QUALITATIVE AMBIENT AIR QUALITY ASSESSMENT

PROPOSED EXTENSION OF SAND DREDGING AREA WITHIN THE SHOALHAVEN RIVER

SHOALHAVEN SANDS PTY LTD

125 TERARA RD

TERARA NSW 2541

Client:
Allen, Price & Associates
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Nowra NSW 2541

Reference	Revision Status	Date of Report	Prepared By	Authorised By
1144-01-A-AQ	Revision A	14th February 2012	John Higgins	Ryan Heckenberg

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1 INTRODUCTION AND SCOPE

Clearsafe Environmental Solutions Pty Ltd (Clearsafe) was appointed by Allen, Price & Associates on behalf of Shoalhaven Sands Pty Ltd (Shoalhaven Sands) to undertake a qualitative air quality impact assessment for a proposed extension of sand dredging operations within the Shoalhaven River (NSW, Australia).

The Scope of Work conducted by Clearsafe for this commission is in accordance with Clearsafe Proposal 1144-01-OS dated 18th August 2011. The agreed Scope of Work is to:

- Undertake project planning and a pre-start job safety and risk assessment;
- Undertake a site visit to gain familiarity with the local environmental conditions;
- Undertake an assessment of likely existing air quality conditions;
- Undertake an assessment of local sensitive receptors;
- Undertake an assessment of local meteorological conditions using data gained via the bureau of meteorology;
- Conduct a qualitative review of existing surrounding land uses and likely resultant impacts on the ambient air quality;
- Undertake an assessment of surrounding National Pollution Inventory (NPI) reports for surrounding industries;
- Prepare a qualitative ambient air quality assessment report for submission to the relevant determining authorities.

2 LIMITATIONS

All work is conducted in a conscientious and professional manner, with due diligence and appropriate care. However due to the disproportionate cost of potential damages or liability relative to the cost of our services, Clearsafe cannot offer any guarantee that all hazards have been identified. Subsequently, Clearsafe's liability to the client or any other party resulting from the performance or non-performance of the service, whether under contract law, tort law or otherwise, is limited to a maximum of up to five (5) times the total fee excluding expenses.

Clearsafe reports are not to be reproduced or reviewed except in full. All reports are prepared for a particular client's objective, and therefore should not be used by any third party as a basis for future decision-making.

Clearsafe relies on the accuracy of information provided by the client.

3 OUTLINE OF REPORT

The report outline is as follows:

Section 4 Australian Standards for Air Quality

Section 5 Information surrounding the details and dynamics of existing site operation, inclusive of a summary of the proposal.

Section 6 Details of methodology employed to gather information and conduct the assessment.

Section 7 Discussion of the site surroundings, synoptic climatology, existing land uses and existing air quality conditions.

Section 8 Summary of existing operations and conditions determined from on-site inspection.

Section 9 Qualitative assessment of air quality and potential impacts.

Section 10 Conclusions and Recommendations.

4 AIR QUALITY CRITERIA

Effective air quality assessment and management should always be made with due consideration of air quality guidelines and standards. Values contained within such guidelines provide an indication of the levels of exposure which are deemed as being legally binding on each level of Government.

The following table details the National Air Quality Standards agreed upon by the National Environment Protection Council (NEPC) and the Australian, State and Territory Governments, developed in consultation with health professionals, environmental groups and the community.

Table 1: National Air Quality Standards for Australia.

Pollutant	Concentration and Averaging Period
Carbon monoxide	9.0 ppm (parts per million) measured over an eight hour period
Nitrogen dioxide	0.12 ppm averaged over a one hour period 0.03 ppm averaged over a one year period
Ozone	0.10 ppm of ozone measured over a one hour period 0.08 ppm of ozone measured over a four hour period
Sulfur dioxide	0.20 ppm averaged over a one hour period 0.08 ppm averaged over a 24 hour period 0.02 ppm averaged over a one year period
Lead	0.5 µg/m³ (micrograms per cubic metre) averaged over a one year period
Particles as PM10	50 µg/m³ averaged over a 24-hour period
Particles as PM2.5	Advisory reporting standard: 25 µg/m³ over a one day period; 8 µg/m³ over a one year period

Source: http://www.environment.gov.au/atmosphere/airquality/publications/standards.html

5 PROJECT INFORMATION

5.1 SITE LOCATION

The Shoalhaven Sands site is located on the southern banks of the Shoalhaven River, approximately 2km due east of the Shoalhaven River Bridge adjoining Nowra (south) to Bomaderry (north). Land based activities, including sand processing and distributions occur at 123 & 125 Terara Road, Terara (Lots 1 & 2 DP787495). Sand dredging is currently undertaken within an approved designated area within the river. The existing area is adjacent to both the land based site and Burraga (Pig) Island (Figure 1).

