Quarterly / events.
	• Water Storage Volumes	Monthly.
	• Groundwater Levels	Automatic Water Level Recorder on four site piezometers. Quarterly in bores measured manually on adjoining properties.
	• Groundwater Quality	
	– Field pH and EC in the four on-site piezometers.	Monthly
	– Full set of analytes in the four on-site piezometers.	Annually

Table 3.2 (Cont'd)
Statement of Commitments for Management of Environmental Issues

Desired Outcome	Action	Timing
	18. Environmental Monitoring (Cont'd)	
	• Noise: Record $L_{Aeq\ (15\ minute)}$ from operations at sites SN-1 to SN-4 and $L_{Aeq\ (1\ hour)}$ from transport operations.	Quarterly for first 2 years (subject to review after 2 years) / related to activity (in conjunction with Somersby Public School).
	• Deposited Dust: Maintain deposited dust gauges at Sites SD-1 to SD-5 260m from Somersby Public School (Stage 1) or at other sites nominated in the project approval or Environment Protection Licence. • PM_{10} – maintain the continuous PM_{10} monitor at nominated locations.	Continuous measurements.
Demonstrate dust and noise levels can satisfy DEC criteria during Stage 1 – at a comparable distance to that between Stage 2 and Somersby Public School.	18.3 Establish dust and noise monitoring approximately 260m from Stage 1 operations.	Following the date of commencement of operations – at the completion of site establishment.
Note: Full details of all monitoring to be undertaken will be included in the Environmental Monitoring Plan for the project.		

Table 3.3
Statement of Commitments for Community-Related Issues and Consultation

Desired Outcome	Action		Timing
19. Indigenous Heritage			
Effective protection provided for archaeologically sensitive areas.	19.1	Provide buffer zone 30m wide along the eastern boundary of the Project Site (to be covered by a Section 88b commitment (see EA Figure 2.16).	At start of construction period.
Employees who are sensitive to and respectful of possible Aboriginal heritage on the site.	19.2	Inform all contractors and employees of the 30m buffer zone.	From the start of their employment.
	19.3	Inform all contractors and employees of their responsibility under the *National Parks and Wildlife Act 1974* if any bone, stone artefacts etc. are found.	From the start of their employment.
Pupils at Somersby Public School better understand local Aboriginal heritage.	19.4	Offer Somersby Public School the opportunity for pupils, under appropriate guidance, to visit the site and learn of Aboriginal heritage of Somersby areas.	From the 2nd year of operations.
20. Somersby Community Relationships			
Local Somersby community has confidence Somersby Fields is meeting the required environmental standards.	20.1	Establish a Community Consultative Committee (CCC).	Prior to construction commencing.
	20.2	Report to the CCC and in the community newspaper on environmental results.	Quarterly.
	20.3	Provide the CCC with access to specialist consultants to build credibility about the monitoring program.	Every 6 months (if requested).
To be a good contributory member of the local Somersby community.	20.4	Undertake annually a community and a school survey and report findings to the CCC and in the community newspaper.	Annually.
	20.5	Develop and publicise a Community plan and update it annually.	Prior to construction commencing and then annually.
	20.6	Provide easy access for residents to query / complain / respond on any aspect of the project.	Prior to construction commencing.
	20.7	Support local community events.	As appropriate.
	20.8	Commit that the site's end use will not be for hard rock quarrying or as a waste facility.	As part of approval process.
To achieve a good understanding and acceptance of the activities on the Project Site within the Somersby Public School community to avoid the need for counselling etc.	20.9	Develop a program with the school Principal and P & C Association to identify the most effective manner in which information about the project can be conveyed to the parents and students.	Prior to construction commencing and as often as required.
Support educational program at Somersby Public School and elsewhere.	20.10	Offer access for pupils to Voluntary Conservation Area as well as to other areas of educational interest re: geology, water chemistry etc.	As appropriate.
	20.11	Work with TAFE and other training organisations to encourage local take up of employment and support local employees to green light trade skills.	As appropriate.
Develop ways of operating which best meet the requests of the Somersby community.	20.12	Use the CCC Forum to develop ways to improve relationship with Somersby community.	Quarterly.
	20.13	Work with Gosford City Council's Cumulative Impact Consultative Committee for extractive industries on the Somersby Plateau.	As per committee meeting schedule.

