



EIS 388

AA054648

Environmental impact statement for proposed sand extraction :

Lot 1 DP 535947 and Lots 1, 2 and 3 DP 634989, Sackville

Ferry Road, Sackville Ferry in the Shire of Baulkham Hills

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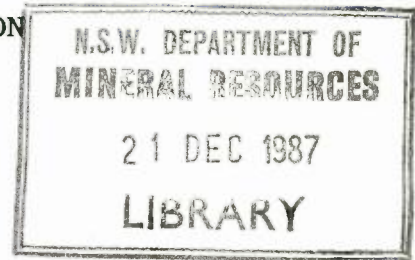


AA054648

L87/548

ENVIRONMENTAL IMPACT STATEMENT

FOR PROPOSED SAND EXTRACTION



LOT 1 DP 535947 and LOTS 1, 2 and 3 DP 634989

SACKVILLE FERRY ROAD, SACKVILLE FERRY

IN THE SHIRE OF BAULKHAM HILLS

JULY 1987

EIS
388

JOHN HANCOCK & ASSOCIATES

TOWN PLANNERS, LAND DEVELOPMENT AND BUILDING DESIGN CONSULTANTS

AAO 54648

FORM 4

ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979
(SECTION 77 (3) (d))

ENVIRONMENTAL IMPACT STATEMENT

This Statement has been prepared on behalf of Stratton Brothers Pty Limited and Stratton Bus Lines Pty Limited being the applicant making the development application referred to below.

The Statement accompanies the development application made in respect of the development described as follows:

THE EXTRACTION OF SAND FROM AN ALLUVIAL SAND RIDGE
AT SACKVILLE FERRY

The development application relates to the land described as follows:

LOT 1 DP 535947 and LOTS 1, 2 and 3 DP 634989
SACKVILLE FERRY ROAD, SACKVILLE.

The contents of this Statement, as required by Clause 34 of the Environmental Planning and Assessment Regulation, 1980, are set forth in the accompanying pages.

Name, Qualifications and Address of person who prepared the Environmental Impact Statement.

John Hancock and Associates
Town Planning Consultant
Suite 8, 19 -21 Broken Bay Rd
ETTALONG BEACH 2257

CERTIFICATE

I, JOHN HANCOCK of JOHN HANCOCK AND ASSOCIATES, Suite 8, 19 - 21 Broken Bay Road, Ettalong Beach 2257, hereby certify that I have prepared the contents of this Statement in accordance with Clauses 34 and 35 of the Environmental Planning and Assessment Regulation, 1980.


.....
Signed

..... 7.7.87
Dated

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1.0 INTRODUCTION

This Environmental Impact Statement has been prepared for the purpose of demonstrating the extent of likely environmental impacts and interactions resulting from the proposal to carry out an extractive industry, namely the extraction of sand for building and nursery use, from a ridge of alluvial sand adjacent to the Hawkesbury River on:

Lot 1 DP 535947 and
Lots 1, 2 and 3 DP 634989
Sackville Ferry Road, Sackville.

The Environmental Impact Statement also has the purpose of identifying the safeguards necessary to eliminate or reduce to an acceptable level those impact and interactions identified.

Under the Rural 1(a) zoning applying under the Baulkham Hills Interim Development Order No. 118 (IDO. No. 118), extractive industries are a permitted use with the consent of Council. An extractive industry is a 'designated development' pursuant to Schedule 3 of the Environmental Planning and Assessment Act Regulations, and as such is subject to the requirements and procedures set down in Sections 84/93 of the Environmental Planning and Assessment Act and Part IV of the Regulation.

A major component of the necessary procedures is consultation with the Assessments Branch of the Department of Environment and Planning in regard to the setting of parameters and matters to be covered by the Environmental Impact Statement. Consultation has also been carried out with relevant government departments with jurisdiction of various components of the environment so as to identify their major areas of concern in regard to the proposed extractive industry.

2.0 DETAILS OF PROPOSAL

2.1 Site Location

The site of the proposed extractive industry is located on Lot 1 DP 535947 and Lots 1, 2 and 3 DP 634989, an agricultural holding fronting the Sackville Ferry Road, Sackville, adjacent to the Sackville Ferry. The extractive industry will occur on Lot 2 DP 634989 only.

The site is owned by Mrs T Anderson and Mr K Anderson. The holding has extensive frontage to the Hawkesbury River. The actual location of the proposed extractive industry is on the lower northern portion of the holding (see Figure 1 - Location Map, and Figure 2 - Site Plan).

2.2 Proposed Extractive Industry

It is proposed that a ridge of alluvial sand be extracted from the site through the granting of a lease for its extraction to a Joint Venture Company comprising Stratton Brothers Pty Limited and Stratton Bus Lines Pty Limited.

This ridge of sand has dimensions of approximately 500 metres x 60 metres. The highest point on this ridge has an elevation of 11 metres AHD and it is proposed that extraction be carried out to an elevation of 8 metres AHD. The finished level after extraction operations are completed will be graded to fall towards the existing low area between the extraction site and Sackville Ferry Road.

The sand deposit to be extracted consists of fine to medium grain particles suitable for construction purposes and nursery use. It is estimated that approximately 35,000 tonnes of sand will be available for extraction.

2.2 Proposed Extractive Industry (cont'd)

The Joint Venture Company propose to extract the sand deposit using a Volvo EM500, or a Volvo LM1240 four wheel, rubber tyres, front end loader. The extracted sand will pass through a portable Powerscreen Unit driven by a Lister three cylinder diesel motor and stockpiled ready for delivery by independently owned trucks of up to 24 tonnes pay load.

Trucks will travel via the Sackville-Maroota Road to their destination.

It is expected that between five and seven trucks will make a total of up to 20 deliveries from the site each day between the hours of 7.00am and 5.00pm. No extraction or deliveries will be carried out on weekends or public holidays.

This sand extraction project is expected to be carried out over a two or three year period when the area will revert to its present rural situation.

Extraction will be carried out in a staged manner to limit the extent of the site disturbed at any one time and to also reduce the impact of noise and dust generation on other users of the area. Figure 4 shows the staging of the extraction operations proposed.

3.0 DESCRIPTION OF RELEVANT ENVIRONMENTAL FEATURES, POTENTIAL IMPACTS
AND INTERACTIONS

3.1 Topography, Drainage and Land Systems

The topography of the Sackville area consists of undulating hills with incised creek valleys draining into the deeply incised Hawkesbury River Valley.

The subject property represents an alluvial extension of a Hawkesbury Sandstone ridge extending in a south-western direction parallel with Sackville Ferry Road. Lot 2 DP 634989 falls from Sackville Ferry Road at a slope of 10-15% to a central low area, then rises steeply to an alluvial sand ridge which in turn falls to the Hawkesbury River at a general slope of 15%.

Run-off from the extraction site is directed to the Hawkesbury River on the north-western side of the alluvial ridge and on the south-eastern side to the central low area where a lagoon is presently located. Run-off to the central section is directed to an intermittent water course before discharge into the Hawkesbury River. Run-off from Sackville Ferry Road and the higher ground to the south-east is directed towards the aforementioned central low point where run-off is readily absorbed and stored in the lagoon before being dissipated into the water table. The pervious nature of alluvial soil on the extraction site results in minimal run-off from normal storm events.

The extraction site consists of a land system that is a totally man-dominated land system. The natural landscape has been modified in the past in the process of carrying out agricultural uses on the holding.

3.1 Topography, Drainage and Land Systems (cont'd)

Two land sub-systems on the extraction site are as follows:

1. Cultivated and grazing land: small cropping and orchards supported by water pumped from the Hawkesbury River and rough grazing surrounding the dam in the central low area;
2. A small natural drainage channel running south-west to the Hawkesbury River;

Lot 2 DP 634989 is a typical example of a cleared and farmed alluvial land form associated with the Hawkesbury River and does not contain any significant or unusual topographical, drainage, or vegetation features.

POTENTIAL IMPACT

The extraction of sand from the site will not alter the current drainage regime. Run-off on the north-western side of the site will continue to flow towards the Hawkesbury River and run-off to the central section will be maintained. No changes are proposed to the overall north-south drainage pattern. Therefore the proposed extraction operations will have no interaction whatsoever with this component of the environment.

Due to the nature of crop rotation associated with agricultural activities on the site, interaction with the agricultural land system will be minimal.

3.2 Soils

Soils on the holding are typical of alluvial deposits along the upper reaches of the Hawkesbury River, consisting of fine to medium grain sands and limited silt deposits. These alluvial deposits have progressively extended in a south-westerly direction from the main sandstone ridge on the inside curve of a meander in the river.

3.2 Soils (cont'd)

Previous alluvial deposits have been overlaid by new deposits during major flood occurrences. Both of these alluvial deposits are of recent geological origin. Some horizontal sorting is evident amongst the alluvial deposits in response to the pattern of water velocities during flood occurrences.

The predominant sandy soils on the extraction site are not highly erodable given the general pattern of slopes on the site. These sandy soils have very poor water retention properties, a low nutrient status and are only suitable for agricultural use with heavy fertiliser applications.

POTENTIAL IMPACT

The extraction operations will not result in significant changes in soil profile characteristics. Since soils on the extraction site lack any highly developed profile characteristics and have a low organic content, loss of upper sections will not affect overall soil characteristics nor their agricultural potential.

Whilst the nature of soils on the site are not conducive to major erosion problems, the exposure of soils on the extraction site to erosive processes has the potential to result in soil erosion. Both scour and wind removal of sand are possible, however, the pervious nature of soils and the protection of the site from strong winds reduce the significance of this interaction.

3.3 Flora and Fauna

Due to the extent of past farming and cultivation activities, there is little of the original natural environment on the lower portion of the holding. A small area of tea-tree vegetation occurs along the natural drainage channel running to the lagoon. No native animals have been observed on the extraction site, however, a few species of birds and possibly some reptiles may visit the area.

POTENTIAL IMPACT

The carrying out of the extraction proposal will not have any impact or interaction on native flora and fauna in the area.

3.4 Hydrology

The holding is located on the inside curve of a very sharp bend in the Hawkesbury River and as a result is bounded on three sides by the river. Drainage from the holding consists of direct run-off to the river and by the infiltration of water into the sandy soils which enters the water table before eventually contributing to the river waters.

A major feature of the hydrology of the Hawkesbury River is the periodic flooding that occurs following major storm events in the Nepean River/Hawkesbury River catchment.

Flood heights for various flood intervals have been extrapolated from recorded data and are as follows:

1:20	year	9.3 metres AHD
1:50	year	10.7 metres AHD
1:100	year	11.6 metres AHD

The ridge on the extraction site currently has an elevation 8 metres AHD to 11 metres AHD. It is proposed that the extraction process be carried out to a maximum depth of 8 metres AHD as shown in Figure 3.

The 1:100 year flood level in the Hawkesbury River at Sackville Ferry is approximately 11.6 metres AHD. Using this flood level the extent of inundation at the site has been shown on Figure 2 of the Gutteridge Haskins and Davey (GHD) Report. The extraction site will be completely covered by a flood of this magnitude.

During normal flows the velocity in the river is very low, probably less than 0.3 m/s depending on tidal effects. During a major flood it is estimated that average sectional velocities could get up to 2.0 m/s with isolated uncontrolled velocities up to 3.0 m/s.

Since the subject site is on the inside of a sharp bend in the river, high velocities will not be experienced. In fact, large sand deposits at the site indicate that in past floods, velocities have been low enough for sand sediments to come out of suspension.

The natural drainage channel through the site allows early inundation of the site when flood levels get above 5 metres AHD. By the time major flows are ready to short cut across the peninsula the subject site has already been inundated by backwater with the effect of reducing the impact of flood velocities.

POTENTIAL IMPACT

The proposed sand extraction operation will have no effect on the hydrology of the Hawkesbury River during periods of normal flow, both during the operation and following rehabilitation of the site. During major flood events in excess of the 1:20 year occurrence, the effect of the extraction process will be to marginally increase the flood storage capacity of the Hawkesbury River Valley. An increase in flood storage capacity will decrease the extent of flooding in nearby areas, however, this decrease will be of a minor nature only. This impact is considered to be beneficial in nature. It is not anticipated that there will be any change in the flow pattern of the river during flood events. Consequently, there will be no effect on sediment movement, tidal flow or bank erosion.

It is proposed that excavation will proceed from the downstream end of the site and therefore during major flooding the existing profile being higher will offer protection for the excavated area.

As excavation proceeds in an upstream direction, turf will be re-established on the new profile. Therefore only a minimal portion of bare sand will be exposed to major flooding at any one time.

During major floods these unprotected areas are likely to be filled primarily with fine sand and may even exhibit some localised scour due to eddying. In any case, the impact downstream caused by flooding of the site will be insignificant in comparison with the effect of a flood of this magnitude on agriculture, stock, and homes, and the sediment load in the river.

3.5 Archaeological Environment

Investigations have shown that the total absence of rock outcrops or native trees within the study area and the past deep cultivation of most of its surface, result in there being little likelihood of any significant archaeological finds on the extraction site. Disturbed scatters of stone tools or shell midden debris may occur, however, burials were unlikely as human bones would have been noticed during work in the orchards. In addition, river deposition processes are likely to have disturbed artefacts.

No archaeological material was recorded in the study area. Artefacts scatters and midden debris may of been buried by river deposition processes and remain as lenses in the ridge. This seems fairly unlikely as deposits were probably swirled with some force and the former surface rearranged in the process. In addition, the sand ridge appeared unlikely to have been chosen as a camp site; the sandstone ridge to the north-west would have been a more comfortable and safe place for a base camp, and the lower river bank closer the water, more convenient and pleasant for minor daytime camps.

POTENTIAL IMPACTS

Archaeological investigations have shown that there is little likelihood of any significant material on the site, however, scattered artefacts may occur. It is intended that the contractor involved in the extraction process be alerted that archaeological material such as lenses of shells, stone axes, thin slivers of hard rock and unusual rocks may occur on the site. If shells or stone artefacts are found, work will be immediately stopped in that area, the National Parks and Wildlife Service and the Western Metropolitan Regional Aboriginal Land Council will be notified so that finds can be recorded and their importance assessed by an archaeologist.

The implementation of these processes will minimise the chance, however, remote, that the sand extraction proposal will have an adverse impact on archaeological material.

3.6 Acoustic Environment

Investigations have shown that the background noise level for the site is 36.3 dB'A'. State Pollution Control Commission (SPCC) guidelines specify a preferable noise level of 5 dB'A' above the background noise level, however, in view of the short life span of the extraction operations, are likely to require a maximum of 50 dB'A' at the nearest residence, with a preferred level of 45 dB'A'.

Three residential dwellings owned and occupied by members of the Anderson family are located on or near the subject property. Other residential dwellings are located approximately 250 metres to 300 metres across the river and at 500 metres to 600 metres up-river from the sand deposit. Several dwellings located within 50 metres of Sackville Ferry Road above the site may also be affected by the passage of trucks travelling to and from the site.

3.6 Acoustic Environment (cont'd)

TABLE OF BACKGROUND NOISE LEVELS

Average Minimum Noise Level L90 dB'A'	Average Noise Level L 50 dB'A'	Average Maximum Noise Level L10 dB'A'	Maximum Noise Level L1 dB'A;	Leq dB'A'	Noise Sources
31.50	33.25	44.00	61.00	43.60	Traffic Birds Rural & Domestic Activities

The levels of noise generated by items of plant and equipment proposed to be used at the Sackville site have been measured in their present situation at Cattai. These noise levels were recorded and the signals analysed to reveal the levels of noise to be expected at the nearest residences at Sackville following the start-up and operation of sand extraction on the site.

TABLE OF PLANT NOISE LEVELS

Plant Item	Calculated Acoustic Power Level Lw dB'A'	Distance from Plant Item to Nearest Residence in Metres.	Calculated Noise Level at the Nearest Residence dB'A'
Front End Loader Volvo BM 4400	108	200	54
Front End Loader Volvo LM 1240	110	200	56
Powerscreen Screening Plant	109	200	55
Typical Sand Truck moving away loaded 24 Tonne Pay Load	108	100	60

The closest permanent dwelling houses are located approximately 200 metres from the extraction site and temporarily occupied cabins and caravan sites are predominantly occupied on weekends when extraction operations will not be carried out. The greatest potential impact of noise generation will therefore involve family occupied dwelling houses remote from the actual site of extraction.

On site noise generation will result from the operations of a front-end loader, the Powerscreen Unit, and the movement of haulage vehicles. To comply with the likely recommended SPCC noise level of 50 dB'A' at the nearest residence, it is proposed that modifications be carried out to the exhaust system of the Volvo Unit LM1240. It is also proposed that modifications be carried out on the Lister Diesel Engine on the Powerscreen Unit exhaust system to ensure compliance with SEPP recommended noise level.

It is anticipated that haulage vehicles will generate noise levels in excess of background noise levels on major roads in the vicinity of the extraction site. However, due to the low intensity of truck movements and the short duration of noise generation, it is not anticipated that significant disturbance will occur.

From separate assessment of noise generation issues it is evident therefore that a noise reduction of 9dB'A' is required for the Volvo FEL Type BM4400 and a reduction of 11dB'A' required for the Volvo FEL Type LM1240. The Powerscreen Unit is 10dB'A' above the criterion. The excess noise associated with the volvo BM4400 is mainly radiating from the openings in the engine canopy and the radiator grill. As acoustic correction to the canopy may affect the supply of cooling air it is considered preferable to use the alternative Volvo Unit LM1240. In this case the noise is radiating from the exhaust and can be effectively corrected by the introduction of a short, low restriction truck muffler in the exhaust system. Similarly, the noise generated by the Lister Diesel Engine on the Powerscreen Unit is also radiating from the exhaust system. The installation of a general purpose muffler for this machine is recommended. Both of these muffler installations will achieve a greater noise reduction than is required to meet the criterion.

The impact of truck noise is not directly related to its intrusion level over the background level. As roads are used by all forms of vehicular transport, the acoustic impact is determined from noise levels, the number of occurrences, and the duration.

3.6 Acoustic Environment (cont'd)

The Leq 'A' traffic noise level for 20 truck trips of 68 dB'A' at 50 metres for an intrusion period of 0.3 minutes above a background noise level of 35 dB'A' over an eight hour day is 48.1 dB'A' Leq.T. and is 7 dB'A' below the SPCC criterion of 55 dB'A' Leq.T.