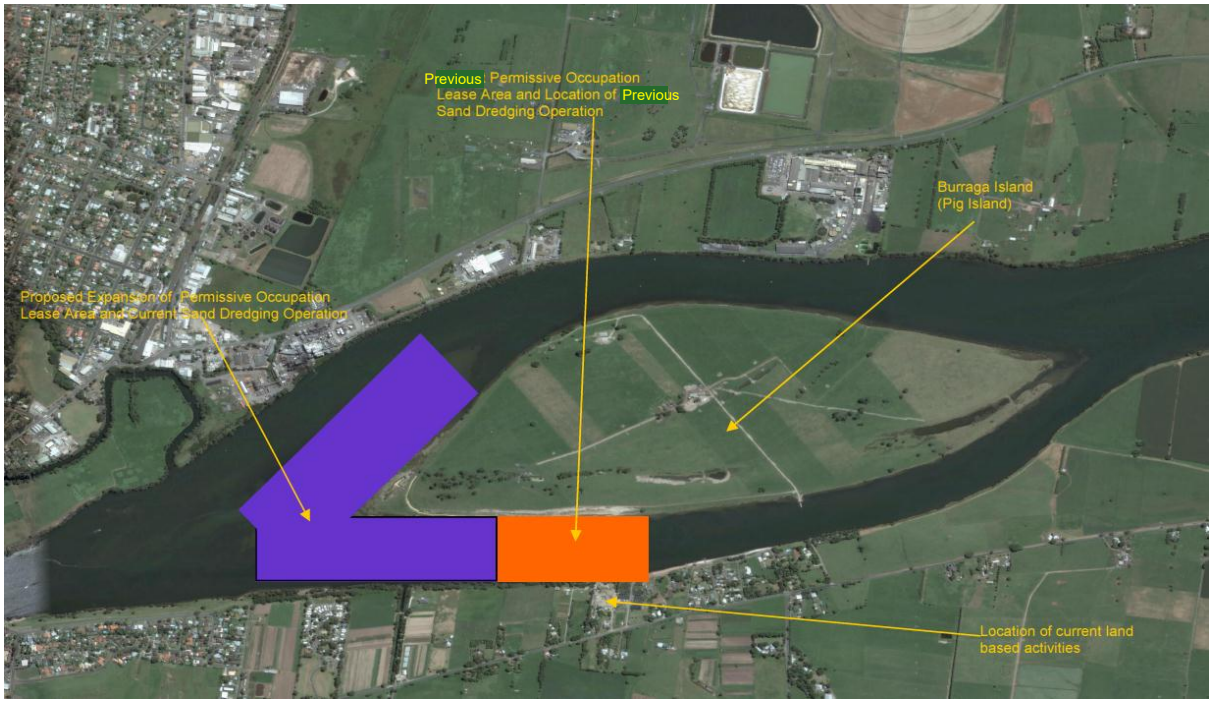

Figure 1: Aerial view of site and surrounding area, area of previous operation (orange) and proposed expansion of approved sand dredging area (purple). Image provided by Allen, Price & Associates.

5.2 CURRENT SITE OPERATIONS

Sand dredging and associated activities have been conducted within the Shoalhaven River for over 45 years. Sand extraction within the surrounds of Burraga (Pig) Island by Shoalhaven Sands (previously Terara Sand Pty Ltd) has been conducted on a continual basis since 1988. The primary uses of the extracted sand are for concrete manufacture and permeable drainage material in the civil engineering industry. Work conducted by Shoalhaven Sands is licensed by the Environmental Protection Agency (EPL 3209) with an approved river sand extraction total of 100,000 tonnes annually.

The current operation involves the use of a dredge pump to extract material from the river bed which is then pumped via a pipeline to the southern bank of the river. The material is then processed by means of a “cyclone” system where fine particles and water are separated from larger (300 plus microns) particles which form the coarse river sand. The coarse river sand is then stockpiled ready for distribution.