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APPENDICES

Appendix 1 Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

(No. of pages excluding this page = 11)

Please Note: The responses to issues relating to flora, fauna and biodiversity offsets will be incorporated into a separate document to be submitted in March 2008.

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Appendix 1

Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

(No. of pages excluding this page = 11)

Table A1.1
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Water and Energy	**Surface Water** 1. Licence required for Dams D and E.	4.2.9.2	Part 1 – 6.4.6	2.1.1.8
	Groundwater 1. Address requirements of WSP.	4.2.6, 4.2.10 & Table 4.17	Part 2 – 9.1	2.1.2.2
	2. Consider water shortage scenario.	4.2.8.2	Part 2 – 8.4	2.1.2.3
Gosford City Council	**Traffic** 1. No need for eastbound right-turn bay.	4.5.4.1	Part 8 – 7.1	2.4.1
	2. Extend eastbound acceleration lane.	4.5.4.1	Part 8 – 7.1	2.4.1
	3. Construct intersection before quarrying commences.	-	-	2.4.2
	Water Supply Catchment 1. Development to comply with Council's Policy D6.41.	-	-	2.1.1.7
	2. Reduction of flows to water supply catchments.	4.2.5.1	Part 1 – Table 11	2.1.1.3 (B or C)
	Economic Impacts 1. Positive benefits outlined.	6.6.2 Appendix 4	-	2.5.1
	2. Economic impacts of reduced water availability not covered.	Not Necessary	-	2.5.1
	3. Role of Calga Sand Quarry in satisfying fine sand supply.	Appendix 4	-	
	Threatened Flora 1. Potential habitat for *Prostanthera junonis* not assessed (therefore s5a assessment inadequate).	2.12.4.2	Part 5 – 5.4.2	Separate Document
	2. Assessments in Payne December 2006 report not consistent with Payne July 2004 report.	-	-	Separate Document
	3. Translocation of *Prostanthera junonis* is not supported as a mitigation method.	4.6.6.2		Separate Document
	4. *Prostanthera junonis* recovery plan not adequately addressed.	4.6.6.2	Part 5 – 5.4.2	Separate Document
	5. Potential habitat for *Hibbertia procumbens* not assessed (therefore s5a assessment inadequate).	12.12.4.2	Part 5 – 5.4.3	Separate Document
	6. Translocation of *Hibbertia procumbens* is not supported as a mitigation method.	4.6.6.2		Separate Document
	7. Council considers the proposal will have a significant impact on *Tetratheca glandulosa*.	4.6.6.2	Part 5 – 5.4.4	Separate Document

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Gosford City Council (Cont'd)	**Air Quality Assessment** 1. Dust impacts on native vegetation is considered inadequate, particularly upon Threatened species.	-	Part 3 – 4.4.2	2.3.1.3
	Threatened Fauna 1. Bulk of fauna surveys carried out in December 2000 – not consistent with LHCCREMS Guidelines 2002.	4.7.3.1	Part 6 - 5	Separate Document
	2. Need for further surveys because fauna sampling period followed preceding dry years.	-	-	Separate Document
	3. Inconsistency between EA and Fauna Assessment re species numbers.	-	-	Separate Document
	4. Large hollow-bearing trees for glossy black cockatoo.	-	-	Separate Document
	Noise Assessment 1. Noise impacts upon Threatened fauna species.	-	-	Separate Document
	Excavation 1. Alternate dimensions for extraction area proposed by Council.	2.4.1.3	-	2.5.4.1 GCC – 64(b)
	Council Preferred Conditions 1. A total of seventy suggested conditions are provided by Council for the Minister's consideration, should the project be approved.	-	-	2.5.4.1
Department of Primary Industries	**Impacts Upon Somersby Horticultural Field Station** 1. Reduction in water security.	4.2.4.2.4	Part 1 – 3.5	1.2.1, 2.1.2.4
	2. Agreement sought with Department regarding appropriate mitigation measures.	Table 4.17	Part 1 – 3.5	2.1.2.4
	Mineral Resources Production Statistics 1. Proponent to provide annual production data.	-	-	2.5.4.6
	Agriculture 1. Impact on water resources on surrounding horticultural users.	4.2.8	8.1.1	2.1.2.8
	Project Description 1. Leachate from mulched vegetation stockpiles.	-	-	2.5.3
	2. Monitoring of start and finish times for product trucks.	-	-	2.4.3