POTENTIAL IMPACT

There is the potential for limited noise impact on the three nearest permanent dwellings to the extraction site. Acoustical investigations have shown that simple modifications can be carried out to plant items so as to reduce noise levels to the acceptable levels as recommended by the SPCC for the type of development proposed.

The impact of noise generated by the extraction process on the three nearest residences, which are occupied by family members, is likely to be further reduced by the direct economic benefits that will accrue to the family. *1/2 days*

Dwellings located on the opposite shoreline will be screened from the extraction operation and associated noise for a major portion of the extraction period provided staged extraction is carried out as recommended.

The impact of truck generated noise is considered to be minimal as associated noise levels will be 7 dB'A' below SPCC guidelines for intermittent traffic noise at the nearest residence to Sackville Road.

3.7 Riverine Environment

The riverine environment in the vicinity of the extraction site typically consists of moderate to high freshwater flows that are generally above the height of saline tidal influence. Both turbidity and suspended solids levels are high. Turbidity is a measure of the amount of interference with the passage of light through the water by suspended and colloidal matter.

Suspended solids include organic matter, clay and silt which also reduce sunlight penetration. Whereas turbidity relates to the actual material in suspension, suspended solids readings relate to the mass of material in suspension. Finely divided particles will result in a higher turbidity than larger particles of the same mass.

POTENTIAL IMPACT

The proposed extraction process has the potential to add additional soil particles to the suspended solids level and turbidity of the river if adequate care is not taken to limit erosion on the extraction site and to prevent the escape of eroded material. Given the procedures that are to be implemented to stop erosion and escape of soil particles on the site and the high suspended solids and turbidity levels currently existing in river waters, it is considered that the extraction operations will have minimum impact on the riverine environment.

3.8 Atmospheric Environment

Due to the nature of small cropping carried out on the site in the past, dust has been generated during times of cultivation and as a result of wind erosion.

The proposed extraction process will generate dust from the following potential sources:

1. extraction site
2. access road
3. on site plant tracks and loading access

Prevailing and local wind conditions are an important consideration when considering the impact of dust generation on the surrounding environment. The nature of topography in the Sackville area has the effect of protecting the extraction site from strong winds and causes local divergence in the Hawkesbury River Valley.

3.8 Atmospheric Environment (cont'd)

Information from the Bureau of Meteorology Station at Glenorie Post Office reveals that predominant wind patterns are divided into morning breezes, originating from the north-west to south-west sector, and afternoon/evening breezes, originating from the north-east to south-east sector. During the morning breeze pattern, dust would be carried either towards the natural bush areas to the north of the site or across the holding to the Hawkesbury River. During the afternoon/evening breeze pattern local divergence results in a constant wind pattern from the north-east/east. This wind direction would carry dust towards the Hawkesbury River and towards natural bush areas and a high rock cliff on the opposite side of the river. These winds by virtue of wind speed will have the highest potential to transport dust from the excavation site.

POTENTIAL IMPACT

Extraction processes can generate a considerable quantity of dust if carried out on dry material. It is proposed that spray wetting be carried out on the extraction site to maintain a level soil moisture that suppresses the generation of dust. Similarly, the access road is to be maintained with a moisture level that suppresses the generation of dust. Given the nature of the occupancy of caravan and cabin sites and the above measures, potential impact will be minimised. Since the extraction operations will be of limited duration only, no permanent interaction with the atmospheric environment will occur.

3.9 Visual Environment

The holding on which the extraction process is to be carried out does not currently constitute a high scenic character. This results from the scattering of caravans and cabins located around portions of the property abutting the Hawkesbury River, the occurrence of disturbed areas on the site where cultivation has been carried out and the nature of rough grazing and associated unimproved pasture species.

The extraction site is located in a prominent visual position in relation to Sackville Ferry Road, the surrounding Hawkesbury River, and a lookout on the opposite side of the river off Old Portland Road.

POTENTIAL IMPACT

The potential impact on the visual environment is significant, however, it is proposed that extraction operations be carried out in a staged manner to minimise site disturbance and hence, visual impact. The retention of a major proportion of the grassed bank on the north-western side of the extraction site and the grading of the finished workface to the south-east will ensure loss of visual amenity from the Hawkesbury River is minimal. Additionally, site disturbance associated with the extraction process will closely resemble site disturbances with normal farm cultivation practices.

While some minor and temporary loss of visual amenity will occur, there will be no permanent interactions between the visual environment and the extraction operations.

3.10 Social Environment

The agricultural holding on which the extraction site is located has been farmed continuously by the same family for three generations. Existing farming activities comprise: citrus growing, small cropping, and cattle grazing. Three permanent dwelling houses occupied by family members are located at the lower end of the holding to the south of Sackville Ferry Road. The river bank portions of the holding are currently used for temporary accommodation involving fifty caravan sites and four cabins. This temporary accommodation is only put to weekend use for boating purposes. Three dwelling houses to the north of the holding on the opposite side of the Hawkesbury River have distant views of the extraction site. Dwelling density is low in the environs of the holding.

Traffic movements on Sackville Ferry Road are relatively low in number. The estimated Annual Average Daily Traffic Volume (AADT) for Sackville Ferry Road provided by the Department of Main Road (DMR) is 525 to 550 vehicle movements. This is based on a recorded 1985 AADT of 463 vehicle movements.

POTENTIAL IMPACT

The impact of extraction operations on the three family dwellings is considered to be insignificant by virtue of their juxtaposition in relation to the extraction site and the direct benefits of the operation to the family. Personal involvement in extraction procedures will further reduce impacts.

The restriction of extraction operations to weekdays will minimise disturbance to the users of caravan and cabin sites. The potential for dust nuisance exists, however, the presence of the property owners on site will enable dust control measures to be implemented at all times. The grading of the extraction site's finished level from north-west to south-east will minimise loss of visual amenity at these sites.

The potential for noise disturbance to a limited number of dwelling houses from trucking movements exists, however, the low frequency of truck movements will mitigate this factor. As indicated previously, truck generated noise levels will be 7 dB'A' below the SPCC criterion level of 55 dB'A' Leq.T.

It is not anticipated that the extraction operations will interact with the farming activities carried out on the holding. Minor dust generation may cause some dust spotting to citrus crops but this will be offset by the short-term economic benefits of the extraction operations and the long-term increase in the agriculture capability of the holding.

Since dust problems are to be minimised and the fact that loss of visual amenity will be minimal, the use and enjoyment of caravan and cabin sites will not be impeded. Similarly, the quiet enjoyment of other rural/semi rural holdings in the vicinity will not be affected.

3.10 Social Environment - Potential Impact (cont'd)

It is anticipated that the proposed extractive industry will not cause any disruption to traffic flows on Sackville Ferry Road due to the low AADT volumes and the fact that road conditions enable easy passing of haulage vehicles on Sackville Ferry Road. The restriction of extraction operations to weekdays when traffic volumes will be below the average will further lessen potential impacts.

4.1 Erosion Control and Soil Conservation

The exposure of soils on the extraction site to erosive processes will increase the potential for soil erosion resulting from scour and wind blown removal. While the pervious nature of soils and low wind velocities will limit the extent of this problem, it is proposed that a number of measures be employed to prevent the escape of eroded material from the site.

- a) To minimise the amount of disturbed area on the extraction site, it is proposed that extraction operations be carried out in a staged programme. This will involve the excavation and removal of sand and rehabilitation of each stage prior to the commencement of the succeeding stage (see Figure 4);
- b) Following the extraction of sand from each stage, seeding of the area will be carried out using quick growing grass species. The sowing of these species will have the dual role of stabilising exposed soils following extraction operations and as a green manure crop for the later rehabilitation of the extraction site by way of citrus planting;

The following grass species should be sown at the rates indicated:

*	<u>Autumn/Winter</u>	
	Rye of Oats	15 kg/ha
	Wimmera Ryegrass	10 kg/ha
	White Clover	5 kg/ha
	Red Clover	5 kg/ha
*	<u>Spring/Summer</u>	
	Japanese Millet	15 kg/ha
	Wimmera Ryegrass	8 kg/ha
	Red Clover	4 kg/ha
	White Clover	4 kg/ha

- c) Extraction operations will be carried out in such a manner that the extraction site will be graded towards the central drainage channel. This will facilitate the directing of any silt/sediment laden run-off to the existing lagoon which will act as an effective sedimentation pond south-west of the extraction site and preventing run-off reaching directly to the river.

Allowing for the fact that the extraction period may extend for up to (say) four years, it is considered reasonable that the sedimentation pond should be able to cater for a 1:10 year flow from local run-off. Stormwater in excess of the 1:10 year flow would be diverted around the pond.

The pond will be constructed of sandy loam material and the walls battered to safe slopes and grassed. A spillway will be provided to convey clean water discharge. The sedimentation pond will be grassed with overburden and the spillway gravelled to prevent erosion, and the channel downstream will also be partly gravel lined to prevent scour. We do not anticipate the need, but should it prove to be necessary, oil and grease could be retained on a baffled overflow;

- d) Spray wetting of the extraction site and access road will be carried out at all times to ensure that the removal of soil particles by wind is minimised. Ample water is readily available from the adjacent river for this purpose;
- e) The access road will be provided with drainage channels, a causeway and culvert to allow the passage of natural flows and to prevent scouring and rilling;

4.2 Dust Control

The fine to medium grain sands found on the extraction site, by their nature, are not conducive to major dust generation problems. Limited silt impurities in the sand body represent a potential source of dust generation. However, protection of the site from prevailing winds will mitigate this problem.

It is proposed that spray wetting of all exposed extraction areas will be carried out as and when required to eliminate dust generation from wind sources. The availability of ample supplies of water from the Hawkesbury River and the presence of the property owners on site at most times will ensure that these prevention procedures are carried out adequately.

The spray wetting of the extraction area to prevent dust generation by winds will mean that all extraction operations are carried out on damp material, eliminating almost completely, dust generation from this source.

It is also proposed that the access road to the extraction site be overlain with shale where necessary and dampened as and when required to prevent any dust generation from this source. All haulage vehicles will have their loads covered with tarpaulins prior to leaving the site to prevent dust generation from this source.

5.0 JUSTIFICATION OF THE DEVELOPMENT

5.1 Economic Benefits of Extractive Industry

The proposed extractive industry will have dual economic benefits for the owners of the agricultural holding.

Firstly, there will be direct economic benefits from the sale of a valuable resource which will enable investment in and upgrading of agricultural uses on the holding and will therefore be the source of future potential income. This investment will have secondary and multiplied effects in the local economy.

Secondly, the extraction operations will render the extraction site suitable for more intensive and profitable agricultural uses in the future. The farm owners propose to plant citrus trees as each stage of extraction operations are completed. (Note: This issue is addressed in more detail in the attached Geological Report)

5.2 Sand Resources in the Sydney Region

In 1980 the Department of Mineral Resources published a study entitled 'Construction Sand Resources for Sydney 1981-2020' in which it was stated that the Sydney region faces a potential shortage of some types of construction sand between now and the year 2000. The report also indicated that in the year 1978-79, the Sydney region consumed 5.08 million tonnes of construction sand and that future demand up to 2020 was estimated at 307 million tonnes. The following sources of fine to medium grained construction sands have been identified in the Sydney region.

SOURCES OF FINE - MEDIUM GRAINED SAND

SOURCE	ESTIMATED QUANTITY	CLASSIFICATION	AVAILABILITY
	(million tonnes)		
Kurnell Peninsula	15	indicated reserves	mostly available
Pagewood-Eastlakes area	5	indicated resources	mostly unavailable
Narrabeen Lake/ Middle Harbour	5	indicated resources	mostly unavailable
Richmond Lowlands	112	indicated reserves	unavailable
Macdonald River - dredging and flood over bank deposits	20	indicated resources	unavailable
St. Albans area	30	indicated resources	unavailable
Marine aggregate	12	indicated resources	unavailable
Maroota	15	indicated resources	unavailable
Pittwater- Port Hacking	(max) 100	estimate only	unavailable
Other Sources	unknown	not yet investigated	mostly unavailable.

Source: Wallace, I. (1980) 'Construction Sand Resources for Sydney 1981-2020' - Department of Mineral Resources.

Whilst it appears that adequate reserves are available, most of this sand is not available for extraction. It is significant to note that all potential sources for construction sand in the north western sector of Sydney are presently unavailable.

Even though the proposed extraction operation is of a relatively minor scale, extraction of sand from the site will conserve other deposits in the north-western sector for extraction in the future. At this time, the economic benefits attributed to these presently unavailable reserves will be greater, reducing the relative importance of any negative impacts associated with extraction operation on these reserves.

5.3 Alternatives to the Proposal

It is considered that there are two realistic alternatives to the proposed extractive industry as follows:

1. The DO NOTHING alternative which involves leaving the alluvial sand ridge on the site in its present condition. This alternative maintains the existing agricultural land uses which the extraction site is presently put to. The result of this alternative will be: to limit the future agricultural potential of the holding; to eliminate the potential economic benefits to the property owners and the economic benefits to the local economy; and to prevent the utilisation of a valuable resource in the Sydney region.
2. Distributing the sand deposit to lower portions of the holding so as to enable full agricultural use. The alternative is prohibitively expensive in terms of the short-term economic benefits that will result. Additionally, distribution of the sand deposit to lower portions of the holding will have a negative environmental impact in that the flood storage capacity of the Hawkesbury River Valley for minor flood events will be reduced, increasing the spread of flood water elsewhere in the locality.

6.0 SUMMARY AND CONCLUSION

To sum up, the initial proposal stems from early considerations by the owners of the land to simply modify the existing profile of the elongated sand ridge by pushing it easterly over the berm to uncover better soils at a lower level and increase the surface area of the existing orchard. A more practical and economical use of the material is considered to be excavation and the exportation from the site. The end use of the site will be the same as was originally proposed by the land owners but there will be additional economic benefits by the exploitation of a viable resource. The direct economic income derived from the sale of the material will provide for further investment in the Anderson's family property.

The environmental effects of the proposal are manageable by the adoption of the environmental safeguards as set out in this submission.