The fines and water separated from the coarse river sand are then pumped back across the river to Burraga Island into a sediment trench located on the southern edge of the island. The trench serves as a sediment control device allowing the water to still and the fine sediments to settle out. Over a period of time the water seeps out of the trench through the existing alluvial material and back into the river. A dam located on the lower part of the western end of Burraga Island was constructed in the mid 1990's to further assist with sediment control. The dam is fed from a riser pipe located in the western end of the southern trench. Water reaching the riser is relatively clean with sediments already having settled out. The dam is located in an area entirely composed of sand and water entering the dam almost immediately begins seeping out through the sand and back into the river.

The sediment / fines that settle in the trench are periodically cleared out with the use of an excavator. The fines are then stockpiled on Burraga Island and, in accordance with a consent issued by Shoalhaven City Council, are to be transported off the island for treatment/disposal.

Current site operations occur on a standard Monday-Saturday working week, with standard work hours from 7am-6pm Mon-Fri and 8am-1pm on Saturday. Shoalhaven Sands are licensed by the EPA to operate under these working times.

5.3 PROPOSAL SUMMARY

The following section summarises the content detailing the proposal prepared and provided by Allen, Price & Associates (REF: 21519). Summary is not exhaustive.

It is the intention of Shoalhaven Sands to extend the area of the river bed where the initial dredging occurs to include the area as shown in Figure 1.

The proposal does not involve extending or expanding any land based activities associated with the dredging operations. The status quo will remain as to the current method and hours of operation, stockpiling and transporting of material, processing of residue fines and water. The current approval held by Terara Sand Pty Ltd now Shoalhaven Sands Pty Limited to extract 100,000 tonnes of sand per annum will be maintained.

A proposal was initially made to obtain consent to fill and regrade part of the existing natural depression located on the southern side of the island over an extended time, with the sediment / fines that settle in the earlier described sediment trench. Clearsafe was advised by Ernie Panucci of Allen, Price and Associates on Tuesday 14/02/12 that this proposal is no longer applicable. Rather, all fine material cleaned out of the sedimentation trench and overflow damn at the Western end of the Island, as well as the material stockpiled next to the trench, will be transported off the island to council approved land fill sites. It has also been noted that this material will be treated in accordance with an Acid Sulphate Soil Management Plan dated November 2011 (see Network Geotechnics report W07/1356-Cr), once delivered to the receiving site.

The statutory controls affecting the proposal are likely to include:

- The Shoalhaven Local Environmental Plan 1985;
- The Illawarra Regional Environmental Plan No.1;
- State Environmental Planning Policy No.71;
- State Environmental Planning Policy – Mining Petroleum Production and Extractive Industries 2007;
- The Water Management Act 2000;
- Mining Act 1992;
- Fisheries Management Act 1994;

- Protection of the Environment Operations Act 1997.

For more detailed and exhaustive information regarding the development proposal, see “Amended Project Application” prepared by Allen, Price & Associates (REF21519).

6 METHODOLOGY

A qualitative air quality impact assessment was undertaken for Shoalhaven Sands, addressing the local environmental conditions, likely existing air quality conditions and the local air quality receptors.

Meteorological mechanisms are of significant importance in determining atmospheric emissions and the resultant effects on communities. Wind speed and direction for example, have important implications on the transport and dispersion of particular matter in a given area. The prevailing wind velocities typical of the location were analysed in addition to temperature and rainfall, using existing published sources and the Bureau of Meteorology.

Background levels of insoluble non-combustible deposited dust were assessed through identification of nearby emission sources of particulate matter and other relevant atmospheric constituents. The National Pollutant Inventory (NPI) was referred to as part of this assessment.

7 SUMMARY OF EXISTING CONDITIONS

7.1 LOCAL ENVIRONMENTAL AND METEOROLOGICAL CONDITIONS

The existing air quality environment is primarily influenced by two factors; 1) the prevailing meteorology of the surrounding area and 2) the existing emission sources. Additionally, meteorology and topography at a local level is highly significant as topography influences air flow which influences dust transport and deposition rates.

The study site has an elevation of approximately 2-3m, extending into the Terara floodplain. This continues due east to the coast, with very little topographical variation in the surrounding area. The nearest significant rise in elevation is Coolangatta Mountain, with a maximum elevation of approximately 280 metres above sea level. This topographical feature is expected to contribute minimally to local meteorological conditions offering minimal protection from prevailing wind, being approximately 7km away and covering only a small land area.