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Primary Industries (Cont'd)	**Management of Environmental Issues** 1. Long-term groundwater seepage – consistent with current seepage of 31.6ML/per year?	4.2.7.3.2	Part 2 - 8.1.3	2.1.2.10
	2. Groundwater monitoring at surrounding horticultural businesses.	4.2.11.2	9.2	2.1.2.11
	3. Agreement for maintaining a base flow from Dam A.	4.2.8.1	Part 1 – 4.3.3	Section 3 Commitment 9.1
	4. Compensation agreement with DPI incorporated into project approval conditions.	4.2.8.1	3.5	Section 3 Commitment 9.1
	5. Consideration of Dam D in WAL calculations.	4.2.7.2.3	6.4.6	Not Applicable
	6. Inclusion of Dam D in EA / Surface Water Assessment figures.	Figures 4.11 & 4.14	Figures 7 & 8	2.1.2.12
	7. Bores GW075012 and GW057452 absent from EA Figure 4.9.	Figure 4.9	N/A	2.1.2.12
	Management of Dust from Sand Stockpiles 1. Trigger for dust suppression procedures on unsealed roads.	4.4.5	Part 3 - 7	2.5.3
	2. Future expansion of proposed sand extraction.	2.4.4	-	None Proposed
Roads and Traffic Authority	**Design Requirements for Site Entrance Intersection** 1. Intersection to be designed for an operating speed of 100km/hr.	4.5.5.2.1	Part 8 – 8.2	2.4.1
	2. Design intersection to prevent heavy vehicles turning left onto Peats Ridge Road.	2.7.2, 4.5.4.1	Part 8 – 7.1	2.4.1
	Onsite Road Network 1. Turning facilities for all vehicles to exit the site in a forward direction.	2.7.2, 4.5.4.1	Part 8 – 7.2	2.4.1
	2. All parking facilities constructed in accordance with nominated codes.	-	-	Noted
	3. Site entrance and internal roads designed to accommodate the swept turning path of the largest vehicle.	2.7.2 4.5.4.1	Part 8 – 7.2	Agreed
	4. Management of groundwater seepage and stormwater flow within Peats Ridge Road reserve.	-	-	2.1.1.5
	Peats Ridge Road 1. Noise from new traffic to comply with the Environmental Criteria for Road Traffic Noise – 1999.	4.3.4	Part 7 - 4.2, 8	2.2.6
	2. No on-street parking.	-	-	Agreed

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Wyong Shire Council	**Water Catchment** 1. Potential adverse impacts on water quality and flow regimes within Ourimbah Creek.	4.2.7.2.1	Part 1 – 6.2	2.1.1.3(c)
	2. Extractive industries prohibited within Ourimbah Water Catchment (WSC Policy Manual – W1).	-	-	2.1.1.7
	Threatened Species and Wildlife Corridors 1. Proponent's capacity to restore *Prostanthera junonis* habitat.	2.12.2	Part 5 – 5.3.1	Separate Document
	2. Inadequate amphibian survey.	4.7.3.2	Part 5 – 5.1	Separate Document
	3. 2002 potential wildlife corridor route recommended by Payne affecting the Project Site (Wildlife Corridor No. 4).	-	-	Separate Document
	Public Health and Safety 1. Appropriate mitigation measures and monitoring are required for noise and dust.	4.4.5, 4.4.9, 4.3.5, 4.3.7	Part 3 – 8 Part 7 – 9.4	Section 3 Commitments 10 and 11
	Visual Impact 1. Staged extraction and rehabilitation plan recommended to reduce visual impact at residents residing on Dog Track Road.	2.4.1.1	-	Not Relevant Activities will not be visible
	Traffic Noise 1. Ensure no truck haulage outside designated hours.	2.8.2	-	2.4.3
	2. Maintain truck engines and exhaust systems.	4.3.5	Part 7 – 9.2.3	Within Code of Conduct
	3. Truck tailgates are secured.	4.3.5	Part 7 – 9.2.3	Within Code of Conduct
	4. Operations to cease if impacts are not adequately managed or monitoring demonstrates inadequate performance.	4.3.7	-	Agreed
Hawkesbury-Nepean Catchment Management Authority	**Vegetation Values** 1. Little scope to avoid substantial clearing of native vegetation.	2.12	Part 5 – 2	Separate Document
	Recommended Strategic Approach 1. Locate works and structures to minimise the need to clear native vegetation.	2.12	Part 5 – 2	Separate Document
	2. Offset the clearing of native vegetation in perpetuity.	2.12	Part 5 – 2	Separate Document
	Mitigation and Offset Measures 1. Progressive reshaping and revegetation recommended.	2.12.5	Part 5 – 2	Separate Document
	2. Revegetation should use local provenance seed.	2.12.5.4	Part 5 – 2	Separate Document
	3. Criteria for offset areas.	2.12.2	Part 5 – 2	Separate Document