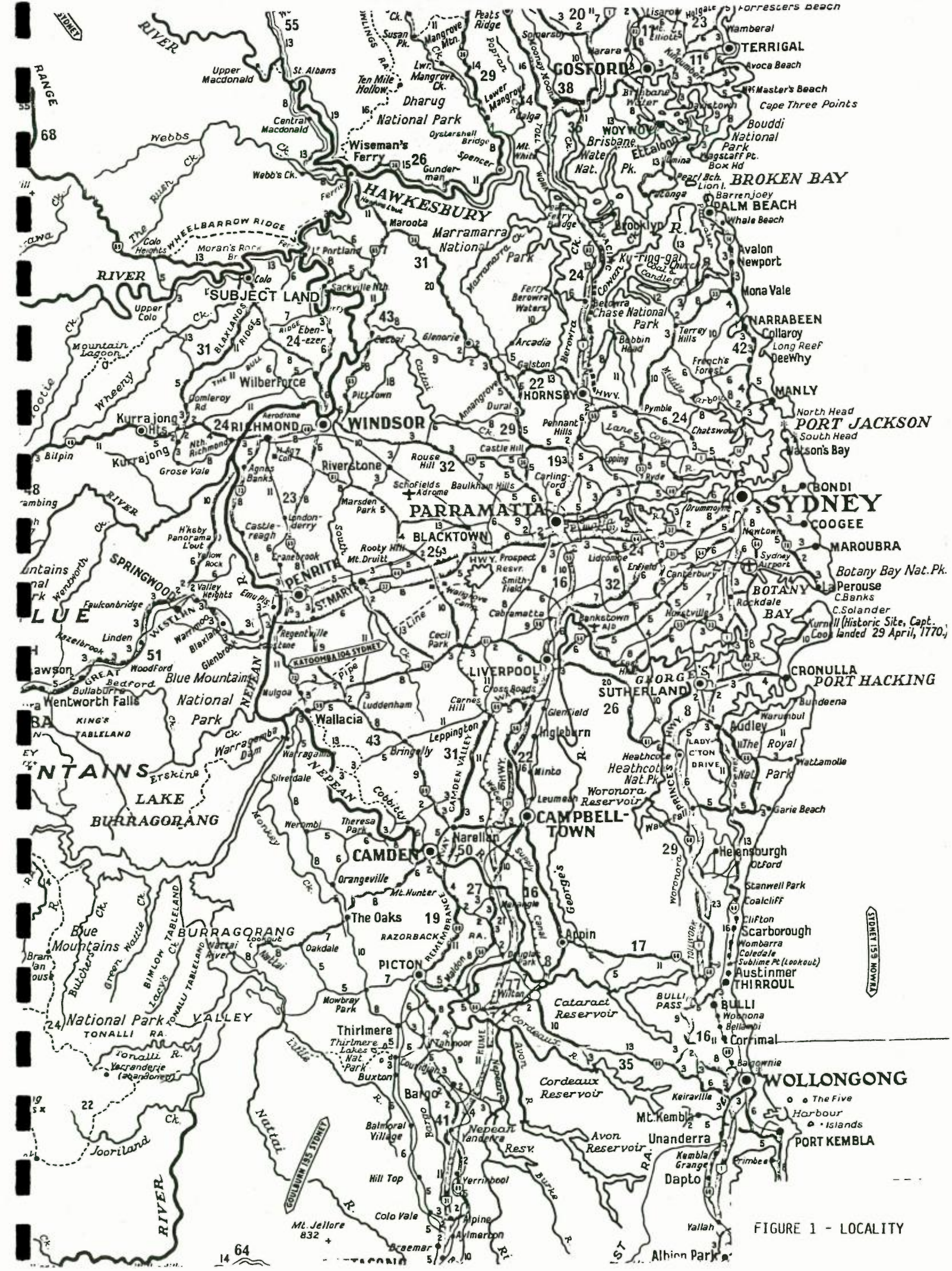


FIGURE 1 - LOCALITY

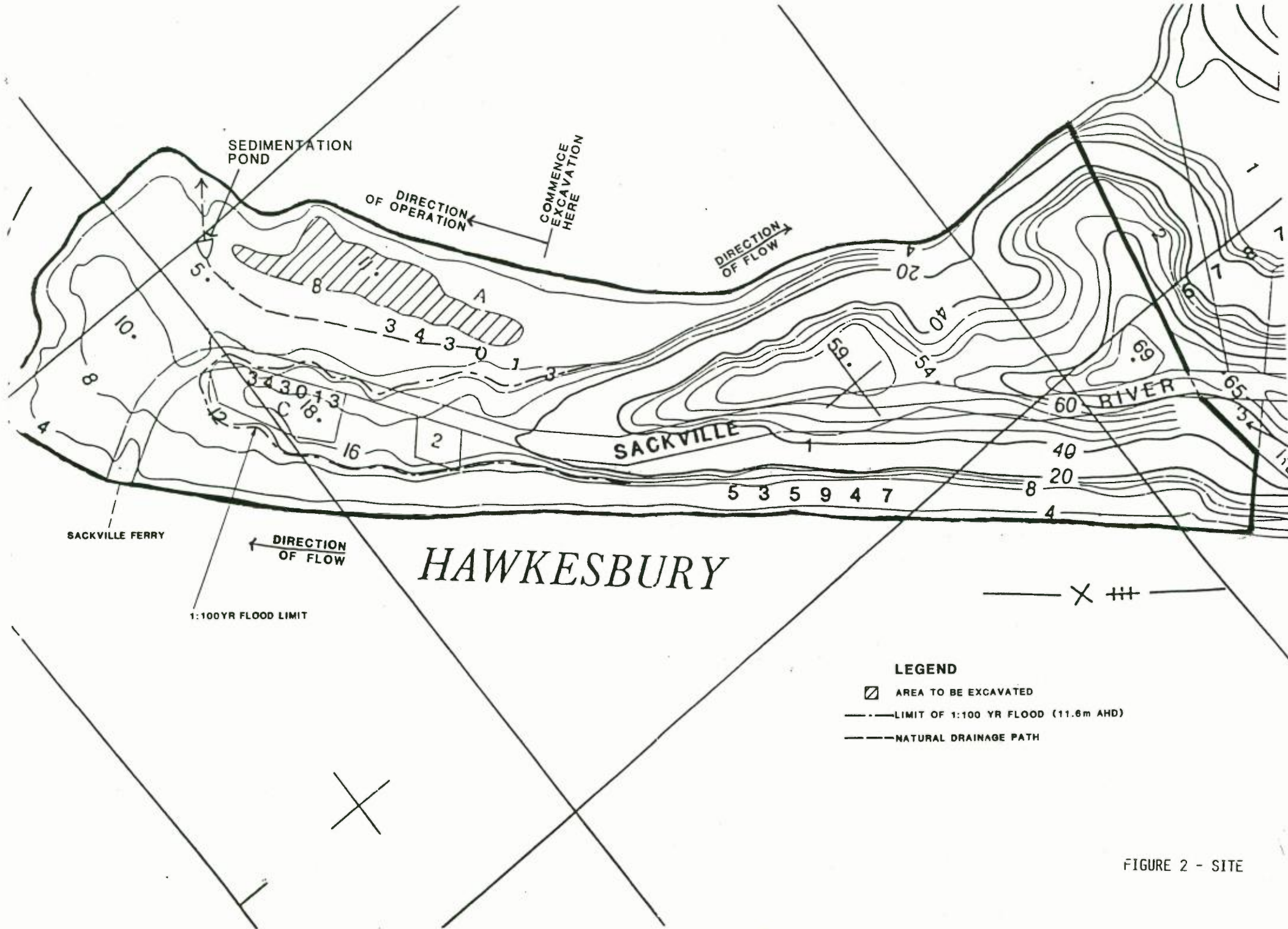


FIGURE 2 - SITE



FIGURE 3 - ORTHOPHOTO

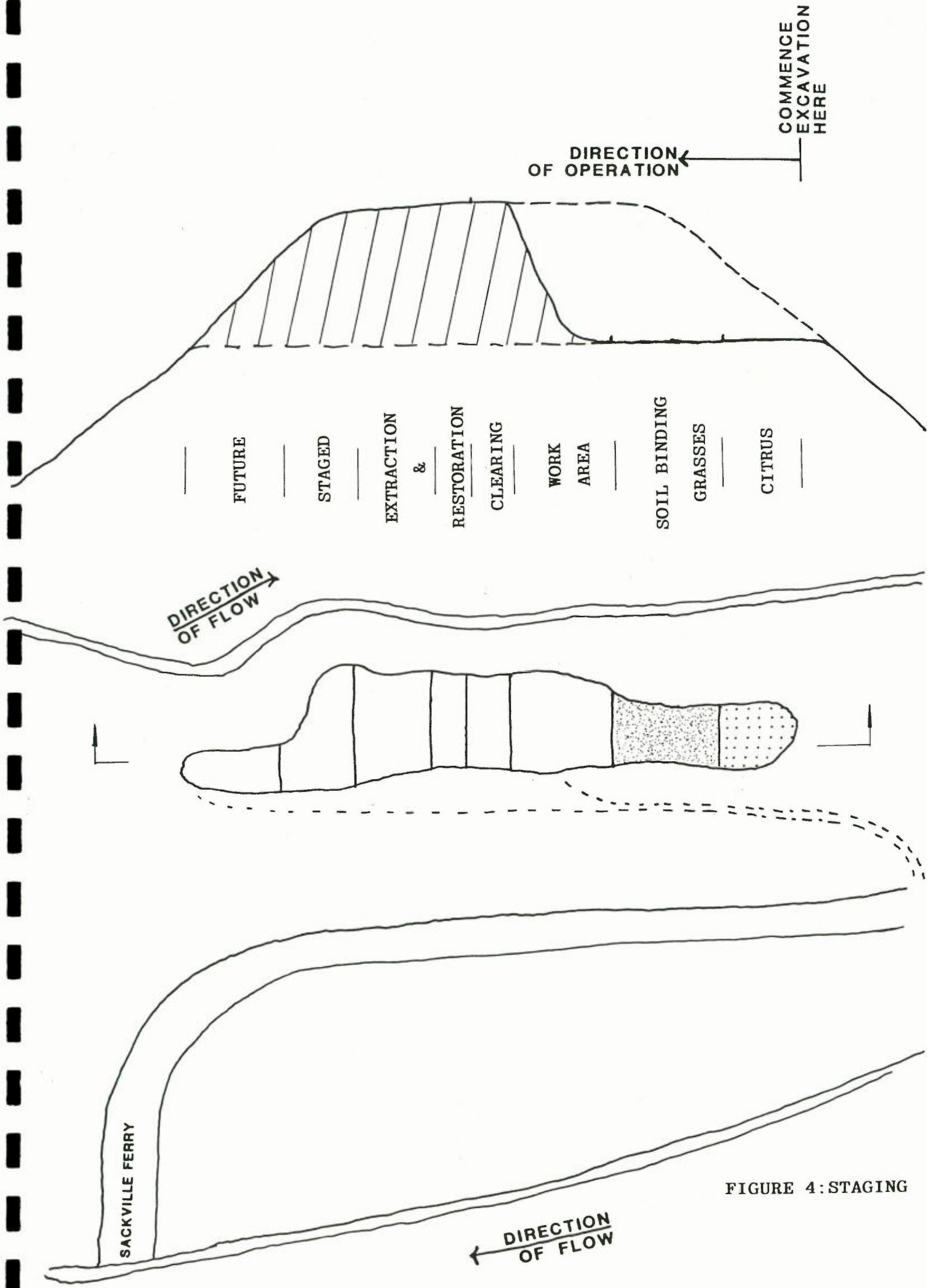


FIGURE 4: STAGING

PART B:

SUB CONSULTANTS' REPORTS

1. Acoustical Evaluation: Prepared by Caleb Smith Consulting Pty Ltd
M.A.A.S, M.A.S.A.
2. Geological Evaluation: Prepared by G B Brink
B.Sc., MAusIMM, M.G.S.A.
3. Archaeological Survey: Prepared by Dr Laila Haglund
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Consulting in acoustics since 1968

Ref:

REPORT NO. 87.221.R1

ACOUSTICAL ASSESSMENT

PROPOSED SAND EXTRACTION

SACKVILLE NSW

MAY 1987

Prepared for : Stratton Brothers Pty Ltd
and
Stratton Bus Lines Pty Ltd
(Joint Venture)

via

John Hancock & Associates
Town Planners, Design & Development Consultants
Suite 3/24 Dane Drive
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REPORT NO. 87.221.R1
ACOUSTICAL ASSESSMENT
PROPOSED SAND EXTRACTION
SACKVILLE NSW
MAY 1987

1.0 INTRODUCTION

This Report provides the results, findings and recommendations of our Acoustical Assessment into the levels of noise expected to be generated by extraction plant, screening equipment and transport vehicles, operating on the site of a sand deposit, within audible proximity to residential dwellings in the district of Sackville, NSW, and the surrounding area.

The purpose of the Assessment was to determine by measurement and analysis, the extent of noise propagation from plant and equipment to the residential dwellings in the area, and to compare the resulting noise levels with established criteria, as set down by the NSW State Pollution Control Commission in their Environmental Noise Control Manual, Section 21.

The recommendations made in the Report are designed to minimise the noise impact on residents living in the area, in keeping with the objectives of the NSW State Pollution Control Commission Guidelines, for a short-term extractive industrial activity being carried out in a rural district.

The Acoustical Assessment has been carried out for presentation to the Baulkham Hill Shire Council in the Environmental Impact Statement Documents prepared for the project by John Hancock & Associates.

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2.0 SITUATION

Mrs T. Anderson and Mr K. Anderson, owners of Lot 1 DP 535947 and Lots 1, 2 and 3 DP 634989, Sackville River Road, Sackville, propose to dispose of a sand deposit on their property, through the granting of a lease for its extraction to a Joint Venture Company comprising Stratton Brothers Pty Ltd and Stratton Bus Lines Pty Ltd.

Three residential dwellings owned and occupied by members of the Anderson family are located on or near the subject property. Other residential dwellings are located approximately 250 metres to 300 metres across the Hawkesbury River and at 500 metres to 600 metres up-river from the sand deposit. Several dwellings located within 50 metres of Sackville River Road and those opposite the present access to the property may be affected by the passage of trucks travelling to and from the Site. The dwellings most likely to be affected are shown on the Area Maps, Appendix B1 and Appendix B2.

3.0 PROPOSAL

The Joint Venture Company proposes to extract the sand deposit using a Volvo BM 4500, or a Volvo LM 1240, four-wheel rubber-tyred Front End Loader. The extracted sand will pass through a portable Powerscreen Unit, driven by a Lister three cylinder diesel motor and stockpiled for delivery by independantly-owned trucks up to 24 tonnes pay load. The trucks will travel via the Sackville - Maroota Road.

It is expected that five to seven trucks will make a total of up to 20 deliveries each day, between 7.00am and 5.00pm. No extraction or deliveries will be carried out on weekends or public holidays. The Extraction Project is expected to be carried out over a two to three year period when the area will revert to its present rural situation.

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4.0 METHOD OF ASSESSMENT

This Acoustical Assessment has been carried out by taking sound recordings of the plant and equipment expected to be used in the operation and comparing the results with the measured Background Noise Levels taken in the vicinity of residences in the area, to determine the expected acoustical impact.

4.1 Background Noise Levels

Background Noise Level Measurements were carried out during suitable weather conditions, in a manner set down by the NSW State Pollution Control Commission Guidelines and in accordance with the requirements of the Australian Standard AS1055 - 1984, Part 3, "Acquisition of (Acoustical) Data Pertinent to Land Use".

The Background Noise Level Measurements were carried out in the general area of the proposed Site, in proximity to a residential dwelling. Measurements were taken from 1130 hours to 1330 hours on Friday, 15th May, 1987. Current Background Noise Levels in the area are generated by normal domestic and rural activity and by traffic travelling to and from the vehicular ferry. Weather conditions at the time were fine and sunny, with relatively calm air. The acoustical effect of introducing twenty sand delivery trucks into this particular environment has been mathematically determined.

4.2 Measuring Instruments

Instruments used for the measurement and assessment of the Noise Levels included a Bruel & Kjaer Precision Sound Level Meter, Type 2218, fitted with a 12.7mm Condenser Microphone, Typy 4165, and a Windscreen. Statistical analysis methods were used to establish the L90dB'A' Background Noise Level and the Leq facility of the Meter was used to describe the Equivalent Continuous Noise Level occurring over the measuring period.

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4.0 METHOD OF ASSESSMENT(continued)

4.2 Measuring Instruments(continued)

Noise Levels of Plant Items were obtained by coupling a Bruel & Kjaer Precision Sound Level Meter, Type 2209, to a Marantz Cassette Tape Recorder, Type CP230, analysing the recorded signal by replaying the tape and noting the level of noise displayed on the meter. Calibration and alignment of the instruments was obtained with the Bruel & Kjaer Piston Phone Signal.

5.0 CRITERIA

The NSW State Pollution Control Commission sets the Background Noise Level as the Criterion for new developments. In certain circumstances, the Commission may allow a noise intrusion up 5dB'A' over the level of the existing acoustical climate, providing the intruding noise is bland in character and free from tonal and/or impulsive components. The Commission understands that conflict is possible between a sensitive residential environment and the need for development, particularly in the extractive industry. Its aim is for a sensible balance, where an increase in noise is subtle, and the intrusion is gradual.

The Background Noise Level is obtained by measuring in the vicinity of the nearest residence for a suitable period of time, generally more than twenty minutes, to obtain a statistical distribution of the level of sound prevailing in the area, and, by measurement or calculation, to determine the Background Noise Level as that which is exceeded for 90% of the time.

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5.0 CRITERIA(continued)

The State Pollution Control Commission Environment Noise Control Manual, Sections 19 and 20, sets out the planning objectives to be applied in changing circumstances related to land use. Section 21 of the Manual provides a Table of Recommended Background Noise Levels, wherein the typical rural area has an acceptable daytime noise level of 45dB'A', with a limit of 50dB'A'. This Criterion will be applicable to the Sand Extraction Plant likely to affect residences in the area surrounding the proposed Project.

Noise from the sand delivery trucks will be subject to Section 157-3 of the Noise Control Manual, which deals with Noise from Intermittent Traffic Flow.

6.0 RESULTS

The results of our Environmental Surveys, carried out near the proposed Extraction Site and in the vicinity of residences situated approximately 40 metres from Sackville River Road, are tabulated below.

TABLE OF BACKGROUND NOISE LEVELS

AVERAGE MINIMUM NOISE L90dB'A'	AVERAGE NOISE LEVEL L50dB'A'	AVERAGE MAXIMUM NOISE L10dB'A'	MAXIMUM NOISE LEVEL L1dB'A'	Leq DB'A'	NOISE SOURCES
31.30	33.25	44.00	61.00	43.60	Traffic, Birds, Rural & Domestic Activities

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6.0 RESULTS(continued)

The levels of noise generated by items of plant and equipment proposed for use at the Sackville site have been measured in their present situation at Cattai. These Noise Levels were recorded and the signals analysed to reveal the levels of noise to be expected at the nearest residences at Sackville, following the start-up and operation of sand extraction on the Site.

TABLE OF PLANT NOISE LEVELS

PLANT ITEM	CALCULATED ACOUSTIC POWER LEVEL Lw dB'A'	DISTANCE FROM PLANT ITEM TO NEAREST RESIDENCE METRES	CALCULATED NOISE LEVEL AT THE NEAREST RESIDENCE dB'A'
VOLVO BM 4400 FRONT END LOADER	108	200	54
VOLVO LM 1240 FRONT END LOADER	110	200	56
POWERSCREEN SCREENING PLANT	109	200	55
TYPICAL SAND TRUCK MOVING AWAY LOADED 24 TONNE PAY LOAD	108	100	60

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6.0 DISCUSSION AND RECOMMENDATIONS

In general, the proposed Extraction Site is partially screened from the two closest residents by the topographical features of the area. In particular, the 8 metre, 12 metre and 16 metre contour lines show the front edge of a small plateau, allowing the opportunity to push up screening and overburden material to visually screen the Site along these lines.

Residential dwellings situated on the opposite shoreline will be screened by the sand deposit for the major portion of the extraction period, provided the extraction activity is carried out along the southern side of the deposit, as shown in the Site Plan, Appendix B2.

The NSW State Pollution Control Commission Guidelines indicate a preferable noise level criterion of 5dB'A' above the present Background Noise Level, ie., $31.3\text{dB}'\text{A}' + 5\text{dB}'\text{A}' = 36.3\text{dB}'\text{A}'$. However, realising this development has a short life span of three years maximum, the Commission is more likely to concede to their Recommended Background Noise Levels, described in Section 21.1 of the Noise Control Manual, wherein a maximum of 50dB'A' is given, with a preferred level of 45dB'A'.

Due to the intermittancy of operation of the Extraction and Screening Plant, based on demand for the product, we recommend adoption of the 45dB'A' criterion for each Plant Item.

With this Criterion, a noise reduction of 9dB'A' is required for the Volvo BM 4400 Front End Loader and a reduction of 11dB'A' is required for the Volvo LM 1240 Front End Loader. The Powerscreen Unit requires a reduction of 10dB'A'.

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6.0 DISCUSSION AND RECOMMENDATIONS(continued)

The excess noise associated with the Volvo BM 4400 Front End Loader is radiating mainly from the openings in the engine canopy and the radiator grill. As acoustic correction to the canopy may affect the supply of cooling air, we consider the use of the alternative Volvo LM 1240 Front End Loader is preferable. The LM 1240 Front End Loader is radiating noise from the exhaust, which can be effectively corrected by the introduction of a short low-restriction truck muffler in the exhaust system.

Noise generated by the Lister Diesel Engine on the Powerscreen Unit is also radiating from the exhaust system. We again recommend the installation of a general purpose muffler for this machine. Both of these muffler installations will achieve a greater noise reduction than is required to meet the Criterion.

The Impact of Truck Noise is not related directly by its intrusion level over the Background Noise Level. As roadways are used by all forms of vehicular traffic, the Acoustical Impact is determined by calculating the increased noise level and the increased usage over the norm, using the Background Noise Level, the number of occasions and the time period involved.

The State Pollution Control Commission Noise Control Manual indicates a Criterion for Intermittent Traffic Noise of 55 dB'A' Leq T. The equation for intermittent traffic flow is as follows :

$$\text{dB'A' Leq,T} = L_b + 10 \log \left[1 + \frac{ND}{T} \times \frac{10^{[(L_{\max} - L_b) + 10] - 1}}{2.3} - (L_{\max} - L_b) \right]$$

Where L_b is the Background Level
 T is time in minutes
 D is duration of noise

L_{\max} is the truck noise
 N is number of vehicle trips
 2.3 is a constant

The result of this calculation is 48.10dB'A'Leq,T.