The prevailing wind direction in the Illawarra/Nowra region is typically subject to seasonal variation. In the cooler months, west to south-westerly winds generally prevail, while the warmer months tend to be dominated by north-east to easterly sea breezes.

Graphs below show monthly average meteorological data taken from 2000-2011, at the Nowra RAN meteorological station (approximately 12.1km from Terara). This data is expected to largely reflect the trends in meteorological conditions present at the study site at corresponding times of year. It should be noted that these graphs indicate monthly averages, and thus, do not indicate potential maximum values or weather extremes such as drought or elevated wind levels.

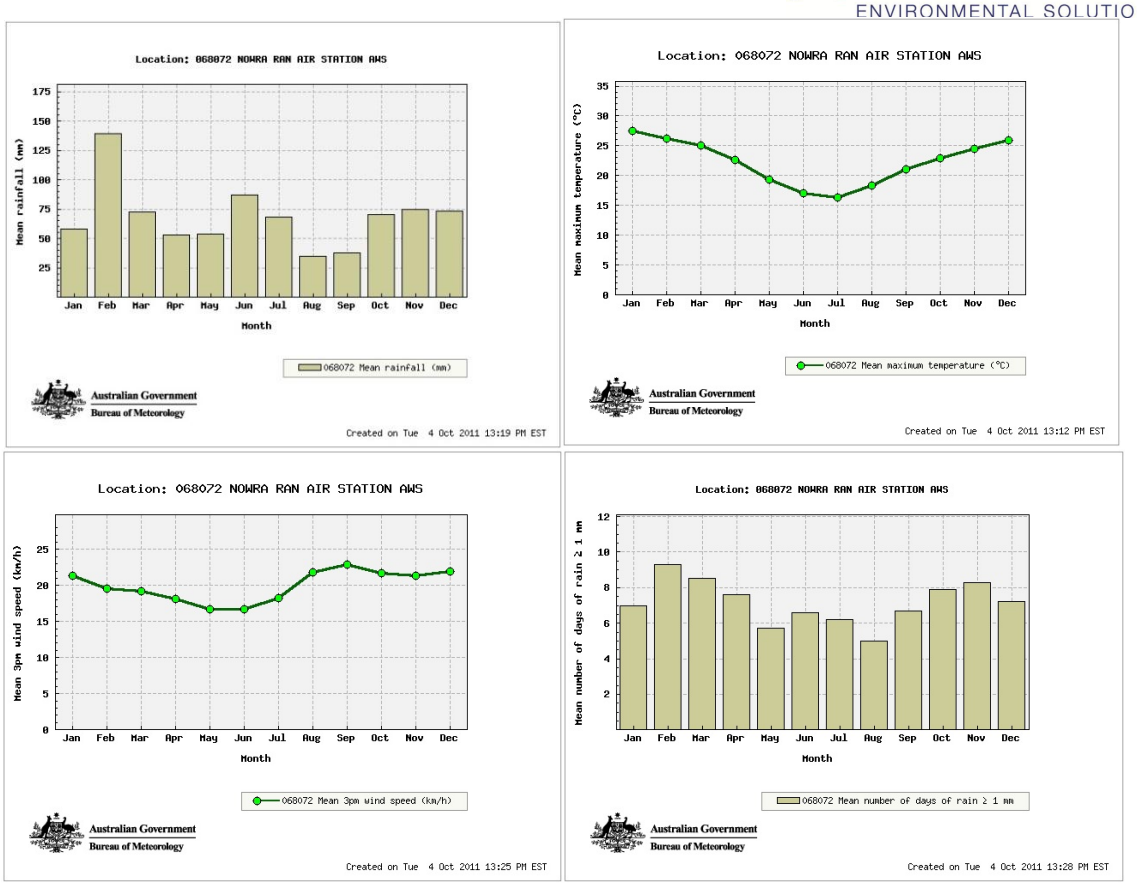

Figure 2: Figures show monthly average meteorological data from 2000-2001 at the Nowra RAN meteorological station. Figures sourced from the Australian Government Bureau of Meteorology

7.2 EXISTING SURROUNDING LAND USES

The nearest residential centre to Shoalhaven Sands is the Terara Village, located in the immediate vicinity of Shoalhaven Sands. It is noted that residents of the Terara Village are located on the Western and Eastern sides of the site, in addition to a single homestead on Burraga Island.