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

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Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Education and Training	**Dust** 1. Concern with any increase in dust levels at Somersby Public School.	4.4.6	Part 3 – 3.2	2.5.4.2
	2. Proponent to accept responsibility for any associated respiratory conditions and future findings related to silica exposure.	-	-	2.5.4.2
	Noise 1. Concern with any discernible increase in ambient noise levels.	4.3.6.8	Part 7 – 10.2	
	2. Proponent required to guarantee noise impacts would not exceed noise level standards.	4.3.7.2	Part 7 – 9.2.1	Section 3 Commitment 10.1
	3. Proponent to cease all work during school hours if noise levels rise above required standards.			Section 3 Commitment 10.18
	Water 1. A written undertaking is required from the Proponent recording the extent of compensation for impacts upon the school's groundwater bore.	4.2.8.2	Part 3 – 8.3.1	Section 3 Commitment 8.5
	School Viability 1. Possible withdrawal of over 50% of students from Somersby Public School.	4.8.2	Part 9 – 8.5	2.5.2
	2. Potential loss of a teacher, a classroom and associated financial and material resources.	4.8.2	Part 9 – 8.5	2.5.2
	Noise and Safety Issues related to Truck Movements 1. Likely increase in employee vehicles travelling to and from the site.	-	Part 8 – 9.2	Acknowledged as correct
	2. Increases in vehicle exhaust emissions – affecting health.	4.5.5.5	Part 3 – 6.7	No further coverage
	Social Impact 1. Student's mental wellbeing – feelings of loss, dislocation and powerlessness.		Part 9 – 8.5	Section 3 Commitment 20.9
	2. Secure nature of perimeter fence.	2.11	-	No further coverage
	3. Preventing unauthorised access by young people.	2.11	-	No further coverage
	4. The Proponent's offer to support educational programs and TAFE etc.	4.8.5	Part 9 - 9	Section 3 Commitment 20.11

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Education and Training (Cont'd)	**DET Recommended Project Approval Conditions** 1. Dust emission readings conducted twice daily on the school grounds.	-	-	2.5.4.2
	2. Noise readings conducted twice daily on the school grounds.	-	-	2.5.4.2
	3. All work onsite should cease if monitored dust or noise levels exceed EPA guidelines.	-	-	2.5.4.2
	4. The Proponent to fund remediation works as a consequence of changes to the water table.	-	-	2.5.4.2
	5. Any breach of the agreed route for truck movements shall result in immediate withdrawal of project approval.	-	-	2.5.4.2
	6. Provision of counselling services for students.	-	-	2.5.4.2
Department of Environment and Climate Change	**Air Quality** 1. 24 hour PM_{10} average concentration increment.	4.4.2.3	Part 3 – Tables 13 & 14	2.3.1.2
	2. Table detailing the maximum predicted incremental 24-hour average PM_{10} levels at each sensitive receptor (due to project only).	Table 4.36	Part 3 – Table 16	2.3.1.2
	Noise 1. Ambient noise monitoring at Residence N (B & L Daniel) not considered consistent with Somersby Public School.	4.3.3.1 Table 4.18	Part 7 3.1.1	2.2.2
	2. Alternate project specific noise levels and consent limits proposed for some residences.	4.3.4.2 Table 4.20	Part 4.1.2	2.2.3
	Sleep Disturbance Criteria 1. Uncertainty re method to establish sleep disturbance criteria.	4.3.4.4	Part 7 – 1.2.5	2.2.4
	Predicted Noise Levels and Impacts 1. Noise from construction of eastern noise barrier.	Table 4.24	Part 7 – Table 15	2.2.5(a)
	2. Construction Noise Management Plan required.	4.3.7.1	-	Agreed
	3. Operational noise impacts confined to Residence N (B & L Daniel only).	4.3.6.4, Table 4.24	Part 7 – Tables 16, 17, 18 & 19	2.2.5 (b)