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6.0 DISCUSSION AND RECOMMENDATIONS(continued)

The Leq'A' Traffic Noise Level for 20 truck trips of 68 dB'A' at 50 metres, for an intrusion period of 0.3 minutes, above a Background Noise Level of 35 dB'A', over an eight hour day, is 48.10dB'A Leq,T.

Adding this Level of Intermittent Traffic Noise to the existing 43.6dB'A'Leq,T, gives a final Intermittent Traffic Noise of 49.3dB'A'Leq,T, which is 5dB'A' below the State Pollution Control Commission Criterion of 55dB'A'Leq,T and will not provide a significant acoustical impact on residences located on the route used by the delivery trucks.

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7.0 CONCLUSION

Our Acoustical Assessment of the Noise Impact Levels reaching local residences in the area of the proposed Sand Extraction Operations at Sackville, NSW, could be of some significance to the two residential properties situated opposite the proposed Site. We understand both of the properties are occupied by members of the Anderson Family.

Excessive noise at these residences would be due firstly to exhaust noise from the engine of the Powerscreen, and secondly, from the Volvo LM 1240 Front End Loader. The installation of exhaust mufflers to both these units will correct the situation, reducing the noise to below 45dB'A'.

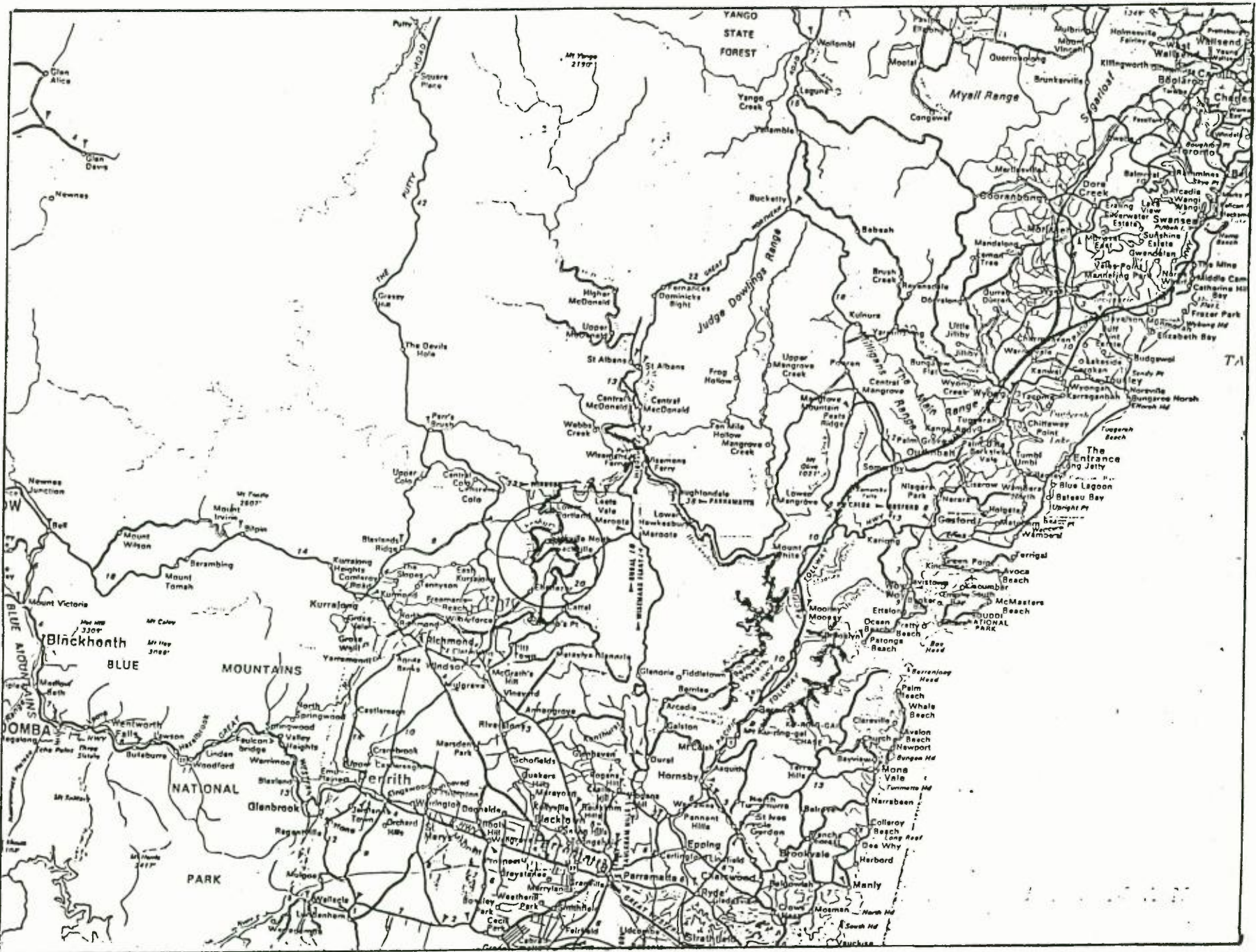
The increase in traffic noise from sand delivery vehicles passing residences on the Sackville - Maroota Road has been determined to be 49.3dB'A'Leq,T, and 5dB'a' below the State Pollution Control Commission Criterion of 55dB'A' Leq,T.

For those residents opposite the Site, a reduction in the acoustical and visual aspect of the operations may be achieved by the introduction of an earth berm along the 12 metre contour line, on the northern side of the road.

Advantage should also be taken of the topography by taking the access road along the lowest ground level, rising up to the Sackville - Maroota Road at a point east of the nearest residence, as shown on our Site Plan, Appendix B2.



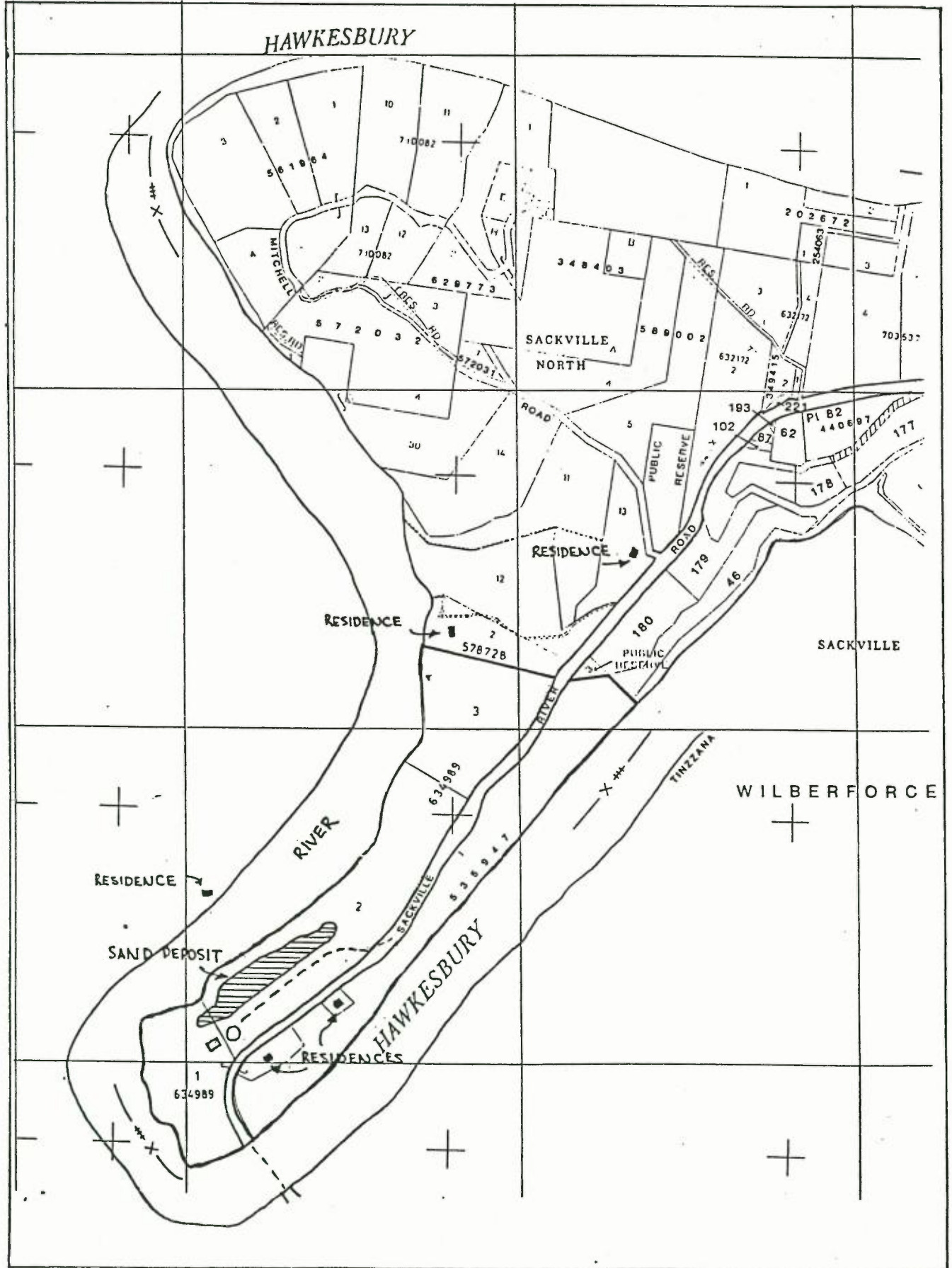
LOCALITY MAP



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APPENDIX B1

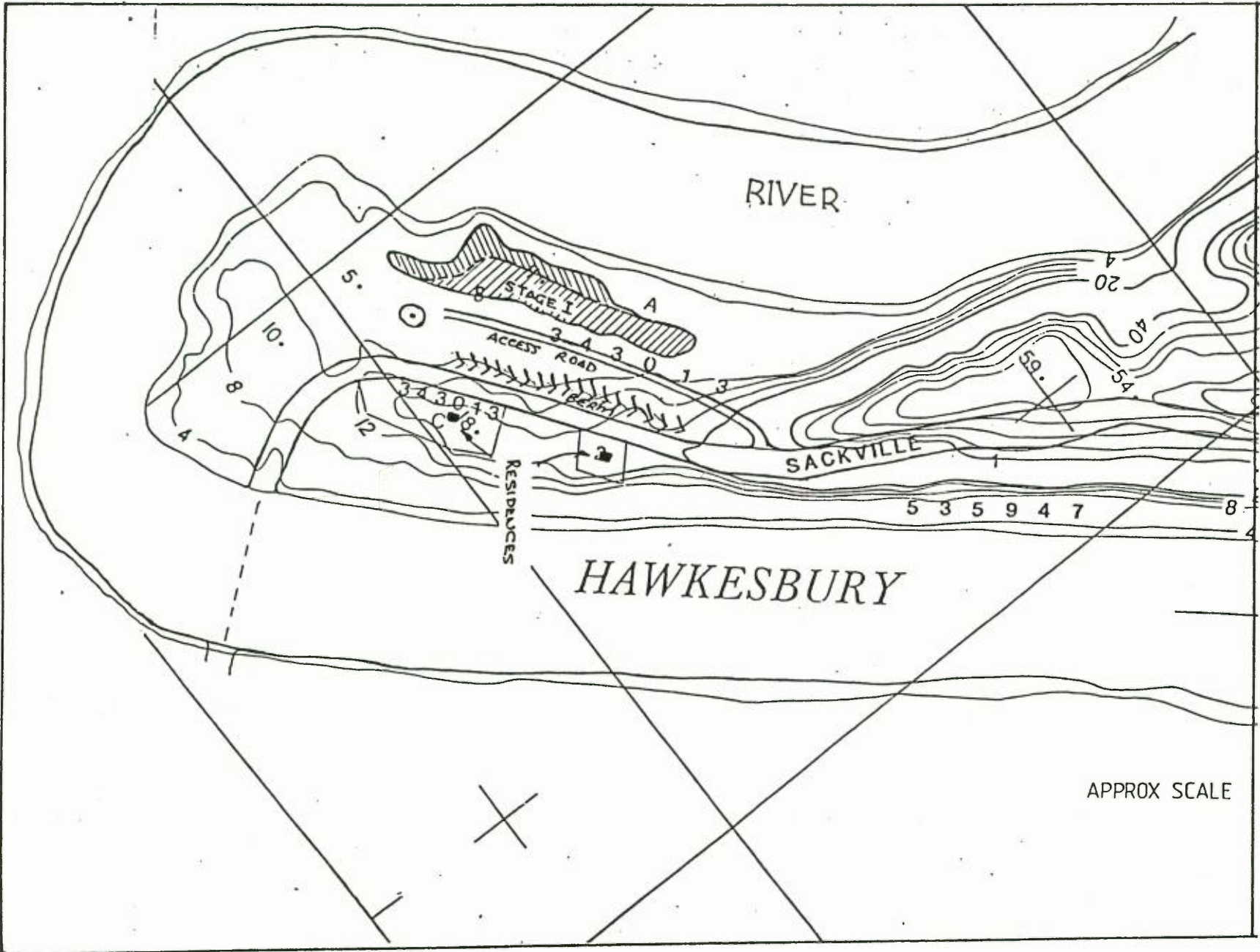
MAP OF THE AREA



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APPENDIX B2

SITE MAP



APPROX SCALE



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GEOLOGICAL EVALUATION
OF A SAND RIDGE
NEAR
SACKVILLE FERRY VIA WINDSOR

G.B. Brink B.Sc., MAusIMM, MGSA

MAY 1987

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2. NATURE OF INVESTIGATION
3. DISCUSSION
4. VOLUME CALCULATIONS
5. COST CONSIDERATIONS
6. SUMMARY

APPENDIX 1 - DRILL LOGS

APPENDIX 2 - SAND SIZING ANALYSES

PLANS

PLAN NO. S.A. 1/87 - PLAN OF PROPOSED ORCHARD IMPROVEMENT AREA.



Geological Evaluation of a Sand Ridge

near

Sackville Ferry via Windsor

1. Introduction

The Anderson family have been growing citrus fruit on their property on the Sackville peninsula for some generations. However, one part of their orchard area has historically produced little fruit from poorly developed trees. This area conspicuously consists of an elongate sandy ridge with some remnant citrus orchard remaining on its upper surface. Mr. K. Anderson wishes to improve the productivity of this ridge and accordingly requested John Hancock and Associates to prepare a submission leading to Council approval for possible corrective earthworks. This report considers the geological nature of the sand ridge and arrives at recommendations to improve its productivity.

2. Nature of Investigation

On the 11th April, 1987 the site was inspected with Mrss. J. Hancock and J. Gray. As a result of that inspection it was decided to investigate the sand ridge by means of a number of drillholes.

It was realised that heavy truckmounted drilling equipment would be likely to bog in the loose sandy surface and hence the drilling method selected for this site consisted of hand augering with a Dormer's hollow shell auger.

.....2/



Accordingly, on the 8th May, 1987 a total of ten auger holes were drilled on the sites shown on the accompanying plan No. S.A. 1/87. The holes varied in depth from three metres to seven metres. All materials brought up with the drill were laid out in one-metre long intervals to provide a continuous sequence of the various strata intersected. Each hole was logged and sampled. Logs are attached to this report as Appendix 1 and show sample intervals. Samples selected for laboratory testing are mainly from the intervals most likely to be removed as part of the land improvement project, although some samples from lower sections were included for purposes of comparison.

The samples were evaluated by Warman International Laboratories and their report is included as Appendix 2. Drill hole sites were determined by firstly fixing the site of DH 1 with a compass bearing to the northernmost corner of the Anderson house lot, marked by a survey peg on the east side of the Sackville River Road. Each successive drill site was then determined by pascings and compass bearings, while fences and other features were noted and similarly measured. This method has been found to be better than 95% accurate and hence is considered quite adequate for the purpose at hand.

3. Discussion

Qualitative appraisal of the materials brought up by the drill have lead to an interpretation of the sandy ridge which explains its structure.

Most holes intersected a layer of fine to medium grained sub-angular quartz sand from the surface down to depths varying from almost nil in DH 8 to



a maximum of 2.5 metres in DH 5. Underlying this upper sand is a dark, relatively humus rich buried soil profile, which rests on a fairly uniform body of fine yellowish sand.

This sequence is interpreted as follows:

The upper coarser sand cover, which is wedge-shaped with its thick part near the southeasterly edge of the ridge was deposited by a major flood in recent times, ie: probably less than a hundred years ago. This upper layer was deposited on an old, well-established soil profile as witnessed by its thickness and humus content. However, the same flood which left the upper sand was responsible for some erosive action, as indicated by some mudfilled patches at DH 6 and DH 8.

Another indication that the buried soil profile was old and well-established is the apparent yellow mottling of the underlying, uniformly fine sand.

The waterlevel of the lagoon below the southeast berm of the ridge is probably the lowest watertable likely to occur below the ridge. It was found that the base of DH 1, which lies approximately 1.5 metres above the level of the lagoon, was wet and therefore at or near the watertable. This was as expected as the watertable would bulge slightly between river and lagoon below the ridge.

It can be seen from the graphic logs of the drill-holes that the upper sand wedge generally thickens from zero thickness along the northwest fence around the top of the ridge to an average of some 2 metres thickness along the southeast fence.



Exeptions are DH 7 where probable erosion excavated a depression which was then filled with "recent" sand and DH 2 and DH 3 where winderosion probably has removed the top of the "recent" sand.

It is apparent that removal of the upper sand wedge will result in a near planar surface on the old soil profile with a slight overall dip to the south-east. There are two possible methods of removing this wedge:

- A. push the sand from west to east over the berm, thus lowering and enlarging the available area, or
- B. quarry the sand and sell it on available markets.

Method A.

Although this method would increase the area of the ridge, the sand pushed over the edge would need to be at least partially compacted. Immediatly upon completion of its relocation it needs to be topsoiled and grassed to protect it from flood waters and wind erosion. If a flood should rise before the sand is fixed by vegetation it may get washed away.

Hence this method is costly in equipment hire and somewhat risky in that a considerable quantity of sand may be lossed in flood waters.

Method B.

If the sand is mined and marketed it will achieve the objective of uncovering the old soil profile and also could raise some revenue to off-set attendant costs, including those of lost earnings through non-productivity of the orchard.



Laboratory analysis of the sand indicates that it is generally a fine to medium grained sand, but mainly fine. Plotting the coarsest of the samples on a graph it is evident that the sand is too fine for concrete sand applications. Furthermore, the fine clay fraction would need to be removed by washing and the relatively high content of carbonaceous material would also cause difficulties.