A degree of historic value is associated with Terara Village, being the first settlement on the southern side of the Shoalhaven River. The village uses are primarily residential and agricultural, with an approximate population size of 300 people. A small primary school is located within the Terara village. The “Shoalhaven Caravan Village” is located less than 1km to the West of Shoalhaven Sands. The next nearest school is Nowra High School which is situated approximately 1.5km to the South East of the site.

The nearest urban coastal communities to Shoalhaven Sands are Shoalhaven Heads (approximately 10km ENE) and Greenwell Point (approximately 10km ESE). The immediate area both South/South East (beyond the Terara Village) and North/North East of the site contains minimal development, with the primary land use being rural land. To the west, northwest and southwest of the site is primarily urban area, with major centres such as Nowra, Bomaderry and South Nowra.

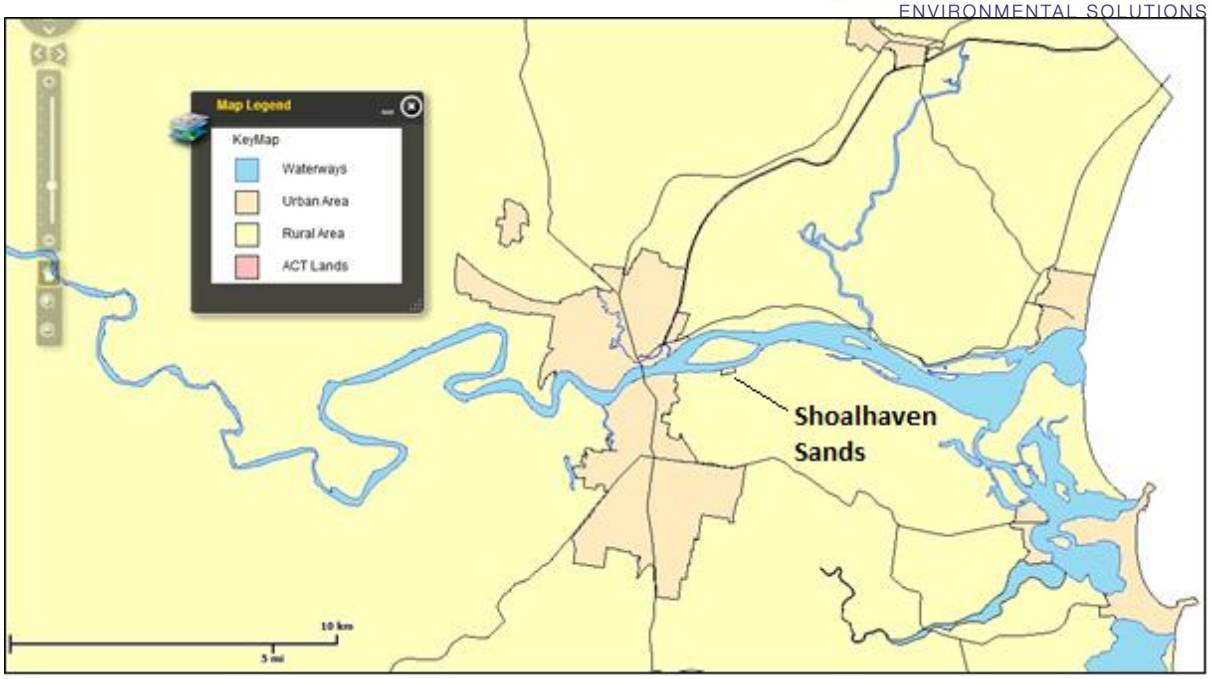

Figure 3: Land use within Nowra and the surrounding area. Image taken from the Shoalhaven City Council Interactive web maps.

7.3 NEARBY SENSITIVE RECEPTORS

The potential sensitive receptors identified are listed in table 1.

Table 2: Nearby sensitive receptors.