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

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Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Environment and Climate Change (Cont'd)	**Offsite Transport Noise** 1. Need to assess if 5:00am to 7:00am noise levels from trucks can satisfy 2dB increase.	4.3.6.6		2.2.6
	2. Consider need for early morning truck movements or alternative traffic regimes.	4.3.6.8	Part 7 - 8	2.2.6
	Recommended Conditions of Approval 1. DECC relies on the project approval to manage situations when predicted noise exceedances.	4.3.6.2	Part 7 - 9	2.5.4.4
	Water 1. DECC is satisfied that the proposal can be undertaken to avoid the pollution of waters.	4.2.5	Part 1 – 6.5.2, 6.5.3	Noted
	Threatened Species 1. Adequate offset measures to compensate for loss of 22 hectares of native vegetation.	2.12.2	Part 5 – 5.4.3	Separate Document
	2. DECC uncertain re long-term protection under Section 88B Covenant.	2.12.2	-	Separate Document
	3. Parks and Wildlife Group of DECC receptive to proposed VCA?	-	-	Separate Document
	4. 50m minimum buffer required to minimise edge effects.	2.4.1.1	Part 5 – 4.1	Separate Document
	5. Inadequate details re proposed VCA in Section 88B Covenant etc.	2.12.2	-	Separate Document
	6. Alternative measures to offset or remediate impacts of threatened species or their habitat.	2.12.2	Part 5 – 4.2	Separate Document
	7. Compensatory measures should be provided in accordance with the DECC's "Offsetting Principles".	-	-	Separate Document
	8. Management Plan – a key mitigation measure for offset areas.	4.6.5	-	Separate Document
	9. Provision of a Vegetation and Threatened Species Management Plan requested prior to support or consideration of the proposal.	4.6.5	Part 5 – 4.2	Separate Document
	10. Inadequate survey for Eastern Pygmy Possum, Red-crowned Toadlet and Giant Burrowing Frog.	4.7.3	-	Separate Document
	11. Draft statement of commitments re fauna.	Table 5.2 Part 14	-	Separate Document
	12. Provide additional detail for eight actions.	-	-	Separate Document

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Environment and Climate Change (Cont'd)	**Threatened Fauna Survey and Assessment** 1. The bulk of the fauna surveys not carried out in the past five years, especially during severe drought conditions.	4.7.3.1	Part 5 - 5	Separate Document
	2. Amphibian surveys considered inadequate.	4.7.3.2	Part 5 – 5.1	Separate Document
	3. Mammal surveys considered inadequate.	4.7.3.4	Part 5 – 5.3	Separate Document
	4. Winter migratory bird survey considered inadequate.	4.7.3.3	-	Separate Document
	5. Tree hollow survey not undertaken.	-	-	Separate Document
	Flora Survey and Assessment 1. Additional assessment recommended for Camfield's Stringybark.	-	3.1	Separate Document
	2. No description of "Sandstone Hanging Swamp – variant A.	-	3.2	Separate Document
	3. Suggested consideration of *Prostanthera junonis* plants in central area of the Project Site as distinct sub-population (6D).	-	-	Separate Document
	Hydrogeological Impacts 1. Consideration of drawdown effects on Sandstone Hanging Swamp community within 1km of the Project Site.	Table 4.7	-	Separate Document
	2. Adverse impacts of lack of groundwater / surface water upon sub-population- 6C and 6D.	-	-	Separate Document
	3. Impacts upon sub-population 6A from bore-related activities.	-	-	Separate Document
	4. Exclusion of groundwater bores from within 100m of groundwater dependent ecosystems.	-	-	Separate Document
	5. Assessment of impacts on vegetation communities as a result of surface water harvesting and groundwater extraction.	-	-	Separate Document
	Miscellaneous 1. Records on the DECC's New South Wales Wildlife Database – Eastern Pygmy Possum and fifteen to twenty *Prostanthera junonis* plants in the central area of the Project Site – additional to those shown on Figure 4.28.	Figure 4.28	-	Separate Document