It appears that the most likely market for this sand lies in horticultural applications, ie: preparation of garden soils. Accordingly it is recommended that large nurseries or garden product suppliers be approached.

4. Volume Calculations

The length of the intended extraction area along the top of the ridge is approximately 350 metres, while the average width is some 60 metres. The thickness along the western edge is taken as zero, while the arithmetic mean thickness of the sand to be removed along the eastern boundary is very close to 2 metres. Hence a simple average thickness of the sand capping to be removed is 1 metre.

The total volume of sand in the cap is

$$350\text{m} \times 60\text{m} \times 1\text{m} = \underline{\underline{21,000\text{m}^3}}$$

At a bulk density of approximately 1.5 tonnes per cubic metre the mass or weight of sand is approximately 30,000 tonnes.

.....6/



5. Cost Considerations

If Method A is adopted to treat the ridge, ie: pushing the sand from west to east, the following cost estimate is considered realistic.

Assume that a Cat. D7 dozer or similar machine is hired to perform the tasks of removing the sand, compacting the sand and distributing topsoil. Such a machine should be capable of treating 3,000 tonnes per day. at a daily hire rate of \$500. the total cost would be some \$5,000.

If Method B is pursued extraction and removal of the sand would probably take place over a number of years. It is likely to affect the underlying soil profile to some extent but it may generate a royalty return.

6. Summary

Some 30,000 tonnes of mainly fine sand caps an elongated sand ridge on Anderson's land near the Sackville Ferry, adjacent to the Sackville-Maroota Road. The sand is not considered suitable as a construction sand, but could have a use in horticultural applications.

The sand covers an ancient, buried soil profile which is expected to be better suited for orchard support than the present surface.

To uncover this soil profile the overlying sand needs to be removed, either by pushing it sideways or removal from the site.

Approximate cost of removing the sand by pushing it easterly over the berm is estimated as \$5,000.

G B Brink

G.B. Brink. B.Sc., MAusIMM, MGSA.



APPENDIX 1

DRILL LOGS



Drilling Method: Hand Auger	Project: Anderson's Orchard
Driller: Percival	Location: Sackville
Logger: G.B. Brink	Coordinates: 120° from corner east of road
Date Commenced: 8/5/87	Angle: Vertical Direction:
Date Completed: 8/5/87	Collar Level:

Interval (m)	Sample	Graphic Log	DESCRIPTION
0 - 0.3			<u>Soil</u> , sandy grey
0.3 - 1.7	DH1/1	1	<u>Sand</u> , yellow/white, fine to medium
1.7 - 1.9		2	<u>Soil</u> , brown/black
1.9 - 2.6	DH1/2 (2.0-3.4)		<u>Sand</u> , reddish brown, fine to medium
2.6 - 7.0		3	<u>Sand</u> , yellow and brownish (mottled?) fine to medium, slightly coarser near base. Water at base.
	DH1/3 (3.4-7.0)	4	
		5	
		6	
End of Hole		7	



Drilling Method: Hand Auger	Project: Anderson's Orchard
Driller: Percival	Location: Sackville
Logger: G.B. Brink	Coordinates: 80m @ 224° from DH1
Date Commenced: 8/5/87	Angle: Vertical Direction:
Date Completed: 8/5/87	Collar Level:

Interval (m)	Sample	Graphic Log	DESCRIPTION
0.0 - 0.8			<u>Sand</u> , grey/yellow
0.8 - 1.4			<u>Soil</u> , brown/black, loamy, sandy
1.4 - 4.0	DH2/1		<u>Sand</u> , yellowish, fine to medium
End of Hole			



Drilling Method: Hand Auger	Project: Anderson's Orchard
Driller: Percival	Location: Sackville
Logger: G.B. Brink	Coordinates: 80m @ 224° from DH9
Date Commenced: 8/5/87	Angle: Vertical Direction:
Date Completed: 8/5/87	Collar Level:

Interval (m)	Sample	Graphic Log	DESCRIPTION
0.0-0.6			<u>Sand</u> , yellowish, fine to medium
0.6-1.9		1	<u>Soil</u> , dark brown
1.9-3.3	DH10/1	2 3	<u>Sand</u> , brownish and yellow bands, fine to medium
3.3-4.0	DH10/2	4	<u>Sand</u> , yellow, medium
End of Hole			



APPENDIX 2

SAND SIZING ANALYSES



WARMAN INTERNATIONAL LTD.

(INCORPORATED IN QLD.)

TELEGRAMS & CABLES:
"WARMANCO" SYDNEY
PHONE: 436 6789
TELEX: AA20711

POSTAL ADDRESS:
P.O. BOX 51
ARTARMON
N.S.W. 2064
AUSTRALIA

LABORATORIES:
6-8 McLACHLAN AVE
ARTARMON
SYDNEY
NEW SOUTH WALES

RESEARCH & DEVELOPMENT DIVISION

LABORATORY REPORT 87/000200

TITLE	SIZE ANALYSIS OF SAND SAMPLES		
CLIENT	Brink & Co PO Box 40 OURIMBAH NSW 2258		
OUR LABORATORY No.	5438	ORDER No.	02
DATE RECEIVED	May 15, 1987		
MATERIAL AND IDENTIFICATION	Sand samples as per attached table		
OBJECT OF TESTWORK	Size analysis to 75 μ m		
RESULTS	See Table 1		

C.J. McDowell

May 25, 1987

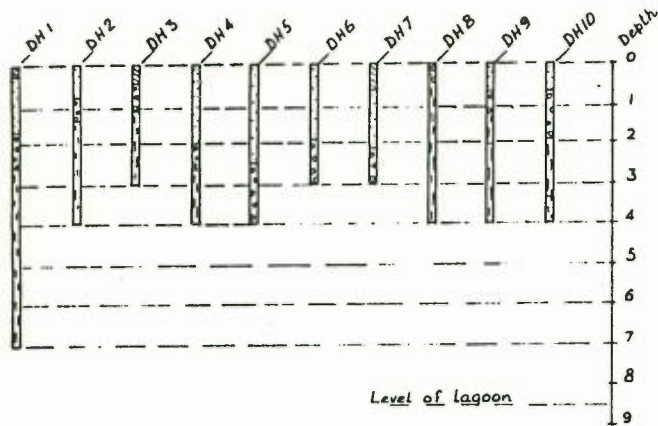
CJMcD:sh
87/1165

TABLE 1

SIZING ANALYSIS: Sand Samples

Screen Aperture (microns)	Cyclosizer separation size (microns)	DH1 1/2		DH 1/3		DH 2/1	
		wt %		wt %		wt %	
		retained fraction	passing	retained fraction	passing	retained fraction	passing
850		0.3	99.7	0.1	99.9	0.1	99.9
600		1.1	98.6	0.3	99.6	0.4	99.5
425		9.1	89.5	3.3	96.3	7.2	92.3
300		29.2	60.3	21.3	75.0	30.7	61.6
212		31.1	29.2	32.2	42.8	31.6	30.0
150		15.6	13.6	19.0	23.8	13.6	16.4
106		5.1	8.5	9.1	14.7	5.3	11.1
75		2.4	6.1	4.8	9.9	2.8	8.3
-75		6.1		9.9		8.3	
		DH 4/1		DH 5/1		DH 6/1	
850		0.5	99.5	0.6	99.4	0.3	99.7
600		3.2	96.3	2.1	97.3	1.4	98.3
425		21.6	74.7	15.8	81.5	10.4	87.9
300		35.8	38.9	35.5	46.0	24.0	63.9
212		22.7	16.2	26.9	19.1	27.6	36.3
150		10.4	5.8	11.4	7.7	20.4	15.9
106		2.5	3.3	3.3	4.4	7.5	8.4
75		1.0	2.3	1.4	3.0	3.3	5.1
-75		2.3		3.0		5.1	

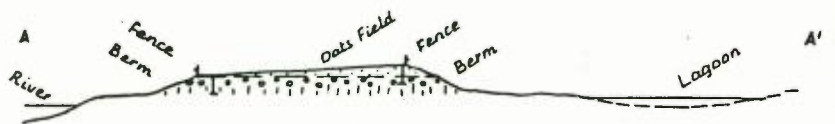
NOTE: The cyclosizer separation sizes are equivalent Stokes' spherical diameters referred to a particle specific gravity of _____. To determine particle sizes relative to other specific gravities apply the formula $d_1^2(S_1-1)=d_2^2(S_2-1)$. Where d and S are respectively the particle size and particle specific gravity.



LEGEND

- Present Soil Profile
- Post Flood Sand
- Buried Soil Profile
- Pre Flood Sand

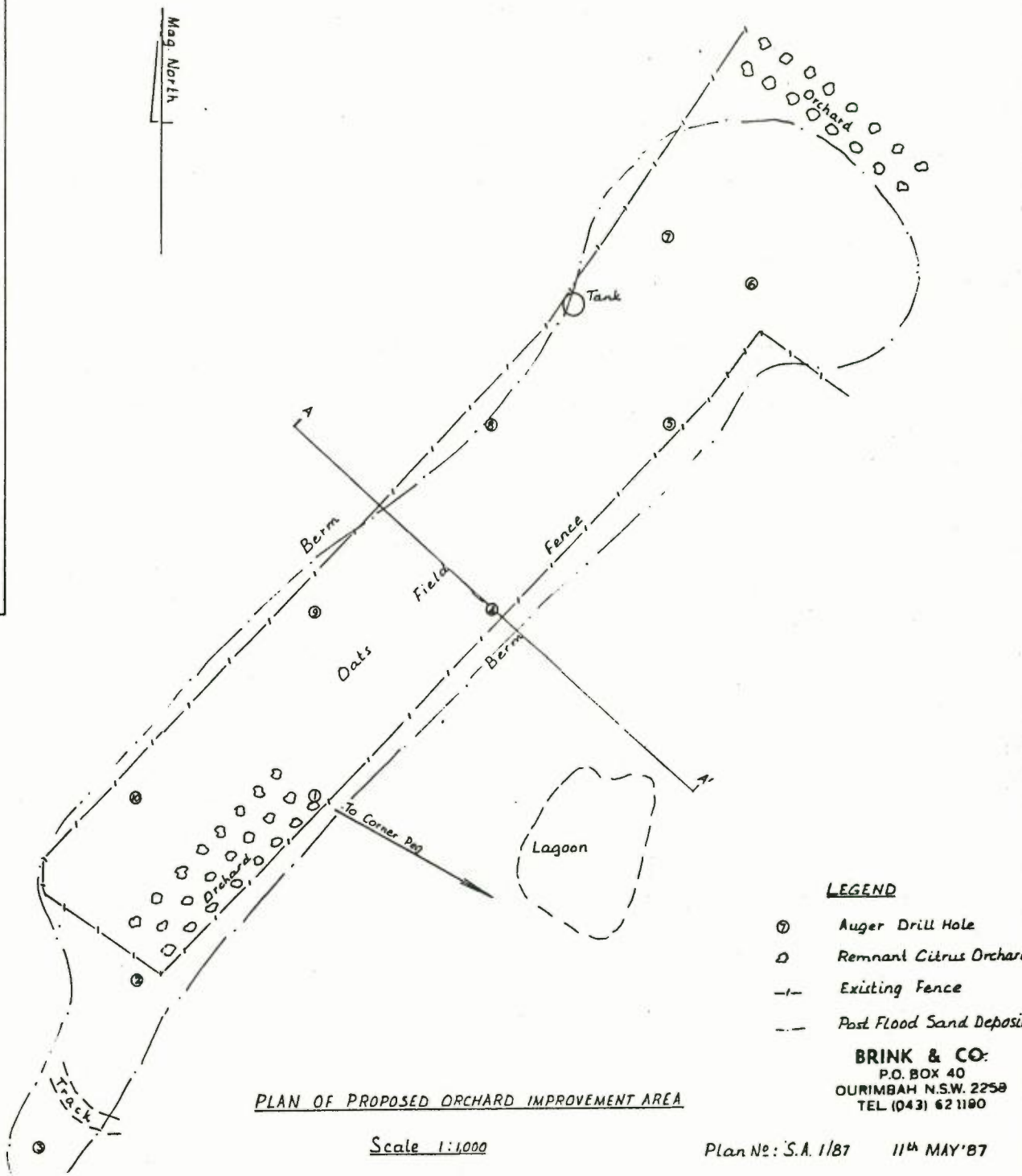
GRAPHIC LOGS OF DRILL HOLES



CROSS SECTION A-A'



Mag North



LEGEND

- ⊙ Auger Drill Hole
- Remnant Citrus Orchard
- - Existing Fence
- - Post Flood Sand Deposits

BRINK & CO:
P.O. BOX 40
OURIMBAH N.S.W. 2259
TEL (043) 62 1190

PLAN OF PROPOSED ORCHARD IMPROVEMENT AREA

Scale 1:1000

Plan No: S.A. 1/87 11th MAY '87

ARCHAEOLOGICAL SURVEY OF PROPOSED SAND EXTRACTION AREA
AT SACKVILLE, N.S.W.

Lots 1, 2, and 3 DP 634989 and Lot 1, DP 535947

Report to John Hancock & Associates.

LAILA HAGLUND

MAY 1987

HAGLUND AND ASSOCIATES

1 CAMERON STREET

BALMAIN, NSW 2041

02-8184541

LIST OF ILLUSTRATIONS

- Fig.1 Location of study area, 1:250,000
- Fig.2 Location of study area, 1:10,000. The hatched area indicates the horizontal extent of the proposed sand extraction.
- Fig.3 Location of study area, 1: 5,000. The shaded area indicates the proposed extraction area.
- Fig.4 View southwestward across the former orchard area. The forested ridges in the background are on the south side of the river.
- Fig.5 View northeastward (from fence between former orchard and grassy extension of ridge) along southeastern slope, across gully and towards southeastern sandstone ridge. Note the shallow lagoon on the floor of the gully.
- Fig.6 View southward along western slope of narrower extension of sand-ridge. Note low, level river bank to the right.
- Fig.7 View northward towards orchard (to be left untouched) across stretch of pale sand in the higher part of the sandridge.

ARCHAEOLOGICAL SURVEY OF PROPOSED SAND EXTRACTION AREA
AT SACKVILLE, N.S.W.

Lots 1, 2 and 3 DP 634989 and Lot 1 DP 535947

1. INTRODUCTION:

The survey was commissioned by John Hancock and Associates on behalf of Mr. and Mrs. Anderson, owners of the property.

The study area, (Lots 1, 2 and 3 DP 634989 and Lot 1 DP 535947) is situated within Baulkham Hills Shire, within a narrow peninsula formed by a meander of the Hawkesbury River (Figs.1 - 3). The parts of the river flanking the area are known as the Kent and Sackville Reaches.

The proposed development will involve extraction of sand from the surface of a sand ridge parallel to Kent Reach. The broad part of the crest has been used as an orchard (Fig.4), the remainder carries tall grass (Figs.5 - 6). The body of sand to be removed is wedge-shaped. The back of the wedge, about 3 - 4m thick, consists of the southeastern margin of the crest and the upper slope below this (Fig.5). The depth of sand to be removed decreases to nothing by the northwestern margin of the crest. The removal of sand will reverse the present slight slope of the crest (which is northwesterly) and reduce the angle of the southeasterly slope to make it possible to take a tractor up the slope. When sand has been extracted, topsoil will be added and the area replanted with fruit trees. There is a dirt track to the northern end of the orchard. This will be used during the sand extraction and no new access tracks are planned.

The brief for the survey was to inspect the area for archaeological material remaining as evidence of past Aboriginal presence and land use, to record and assess any such material and to make relevant management recommendations.

Aboriginal sites and relics are protected under the National Parks and Wildlife Act of 1974, administered by the Director of the National Parks and Wildlife Service of New South Wales (NPWS). Such sites may contain archaeological material or may be of traditional significance to present day Aborigines. They must not be interfered with without prior written consent of the Director of the NPWS. In the issuing of such permits the Director takes into account the attitude of the local Aborigines. It is the policy of the NPWS to support and encourage Aboriginal involvement in the care and control of the part of the Australian heritage which relates to their ancestors.

The area falls within that of the Dharuk Local Aboriginal Land Council, at present inoperative. The Western Metropolitan Regional Aboriginal Land Council (WMRALC) acts on its behalf. This was informed of the survey, and it is recommended that a copy of this report be forwarded to the WMRALC.

The archaeological survey was carried out on 3rd May. Weather and light conditions were good.

2. SOURCES OF BACKGROUND INFORMATION

The Register of Aboriginal Sites kept by the NPWS is the main source of information about prehistoric and other Aboriginal sites in any part of New South Wales. The quality of information listed for each site varies considerably. The NPWS also keeps a file of archaeological reports, mostly of archaeological surveys for environmental assessment studies, or more intensive archaeological investigations following from such surveys.

Some thirty sites, mainly art sites, are listed for an area of some fifteen square kilometres which contains Sackville North, the river enclosing this, and the opposite bank. Many of the site reports are very poor, consisting of little more than a vague grid reference and a note on the type of site present. Some of the art sites have been relocated and studied (McDonald 1985), but the information resulting from this has not yet been accessed. The sites listed are mostly rock shelters in sandstone ridges, a landform not present in the study area.

The inch : mile map complementing the site register shows two sites as occurring some 300 m to the east and 500m to the northeast of the study area: NPWS 45-2-99 and 45-2-100. Both were recorded quite some time ago by an amateur recorder, R.Taplin, who provided information of varying reliability. The site form describes 45-2-99 as a small shelter with charcoal drawings at the head of a creek and 45-2-100 as consisting of two axe grinding grooves on a sloping rock in the bed of a small creek. No attempt was made to relocate these sites as they are well beyond the study area.

Few systematic archaeological surveys have been carried out in adjoining areas, but some reports relevant to the general area have been listed as references.

3. BACKGROUND INFORMATION

3.1 ENVIRONMENT

The following brief description of the environment notes aspects considered likely to have influenced prehistoric patterns of landuse and site location.

The study area is part of the Sydney Basin and lies within the Hawkesbury Sandstone belt. Where this is cut through by a river, as here, the varied habitats (e.g. floodplains with wetlands, dry sclerophyll forests on ridge tops and gullies with rainforest) found side by side combined to provide an environment rich in food resources, raw materials and fresh water, with easy access from the river or via the less densely vegetated ridge crests.

The 'peninsula' bordered by Kent and Sackville reaches can be divided lengthwise into two belts of higher ground separated by a long, broad gully with a shallow lagoon (Fig.5).