Potential Sensitive Receptor	Location Relative to Shoalhaven Sands
Terara Village and Surrounding Rural Properties	Immediate Vicinity
Burraga Island Residents	Immediate Vicinity
Terara Public School	<500m E
Nowra High School	1.5km WSW
Nowra Outskirts	1km WSW
Bomaderry	1.5km NW
Shoalhaven Heads	10km ENE
Greenwell Point	10km ESE

7.4 EXISTING AIR QUALITY EMISSIONS

Sources which may contribute to the ambient air quality within the vicinity of the Shoalhaven Sands operation site includes nearby industrial activities (i.e. Shoalhaven Paper Mill, Shoalhaven Starches & Bomaderry Petroleum Depot etc.), domestic fuel burning for heating, biomass burning and vehicle emissions. Additionally, the nearby agricultural activities are expected to represent a major contribution to ambient air quality. Routine agricultural operations such as soil preparation (sowing, cultivation etc.), heavy vehicle/machinery operation and the use of any pesticide sprays are all likely

sources of significant air quality emissions. Of most concern to the proposal is insoluble non-combustible deposited dust, likely to be generated by many of the above mentioned sources.

Multiple industrial facilities exist in the surrounding areas which are reported on the National Pollutant Inventory (NPI) to emit a variety of airborne constituents. The nearest of these includes Shoalhaven Starches Bomaderry and the Australian Paper Shoalhaven Mill, located opposite the project site on the northern side of the Shoalhaven River. The primary chemical emissions from these sites are carbon monoxide (collectively 277,200 kg) and oxides of nitrogen (collectively 358,600 kg), in addition to a collective total of 31,640kg of 10.0 µm and 31,640kg of 2.5µm particulate matter, as reported on the NPI for 2009/2010.

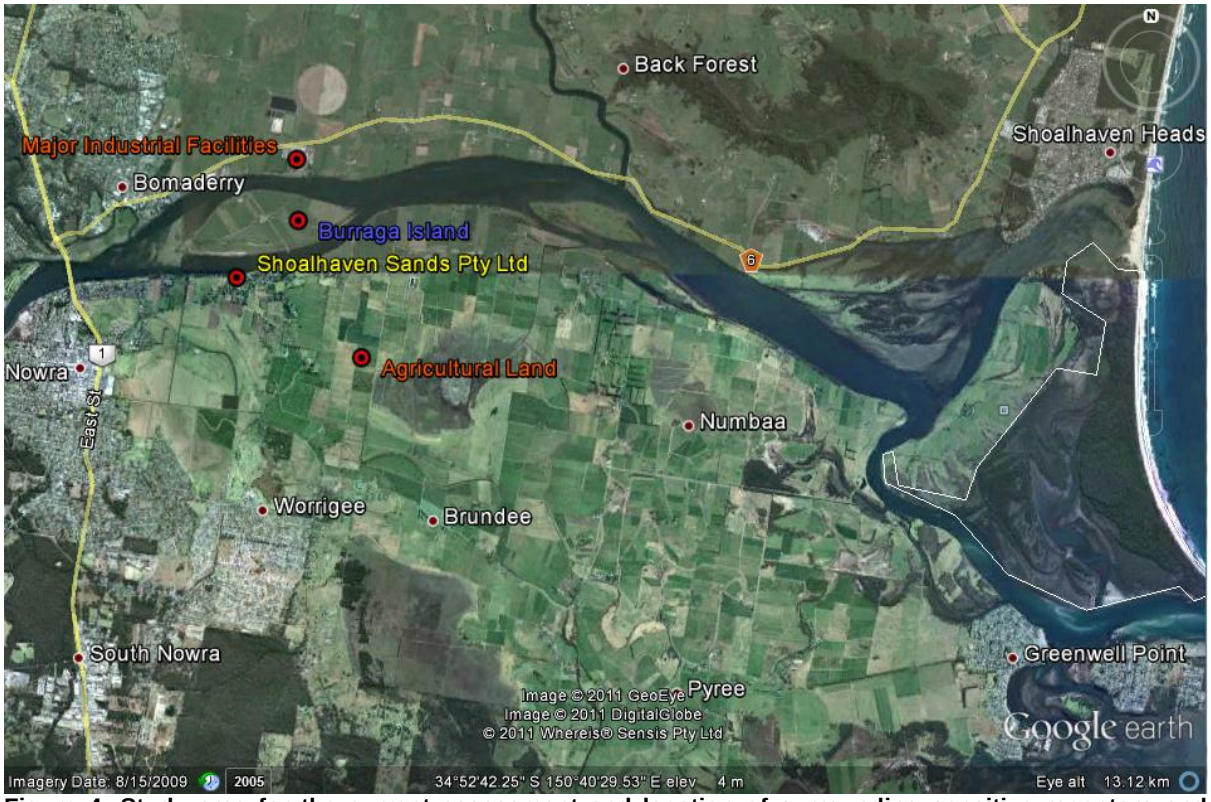

Figure 4: Study area for the current assessment and location of surrounding sensitive receptors and industrial activities