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Department of Environment and Climate Change (Cont'd)	2. No mention of proposed fences to protect native vegetation included in draft Statement of Commitments.	Figure 2.2	-	Separate Document
	3. No reference to a Biodiversity Offset Strategy, Rehabilitation Plan or Vegetation and Threatened Species Management Plan included in the draft Statement of Commitments.	Table 5.2, 7.3, 14.6, 15.3		Separate Document
	Aboriginal Consultation Heritage 1. Aboriginal consultation with Darkinjung Aboriginal Land Council.	4.10.2.5, 4.10.3	Part 10 – Appendix 3	Section 3 Commitments 19.1 to 19.4
	DECC Recommended Project Approval Conditions 1. A total of 18 project approval conditions are recommended for consideration.	-	-	2.5.4.4
Hunter-Central Rivers Catchment Management Authority	**Voluntary Conservation Area** 1. Confirm VCA proposed under Section 69 of the NPWA.	2.12.2	-	Separate Document
	2. Concern re long term protection achieved through Section 88B protected area.	2.12.2	-	Separate Document
	3. VCA map area.	Figure 2.16	-	Separate Document
	4. Offset strategy not consistent with definition, as negative impacts are not compensated.	2.12.2	-	Separate Document
	5. Increase the onsite offset area by reducing the footprint of the extraction area.	-	-	Separate Document
	6. An offsite offset could be used using established offset ratios of between 10:1 and 50:1.	-	-	Separate Document
	7. Consideration of the Native Vegetation Act 2003.	-	-	Not Applicable to Project
	8. The Proponent to consider the Catchment Action Plan for the site.	-	Part 1 Section 7	-
Northern Sydney Central Coast-NSW Health	**Groundwater Impacts** 1. Adequate supplies of groundwater need to be available at the Somersby Public School for toilet flushing.	4.2.7.3.2	-	2.1.2.12
	2. Groundwater impacts beyond Year 15.	Figure 4.12c	8.1.1	2.1.2.13
	3. Protocols to accurately define project-related impacts.	-	-	2.1.2.14

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions – Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Northern Sydney Central Coast-NSW Health (Cont'd)	**Noise Generation** 1. Rating background levels not provided for the Daniel residence.	No monitoring site	-	2.2.2
	2. Important to implement noise management procedures (Page 4-72 of the EA).	4.3.5	Part 7 Section 9	Section 3 Commitments
	3. Appropriateness of noise criteria for Somersby Public School.	4.3.4.3	Part 7 4.1.2	2.2.3
	4. Suggested hours of operation 7:00am to 5:00pm Monday to Friday with reduced hours on Saturdays.	2.8.2	-	2.2.6
	Air Quality 1. Concern re Stage 2 predictions for 24hour average PM_{10} within 50m of three residences.	Figure 4.20	Appendix 7-2	2.3.4.1
	2. Incremental exposure of 10μg/m^3 PM_{10} predicted on approximately 20 days per year. Incremental exposure of this magnitude may manifest with increased respiratory problems particularly in children.	-	-	2.4.4.2
	3. A more robust monitoring and response mechanism for PM_{10} is recommended.	-	-	Section 3 Commitments 11.2, 18.1 & 18.2
	4. Assumptions used to predict the crystalline silica component of PM_{10} should be verified by monitoring prior to works commencing, during construction and operations.	-	-	2.3.5
	Nuisance Dust 1. Assessing nuisance dust by deposited gauges using a twelve-month average.	Table 4.28	Part 3 – Table 4	Commitments 18.1 & 18.2
	2. Implement measures to ensure dust from the site does not impact on the quality of rainwater in surrounding rainwater tanks.	-	-	2.3.6.2
	Occupational Health and Safety 1. Support provided for Proponent's approach.	-	-	Noted
Northern Sydney Central Coast-NSW Health	**Monitoring and Enforcement** 1. Comprehensive monitoring of noise and dust required.	4.4.9 4.3.7	Part 3 – 8 Part 7 – 9	Commitments 18.1 & 18.2
	2. PM_{10} should be monitored continuously using equipment such as TEOM.	4.4.2.2	Part 3 – 3.2	11.2
	3. An Air Quality Management Plan should be developed incorporating both proactive and reactive management.		Part 3 - 7	Commitments 11.7 to 11.9

Table A1.1 (Cont'd)
Coverage of Government Agency and Non-Confidential Public Submissions –
Somersby Fields Project

Agency	Issue	Coverage		
		EA	SCSC	This Response
Northern Sydney Central Coast-NSW Health (Cont'd)	4. Respirable crystalline silica levels need to be measured before any works commence to establish a background level and ongoing monthly levels.	-	-	Commitment 12.1
	5. Establish a community consultative committee and develop efficient response protocols.	4.8.5	-	Section 3 Commitment 20.1