The southeastern part, a fairly low ridge of sandstone, is an extension of the sandstone plateau which carries Sackville North. The fairly level crest of the ridge has been cleared and now carries a road and several houses. There is a gradual slope, with some occasional, exposed sandstone shelves, to the gully floor (Fig.5). The Aboriginal sites mentioned above should be located on the ridge crest (probably at or near the its intersection with the higher plateau) and low down on the southeast slope.

The northwestern part, with the study area, consists of Quaternary sand deposits banked up to form a ridge. The study area occupies a large part of this. It extends some hundred metres eastward from a fence line at the intersection of the crest and the western slope, across the crest of the ridge and the eastern fence line and some three to four metres downslope towards the gully and lagoon. A small orchard at the northern end will not be affected but left as is; the southward extent is some four hundred metres, extending beyond the present cultivated area to a continuation of the eastern gully.

This southernmost part is grassed but cut across by a track and several deep ditches which provide sections through the upper part of the sand deposit. Within the former orchard surface visibility was good as most trees have been removed and little grows in the vacant space.

The crest of the ridge slopes from east to west and to both the north and south from a slightly higher area in the centre. In this higher part the sand is notably more pale and poor in humus (Fig.7) than in the lower stretches; the darkest loam being present within the lower, western strip. The ridge appears to have been built up by severe floods, probably in several stages. It is possible that former land surfaces have been buried within the ridge, but the loosely bedded sand appears likely to be churned up and redeposited by severe floods. Much of the upper deposit (the sand to be extracted), e.g. the paler sand, may have been deposited within recent centuries. The sand appears virtually free of rock; a few fragments of sandstone were seen towards the lower, southwestern end of the former orchard. These could have been introduced during cultivation.

3.2 ARCHAEOLOGICAL CONTEXT

The area now comes within that of interest to the Dharuk Local Aboriginal Land Council. At the time of European settlement, the Hawkesbury River formed the border between the Dharuk to the south and the Darkinjung to the north of the river according to the notes of some early observers (Vinnicombe 1980:IV:1). The borders between the different groups were probably often far less precise than used to be suggested.

Hundreds of sites are known in the Sydney-Gosford-Hawkesbury district. Some major studies have focused on areas north of the Hawkesbury River, e.g. the Mangrove Creek area (Attenbrow 1981, Vinnicombe 1980) or on rock art in the Sydney area (McDonald 1985).

The major site types found are rock shelters with art and or archaeological deposit, rock engraving sites and rocks with grinding grooves. On the coast and in estuaries, shell middens are common. Less frequently recorded, though probably more common than would appear, are scatters of

stone artefacts, quarries, burials, stone arrangements and scarred trees. Detailed investigation of an area tends to change the proportion of site types known to be present, as early and/or amateur recordings tend to be biased towards art sites and grinding grooves.

Sites are often linked with the presence of rock and water. Away from rock exposures the main site types are scatters of stone artefacts, scarred trees, burials and shell middens. Aboriginal sites have survived mainly in rocky, forested areas and on grazing land; in cultivated areas many have been disturbed or, probably, destroyed.

Recent investigations have shown that Aborigines have been present in the sandstone country along the Hawkesbury and Nepean Rivers for some 11,000 to 13,000 years or more (Attenbrow 1981, Kohlen 1986), though sites from the last five millenia appear to be more common. Few sites on the Cumberland Plain or on the coast to the east of this have been dated, but judging from their content of stone artefacts, a date within the last five millenia appears most likely also for these. The Aboriginal population of the area appear to have been relatively large, but diminished rapidly in response to European settlement which spread onto the flood plains quite quickly. Aborigines are unlikely to have been able to leave traces of traditional activities within the study area or the surrounding region for about a century and a half.

4. SURVEY, RESULTS AND DISCUSSION

The total absence of rock outcrops or native trees within the study area, and the deep cultivation of most of its surface, meant that there was little chance of finding anything but disturbed scatters of stone tools or shell midden debris. Burials were unlikely, as human bones would have been noticed during work in the orchard. In addition, the better part of the present surface deposit appeared to have been deposited - or churned up - in recent centuries.

The ground surface within the orchard area was inspected on foot via four transects, two along and just inside the southeastern and northwestern fences and two spaced between these. In addition erosion scars on the slopes, a track and ditches across the grassed southerly extension, the dirt track across the gully and rock shelves on the slope beyond the lagoon were inspected.

It was estimated that some 80% of the surface of the actual study area had good visibility and that more than 50% of the surface was inspected.

No archaeological material was seen in the study area. As noted above, it is possible that former land surfaces have been buried by later flood deposits. Artefacts scatters and midden debris on these could have been buried by the settling sand and remain as lenses in the ridge. This seems fairly unlikely as the sand was probably swirled up with some force and the former surface rearranged in the process.

In addition, the sand ridge appeared unlikely to have been chosen as a

This interpretation was discussed with B. Brink, project geologist.

camp site; the sandstone ridge (Fig.5) to the northwest would have been a more comfortable and safe place for a base camp, and the lower river bank (Fig.6), closer to the water, more convenient and pleasant for minor day-time camps.

The wedge of sand to be removed includes only the upper part of the sand ridge, the part which would have needed a major, forceful flood to end up there. However, to be on the safe side, the operator involved in the extraction of the sand should be warned that archaeological material might occur in this. He should be asked to watch out for such things as lenses of shell, stone axes, thin slivers of hard rock and lumps of hard stone which are not from the sandstone ridge nearby. If shells or stone artefacts are found, work must be stopped immediately, and the NPWS and WMRALC notified, so that the finds can be recorded and their importance assessed by a qualified archaeologist.

5. CONCLUSIONS AND RECOMMENDATIONS

It was concluded that there are no archaeological reasons against the proposed sand extraction.

It is recommended that:

1. A copy of this report be sent to the Western Metropolitan Regional Aboriginal Land Council, for information.
2. The contractor in charge of the proposed sand extraction be informed that there is some possibility that Aboriginal archaeological material could be present in the sand to be removed and asked to watch out for such objects (as described in section four above) and to stop work immediately if any are found, so that the relevant authorities may be informed and the material assessed.

6. REFERENCES

Maps used:

Sydney SI/56-5	1:250,000	Topographic
Sydney SI/56-5	1:250,000	Geological series
Lower Portland 9031-2-S	1:25,000	Topographic map
Wilberforce 9030-1-N	1:25,000	Orthophotomap

Archaeological reports held by the NPWS:

- Attenbrow, V. 1981 Mangrove Creek Dam Salvage Excavation Project.
- Bonhomme, T. 1985 An archaeological sites survey at Paradise Gardens, Hawkesbury River, N.S.W.
- Bonhomme, T. 1986 An archaeological survey of the proposed development of Riverside Oaks, Wiseman's Ferry Road, Cattai, N.S.W.
- Dallas, M. 1985 North West Sector Regional Environmental Study: Aboriginal sites.
- Haglund, L. 1982a Survey for Aboriginal sites and relics near Cattai N.S.W.: Cheeseman's Road, northern part.
- Haglund, L. 1982b Survey for Aboriginal sites and relics near Cattai N.S.W.: part of Portion 71, Parish of Maroota.
- Haglund, L. and J. Stockton 1983 Archaeological investigations of proposed sandstone extraction area at Cattai, Lot 71b and Lot 1, DP 40740.
- Happ, G. and L. Haglund 1983 An Aboriginal sites survey at Cattai State Recreation Area.
- Koettig, M. 1980 Eraring - Kemps Creek Transmission Line, southern section. Aboriginal and historic site survey.
- Kohen, J. 1986 An archaeological study of Aboriginal sites within the City of Blacktown.
- McDonald, J. 1986 Sydney Basin Aboriginal Heritage Study: rock engravings and shelter art sites. Stage 1.
- Ross, B. 1979 Archaeological resource assessment, Maroota sand deposit.
- Vinnicombe, P. 1980 Predilection and prediction: a study of Aboriginal sites in the Gosford - Wyong region.

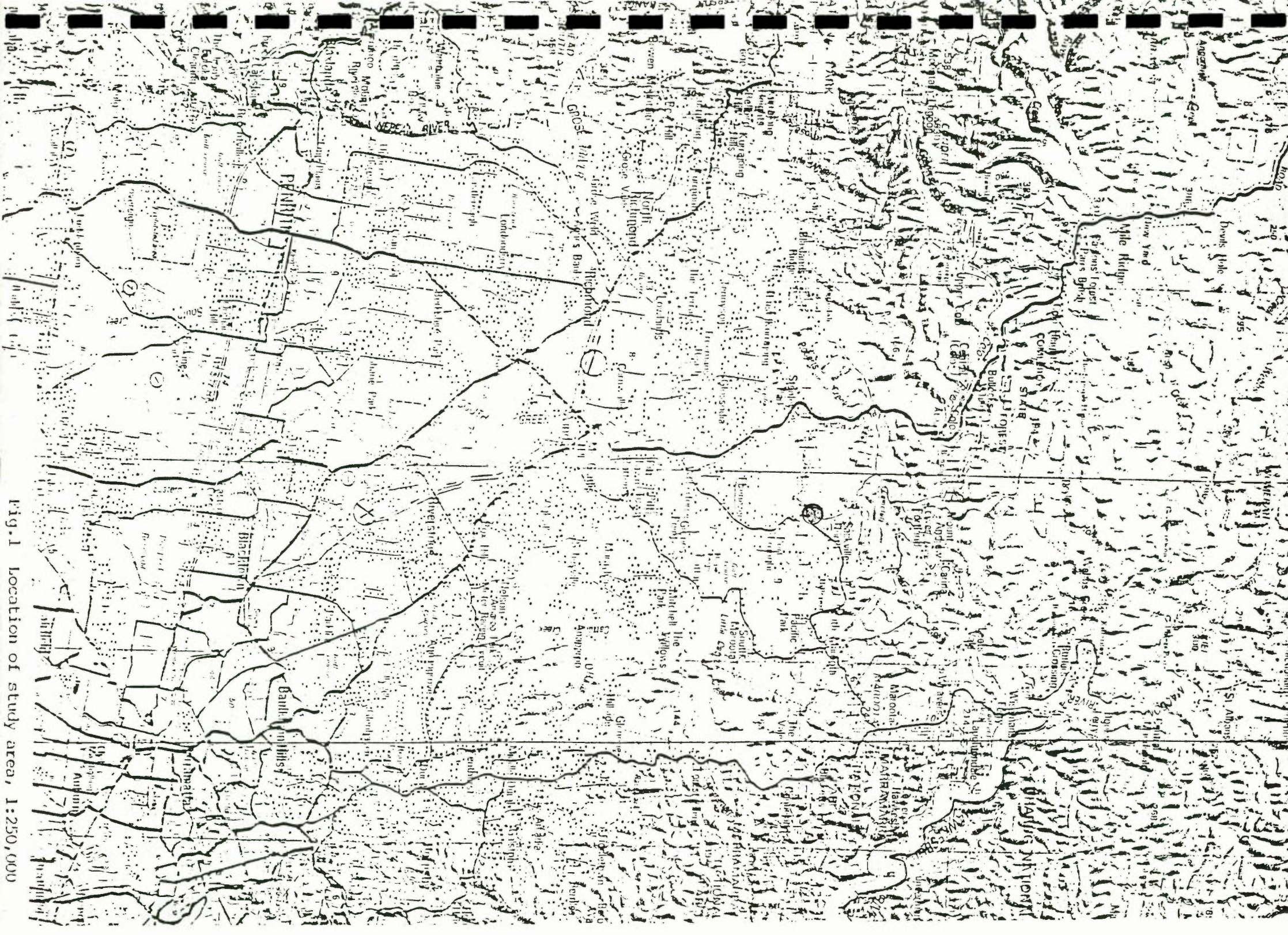
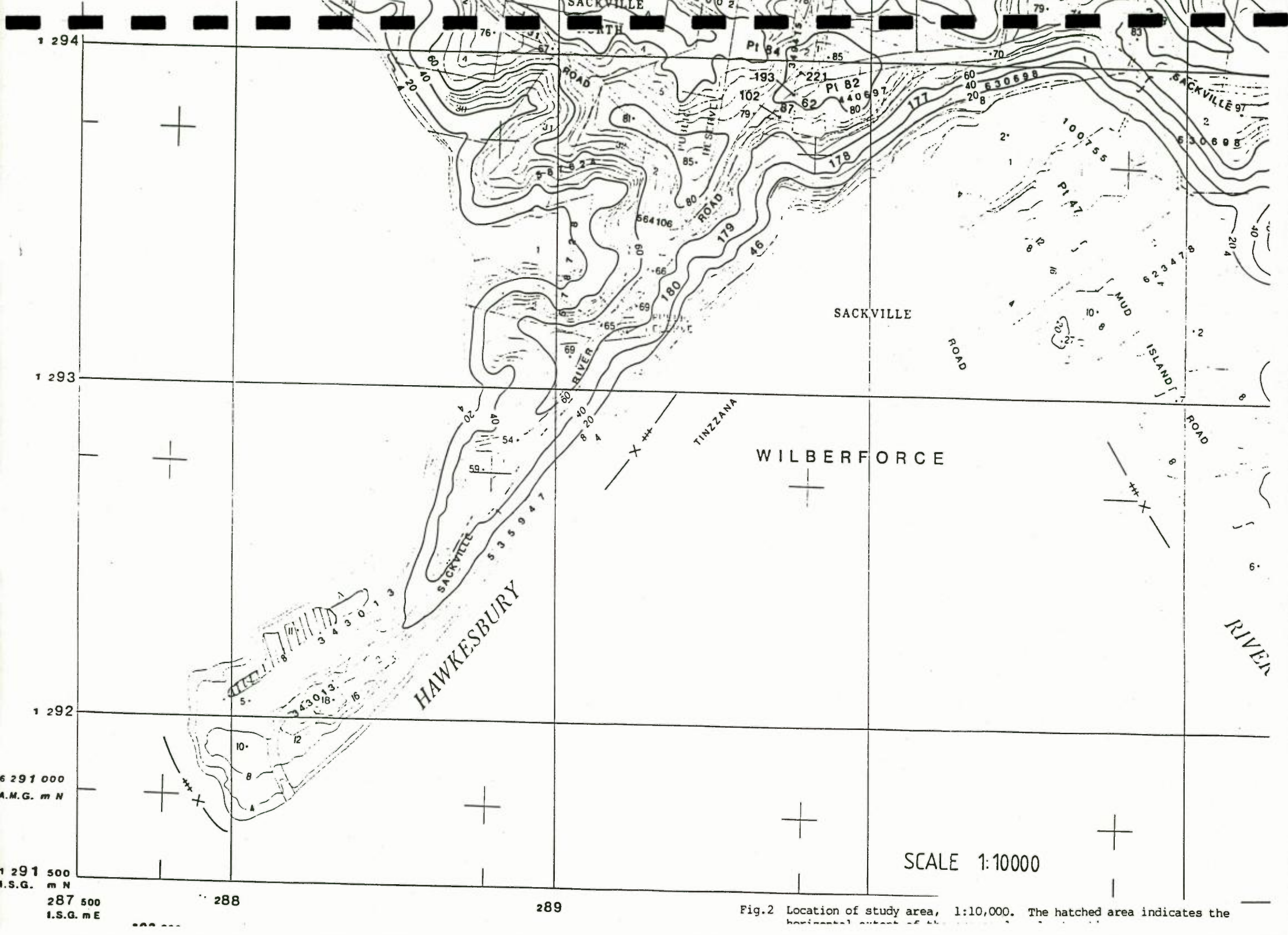
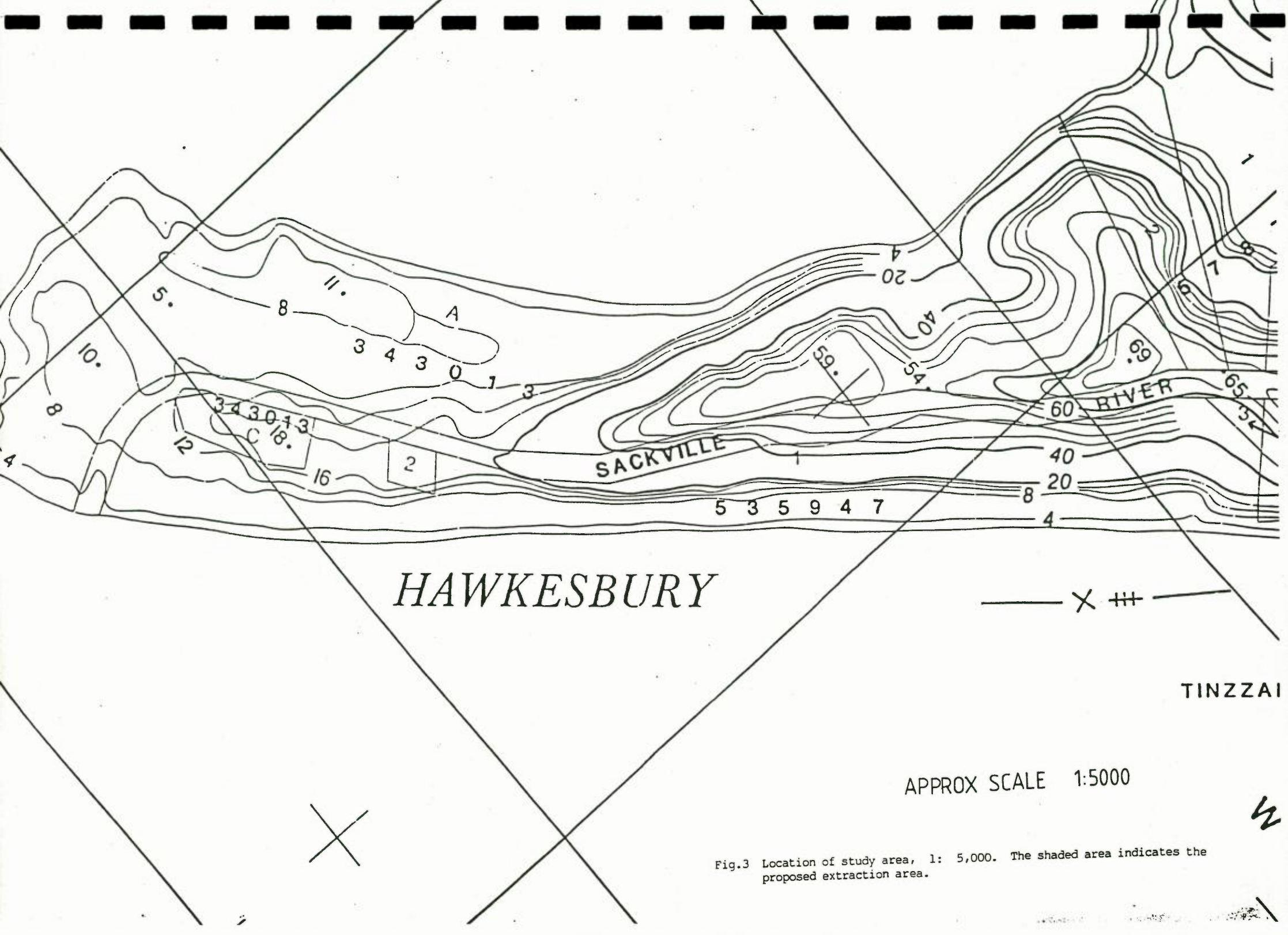


Fig. 1 Location of study area, 1:250,000





HAWKESBURY

SACKVILLE

60 RIVER

APPROX SCALE 1:5000

TINZZAI

Fig.3 Location of study area, 1: 5,000. The shaded area indicates the proposed extraction area.