8 EXISTING OPERATION

Site inspection was conducted on Friday the 30th September 2011 by Ryan Heckenberg and John Higgins. During this inspection, the following observations were made:

- Some dust was observed on the road surface at the immediate entrance to Shoalhaven Sands;
- Strong wind (estimated to be approximately 15 m/sec) was present during the time of inspection;
- A row of trees was observed to be present along both the Eastern and Western boundaries of the site, between the site and the adjacent residential properties;
- No visually detectable dust was observed to be stirred from the fine sand stockpiles on Burraga Island;
- The surfaces of coarse sand stockpiles were observed at the time of inspection as being moist. In the opinion of the consultant, this contributes a significant degree of resistance to wind disturbance of surface dust from the sand stockpiles;
- The above mentioned moisture is likely to be present from a combination of residual moisture from the treatment process and recent rainfall;
- Both the sand loader located on-site and the dredge located on the river are diesel operated;
- A road sweeper was noted as being present on site, used to free road surfaces of dust when required;
- No complaints have been formally lodged to the Shoalhaven City Council as recorded on the Shoalhaven Sands property file.

9 IMPACT ASSESSMENT

Based on information gathered by or supplied to the consultant, a number of potential impacts to Ambient Air Quality as a result of the proposal were identified. The details of these and the associated potential impact are listed below.

Table 3: Impact Assessment.

CONSIDERATION	POTENTIAL IMPACT
An increase in the quantity of airborne particulate matter (either PM10 or PM2.5)	No change anticipated
Degradation of air aesthetics from increased levels of insoluble non-combustible deposited dust	No change anticipated
A change in the type or quantity of airborne particulate matter	No change anticipated
An increase in diesel usage and associated emission of particulate matter	No change anticipated
Change in impact to nearby sensitive receptors	No change anticipated

10 CONCLUSIONS AND RECOMMENDATIONS

Clearsafe Environmental Solutions Pty Ltd (Clearsafe) was appointed by Allen, Price & Associates on behalf of Shoalhaven Sands Pty Ltd (Shoalhaven Sands) to undertake a qualitative air quality impact assessment for a proposed extension of sand dredging operations within the Shoalhaven River (NSW, Australia).

Research conducted by Clearsafe, in conjunction with information supplied by the client and gathered during on-site inspection identified that:

- No changes to the operation process aside from the designated dredging area are associated with the proposal;
- No change in the quantity of material processed, or the method of processing is associated with the proposal;
- Background levels of insoluble non-combustible dust are contributed to by nearby industry, agriculture and other sources such as vehicles and fuel combustion for domestic heating;
- A number of sensitive receptors are located in proximity to the site, including the nearby Terara Village and Terara Pubic School;
- Several potential impacts to ambient air quality as a result of implementation of the proposal were identified and assessed;
- The result of the assessment indicates that no change is anticipated in the key potential impacts as a result of the proposed expansion of the sand dredging operation.

It is therefore in the opinion of the consultant, within the scope and limitations of this commission, that the proposed development is unlikely to have a significant adverse impact on nearby sensitive receptors with regard to the stated ambient air quality criteria.

With due consideration of the above, it is recommended by the consultant that:

- A watering system is implemented and utilised during hot and dry conditions, allowing the application of moisture to road surfaces by means of trucks and/or sprinklers during vehicle operation as a means of supressing any dust stirred by site traffic;
- The above mentioned watering system could be utilised on either on Burraga Island or at 125 Terara Road, depending on the origin of dust stirred by site traffic;
- The installation of a meteorological station is considered as a means of recording metrological conditions experienced during site operation. This meteorological station may be used in the event of public complaint to ascertain the wind strength and direction and thus assist in determining the possible source of the emissions in question. Additionally the weather station could be used to determine when additional dust control measures such as water sprays and road sweeping should be utilised. A suitable location for such a facility would likely be in an area where readings reflect site conditions, and should be based upon the relevant standards and/or manufacturer recommendations.