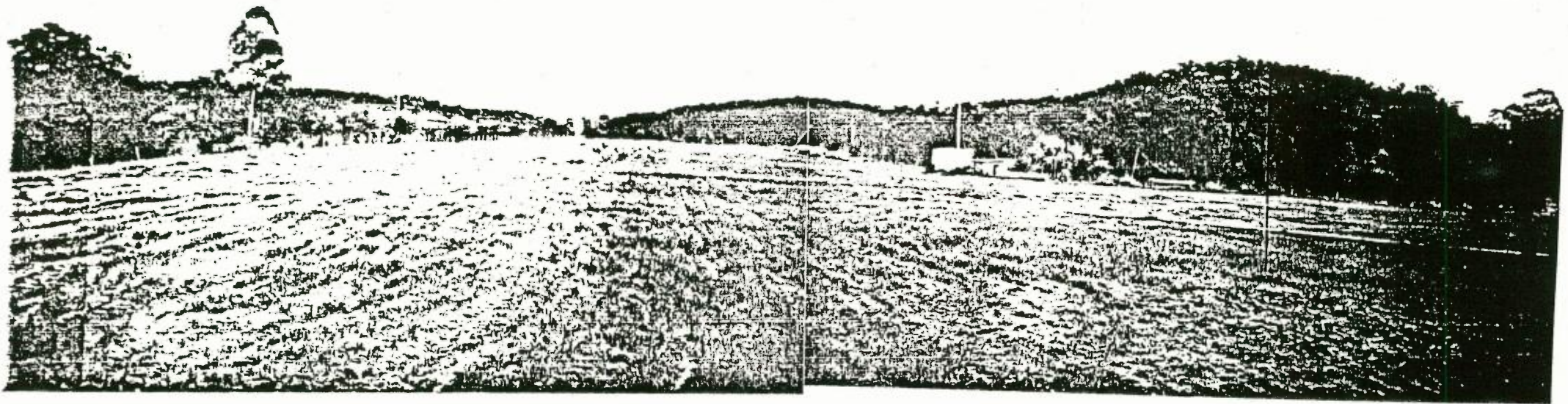


Fig.4 View southwestward across the former orchard area. The forested ridges in the background are on the south side of the river.

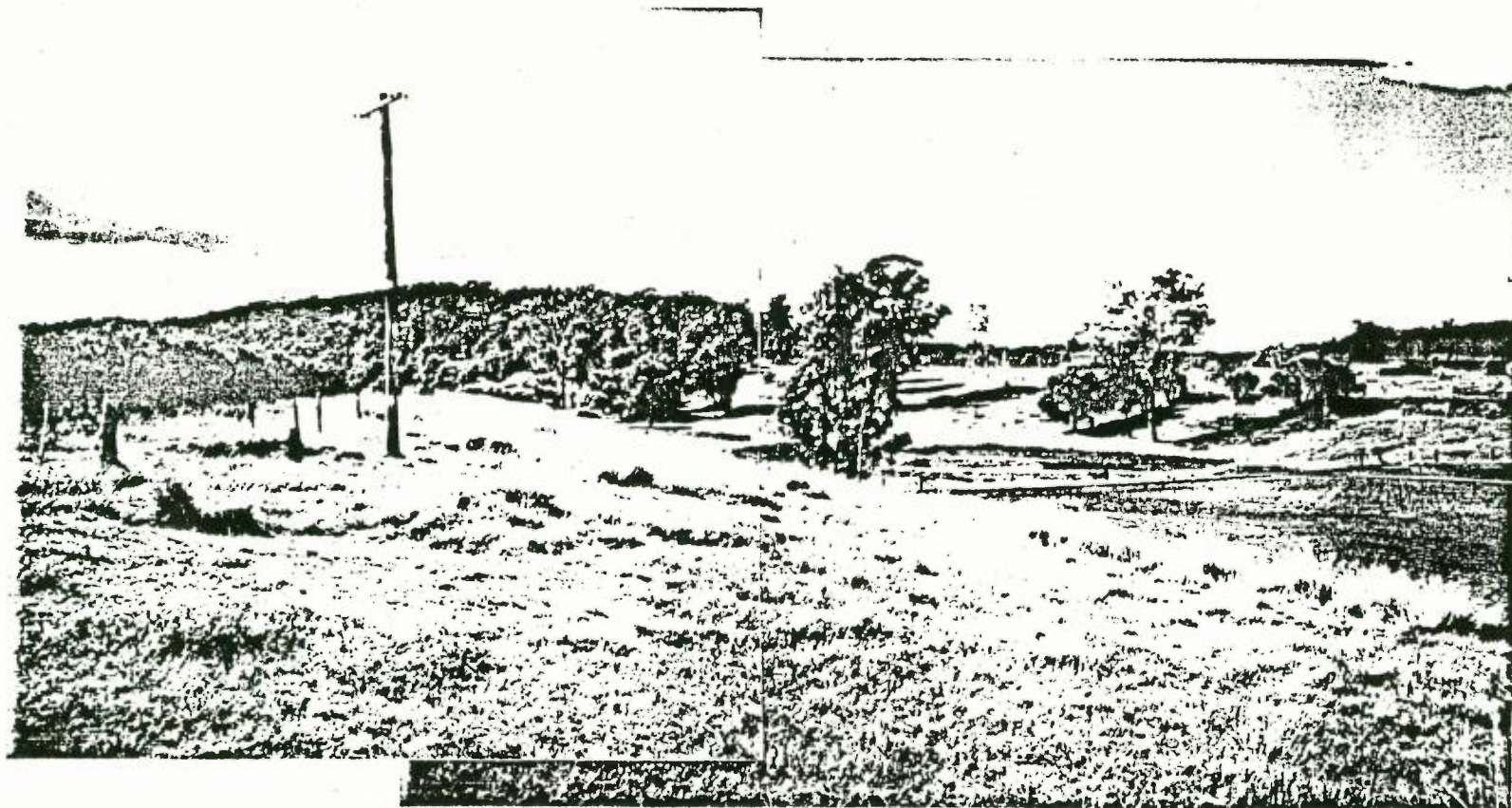


Fig.5 View northeastward (from fence between former orchard and grassy extension of ridge) along southeastern slope, across gully and towards southeastern sandstone ridge. Note the shallow lagoon on the floor of the gully.

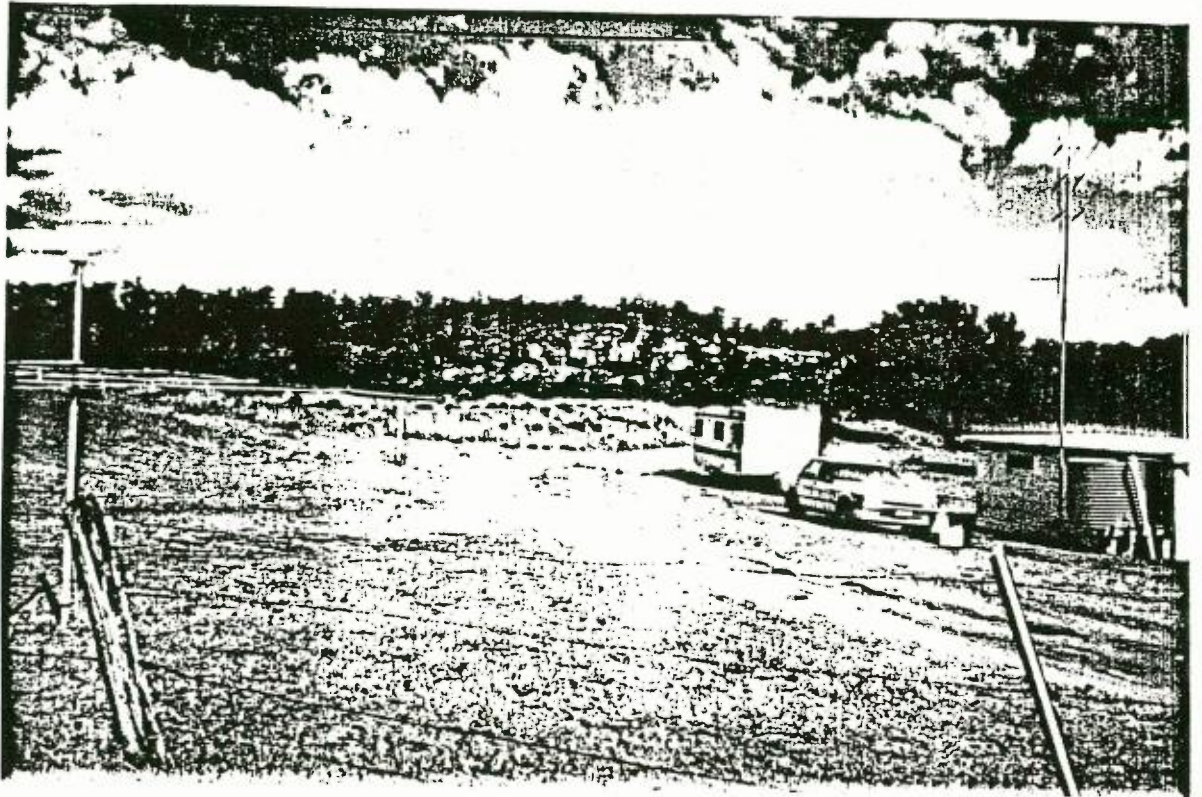


Fig.6 View southward along western slope of narrower extension of sandridge. Note low, level river bank to the right.

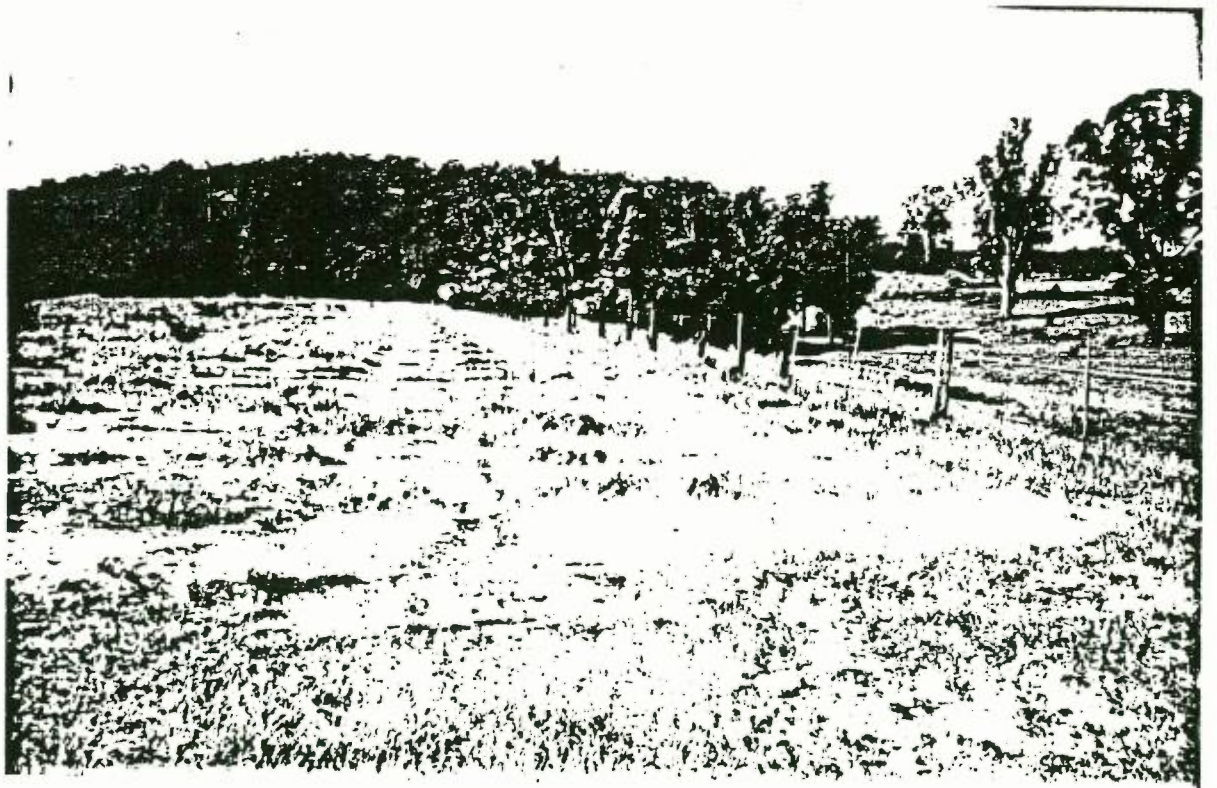


Fig.7 View northward towards orchard (to be left untouched) across stretch of pale sand in the higher part of the sandridge.

HYDRODYNAMIC STUDY
FOR
PROPOSED SANDMINING
AT
SACKVILLE

GUTTERIDGE HASKINS & DAVEY PTY. LTD.
Consulting Engineers
956 Hunter Street,
NEWCASTLE WEST N.S.W. 2302

July 1987

213/0130/W010

3161A

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1.0 INTRODUCTION

1.1 General

The purpose of this report is to assess any possible effects of the proposed sand mining development on the hydrodynamics of the Hawkesbury River and its foreshores. Ecological aspects are also examined. Specifically, this entails the examination of local runoff, soil erosion, water quality, flooding, sediment movements, tidal flows, and the effects on wetlands, oyster farms and commercial and recreational fishing grounds.

1.2 Site Description

The subject site is located on a 400m wide peninsula of land within the Hawkesbury River some 96 km upstream of the Pacific Ocean. The site is adjacent to the right bank of the river some 800m downstream of the Sackville Ferry, and is within the Shire of Baulkham Hills. Refer to Figure 1 for the location of the site.

1.3 Hawkesbury River Physiography

The Hawkesbury - Nepean River system drains an area of approximately 22,000 square kilometres and discharges to the South Pacific Ocean at Broken Bay. Tidal effects extend upstream to about Richmond. The upstream section of the river is known as the Nepean, while downstream of the confluence with the Grose River, it is known as the Hawkesbury.

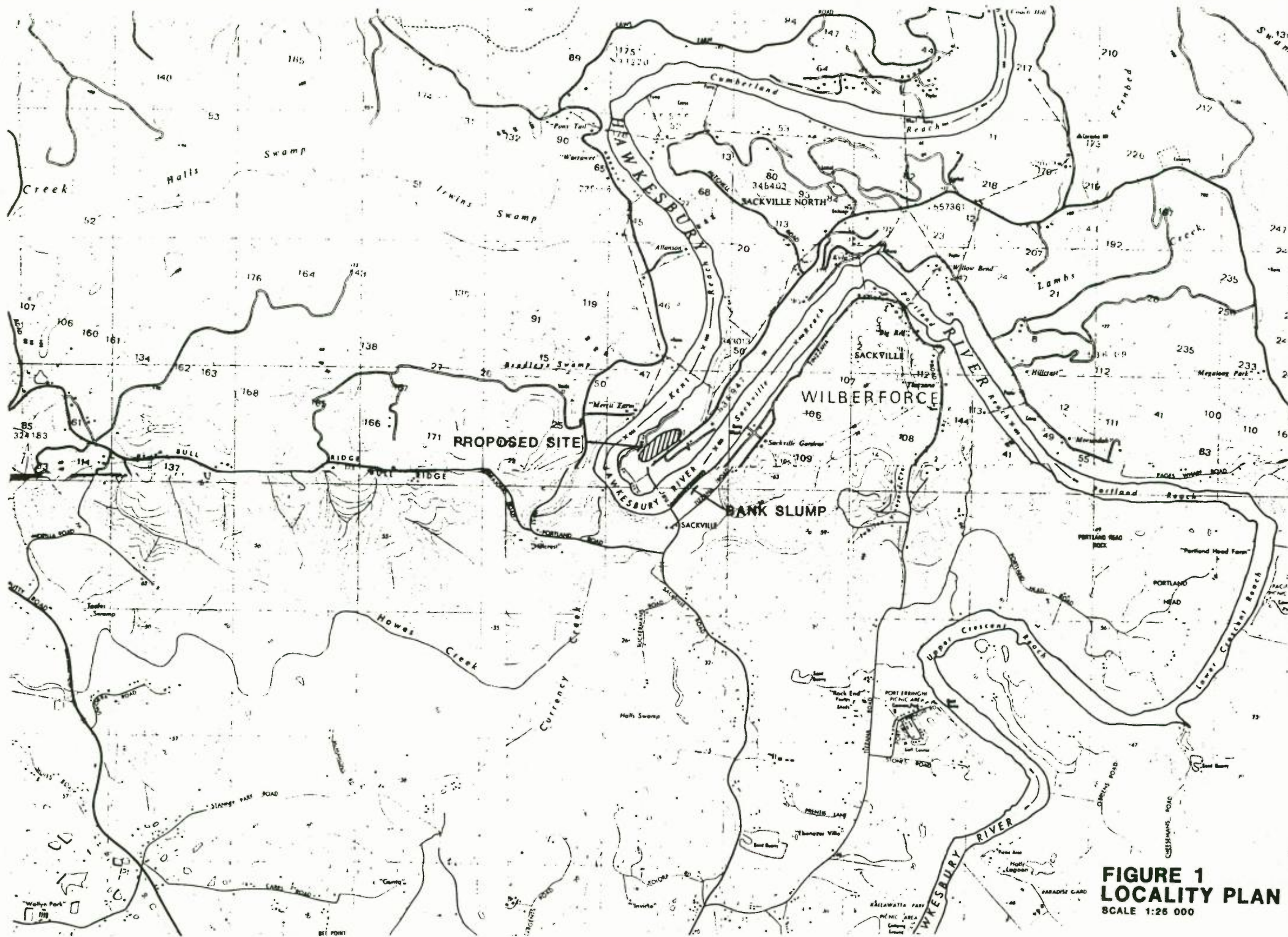


FIGURE 1
LOCALITY PLAN
 SCALE 1:25 000

2.0 DESCRIPTION OF WORKS

The material to be excavated consists of fine to medium grained sand with minor silt deposits. The area to be excavated is shown on Figure 2. Overburden consists mainly of a light grass cover.

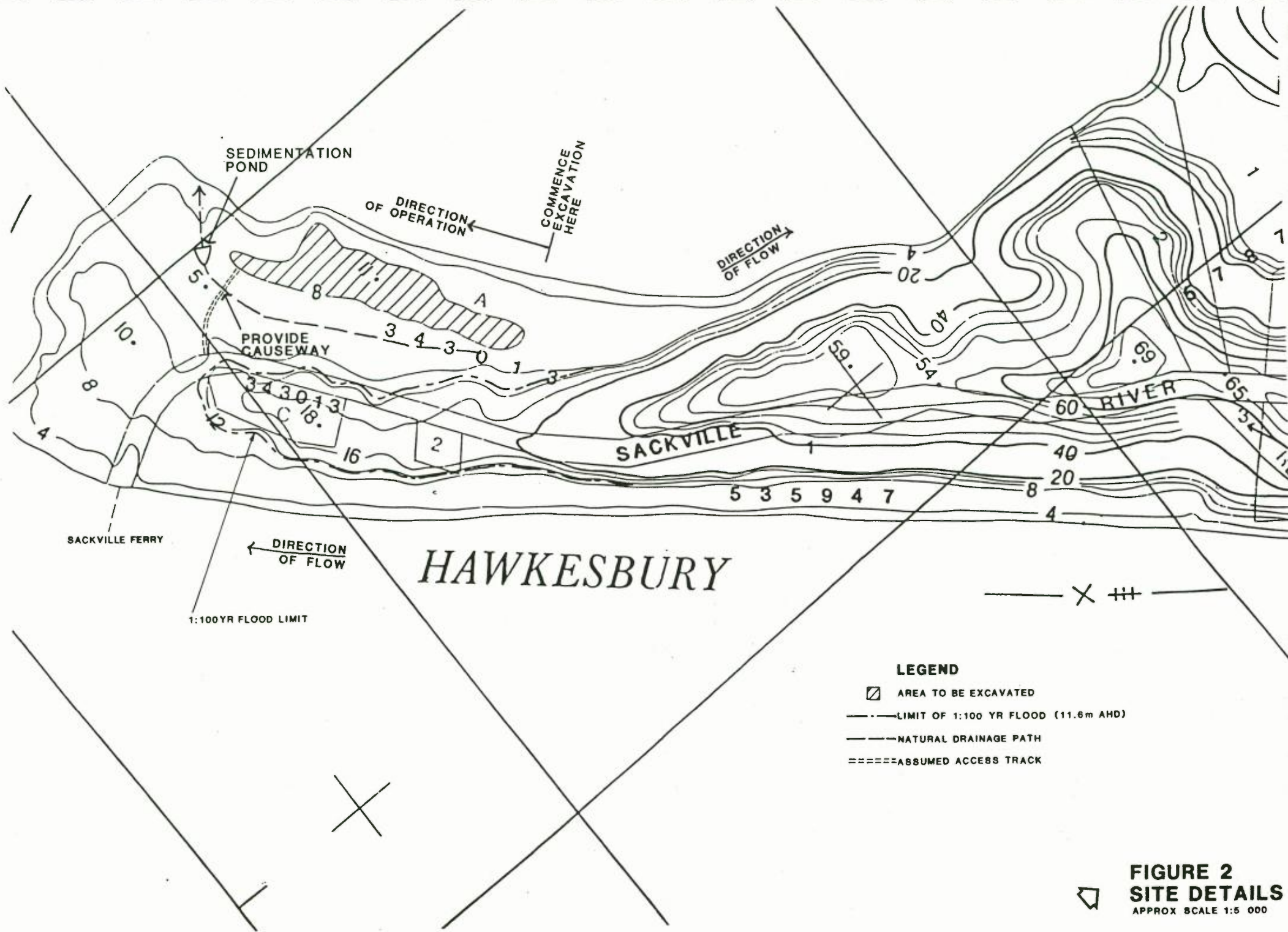
What little overburden there is will be stripped from the site to a depth of 100 - 200mm and placed in the adjacent fill location (see Figure 3) or on the banks of a sedimentation pond to be provided (see Figure 2).

The proposed site will be excavated over the full width with operations commencing at the northern end and moving in a southerly direction, i.e. progressing in an upstream direction. See Figure 2. Depending on its quality the material will be excavated on demand by a front end loader and loaded directly into highway dump trucks for delivery to market, or graded by screening, stockpiled and then transported by truck.

It is anticipated that approximately 35,000m³ of material will be removed from the site over about a four year period. As excavation proceeds in an upstream direction, grass cover will be re-established on the newly formed cross-section.

No extraction will be undertaken within 40m of the river or within 80m of the road reserve. A sedimentation pond will be used to prevent the entry of erodible fines into the river.

Ultimately, when extraction is complete, the area will be used as a citrus orchard. The final profile is as shown in Figure 3.



LEGEND





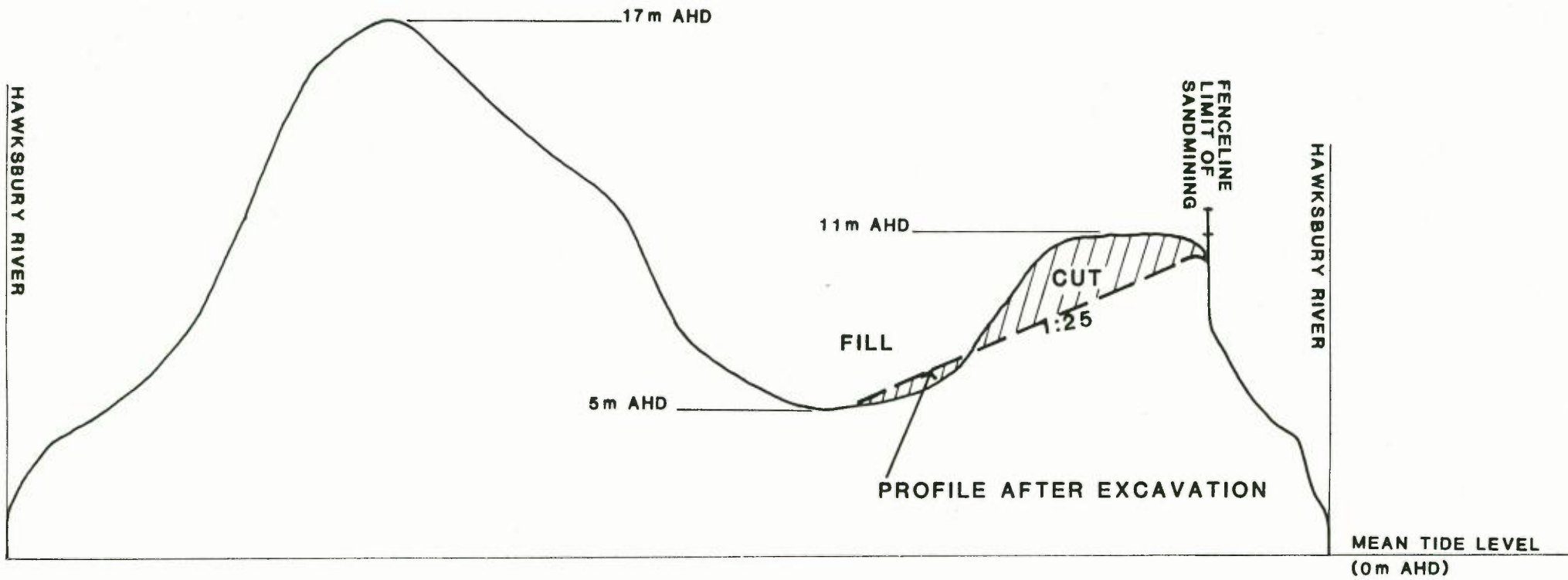
-  AREA TO BE EXCAVATED
-  LIMIT OF 1:100 YR FLOOD (11.6m AHD)
-  NATURAL DRAINAGE PATH
-  ASSUMED ACCESS TRACK

FIGURE 2
SITE DETAILS
 APPROX SCALE 1:5 000



SCALE: VERT 1:200
 HORZ 1:2 000

FIGURE 3
 TYPICAL SECTION

3.0 HYDRODYNAMICS

3.1 Local Runoff, Soil Erosion and Water Quality

3.1.1 Soil Erosion Controls

To prevent soil erosion as a consequence of the extraction and loading operations, only areas occupied by the excavation site and access road will be disturbed.

Re-establishing grass cover as excavation proceeds and providing a sedimentation pond will ensure that soil erosion and its effects are kept to a minimum. The surface of the site drains naturally to the proposed sedimentation pond.

The access road will be provided with drainage channels, a causeway and culvert to allow the passage of natural flows and to prevent scouring and rilling.

3.1.2 Sedimentation Pond

Since overburden will be stripped from the site, it is likely there will be greater infiltration of rainwater and hence less runoff from the site. However, the temporary absence of ground cover is likely to lead to a greater sediment load for the local runoff.

It is proposed therefore to direct all excess natural runoff (note that no process water will be used on site) to a sedimentation pond created in a natural depression, for treatment prior to clean water discharge to the Hawkesbury River.

Allowing for the fact that the extraction period may extend to four years, it is considered reasonable that the sedimentation pond should be able to cater for a 1:10 year flow from local runoff. Stormwater in excess of the 1:10 year flow would be diverted around the pond.

The pond will be constructed of sandy loam material and the walls battered to safe slopes and grassed. A spillway will be provided to convey clean water discharge. The sedimentation pond will be grassed with overburden and the spillway gravelled to prevent erosion, and the channel downstream will also be partly gravel lined to prevent scour. We do not anticipate the need, but should it prove to be necessary, oil and grease could be retained on a baffled overflow.

In the unlikely event of local runoff flows greater than 1:10 year event occurring during the life of the operation, the impact of sediment entering the river and possible increase in turbidity is expected to be minimal and will not cause blockage of irrigation pumps or disturbance to stock, or any other water dependent activity downstream of the site.

3.2 Main River Flooding

3.2.1 Extent

The 1:100 year flood level in the Hawkesbury River at Sackville Ferry is approximately 11.6m AHD (source: Baulkham Hills Shire Council drawing dated 16/2/81 with file reference M162/8).

Using this flood level the extent of inundation at the site has been shown on Figure 2. The extraction site will be completely covered by a flood of this magnitude.

The direction of flow in the Hawkesbury River is shown in Figure 2. During normal flows the velocity in the river is very low, probably less than 0.3 m/s depending on tidal effects. During a major flood we estimate that average sectional velocities could get up to 2.0 m/s with isolated uncontrolled velocities up to 3.0 m/s.

Since the subject site is on the inside of a sharp bend in the river, high velocities will not be experienced. In fact, large sand deposits at the site indicate that in past floods, velocities have been low enough for sand sediments to come out of suspension.

The natural drainage channel through the site allows early inundation of the site when flood levels get above 5m AHD. By the time major flows are ready to short cut across the peninsula the subject site has already been inundated by backwater with the effect of reducing the impact of flood velocities.

3.2.2 Safeguards During Flooding

It is noted in Reference 1 that the sediment yield of the Hawkesbury River has been significantly reduced in recent years due to the vast number of extraction operations combined with the sediment interception by water supply dams and weirs. Although water supply dams have also intercepted large volumes of water in recent years, it appears that this has been more than compensated for by increased precipitation. The end result is that Hawkesbury River waters are sediment-starved and likely to induce erosion problems unless suitable safeguards are employed.

In this section, we have outlined proposals to limit damage at the site and potential erosion during main river flooding.

During high flow periods all extraction operations will cease. There will be no fixed plant at the site. The only plant involved are a front end loader and highway dump trucks, which are easily relocatable to high ground during flooding.

Excavation will proceed from the downstream end and therefore, during major flooding the existing profile, being higher, will offer protection for the excavated area. As excavation proceeds in an upstream direction, turf will be re-established on the new profile. Therefore, only a minimal portion of bare sand will be exposed to major flooding at any one time.

During major floods these unprotected areas are likely to be filled primarily with fine sand and may even exhibit some localised scour due to eddying. In any case, the impact downstream caused by flooding of the site will be insignificant in comparison with the effect of a flood of this magnitude on agriculture, stock, and homes, and the sediment load in the river.

3.2.3 Effect of the Excavation on Hawkesbury River Flooding

One of the main proposals in Reference 1 is for investigations to be made into improving the conveyance of the Lower Hawkesbury River. This option in fact was given a high priority as the possible benefits were vast particularly in relation to the reduction in flood levels.

Extraction of the sand deposit will in fact increase the flow conveyance area by 90m^2 over a length of about 400m. We have made no attempt to quantify the small reduction in flood levels which would result, but it would be a useful reduction.

The new profile will probably have no significant effect on average sectional velocities. However, since the new profile will be more uniform there will be a reduction in turbulence and isolated high velocities. There will therefore be less likelihood that the river would try to change its alignment to follow the natural drainage path through the site.

3.3 Bank Stability

3.3.1 Preamble

In general there are three mechanisms causing bank failures and all can work in conjunction with one another or separately, they are:

- . Slumping due to saturation of the bank material.
- . Slipping due to under-cutting of the toe of the bank.
- . Erosion due to attack by high velocity water.

Slumping is the most common cause of bank failure along straight reaches of the river and usually occurs when a flood follows a prolonged rain period. The banks thus have ample opportunity to become saturated and following or during the recession of the flood, a section of bank slumps down into the river. A slump failure is typified by a near vertical face at the top of the failure and a curved surface leading to gently sloping material at the toe, but depending on the river height when the slump occurs, the toe material may be carried away by the water. Slumps sometimes occur after the flood has receded - perhaps a few days after.

Slipping of banks, as opposed to slumping, is usually the result of undercutting of the toe of the bank, resulting in a block of the bank falling down into the river. This type of failure typically occurs on the outside of bends and also near obstructions like trees, islands and bridges.

Erosion is the result of fast flowing water impinging on unprotected soil and removing it. This is particularly likely to occur at bends and adjacent to obstructions where the turbulent high velocity currents flow against the bed or banks. The unstable face left by a slump or slip is likely to be eroded even in the absence of any great velocities.

3.3.2 Adjacent to Site

The right bank of the river is one boundary of the subject site and is essentially composed of sand/silt deposits. The bank exhibits isolated small pockets of slumping at high flood levels. At lower levels just above tide level, there is significant undercutting (slipping) of the banks due to wave action caused by speed boats.

Action will be taken, as required, to protect the river banks from damage and erosion. However, as no material will be extracted within 40m of the river, it is unlikely that any damage will occur.

3.3.3 Remote from Site

The left bank of the Hawkesbury River is essentially steep with adjacent sandstone hills, and quite stable. The only exception being upstream of Sackville Ferry where a large bank slump has occurred. See Figure 1.

There are a number of factors which have contributed to this bank instability, namely:

- (i) The bank is at the end of a relatively long straight stretch of river called Sackville Reach, and consequently receives the "full force" of high velocity currents during high flow periods.
- (ii) While the left bank generally is steep with sandstone hills adjacent and little or no flood plain, upstream of Sackville Ferry the eroded bank is adjacent to an extensive low level flood plain. During floods, this flood plain is inundated and the subject bank remains covered for extended periods which has no doubt caused the evidenced slumping.

The resulting removal of sand from the extraction site will not aggravate slumping of the bank upstream of Sackville Ferry.

Opposite the proposed extraction site the left bank is comprised of sandstone cliffs, which are inherently stable and show no signs of erosion. The extraction of sand from the site will clearly not have any adverse effect on this bank.

3.4 Tidal Flushing

Removal of the sand deposit will increase flow conveyance for major floods. However, minor flood conveyance will not be altered and flood volumes will not be altered. Therefore, the amount of tidal flushing and upstream penetration of salt water will not be altered.

4.0 ECOLOGICAL ASPECTS

4.1 General

The thrust of this report has been to examine the effect of the proposed sand mining operation on the hydrodynamics of the Hawkesbury River. Where necessary suitable safeguards have been proposed. These safeguards are generally effective in eliminating any adverse effects with respect to the ecology of the Hawkesbury River. Nevertheless, certain ecological aspects of particular relevance to the Hawkesbury River are examined in this section.

4.2 Wetlands

The wetlands of the Windsor - Richmond district are silting up at a rapid rate due to their proximity to highly erodible farmland and possibly to various flood mitigation works (Reference 1). Actions have been proposed which will virtually eliminate erosion at the proposed site and hence the siltation of wetlands will not be aggravated.

Once the proposed excavation has been completed there will be a minor increase in flow conveyance for the Hawkesbury River at the subject site. This may lead to a small reduction in major flood levels, however, it will have no effect on minor flood levels. As a result there will be no decrease in the volume of water supplied to wetlands.

4.3 Oyster Farms, Commercial and Recreational Fishing Grounds

As with wetlands, these natural resources will not be endangered by the proposed sand mining operations. In particular, runoff from the site and associated soil erosion will be strictly controlled. We do not envisage any adverse effects on these natural resources.

5.0 CONCLUSIONS

When excavation of the sand deposit is complete the profile of the site will be as shown in Figure 3 with a uniform slope of around 1:25. The area will then be used as a citrus orchard.

A sedimentation pond will be provided on site to remove fines material from local runoff prior to discharge to the Hawkesbury River. As excavation proceeds grass cover will be re-established to further limit erosion and potential damage during main river flooding.

No works will be carried out within 40m of the Hawkesbury River and consequently we do not envisage any damage to the bank (right bank) adjacent to the extraction site. The left bank, which is on the other side of the river to the extraction site, is generally stable except in the region upstream of the Sackville Ferry. A significant bank slump has occurred in this region. However, neither the altered extraction site profile nor any activity at the extraction site will aggravate this bank instability problem. Opposite the extraction site the left bank is comprised of inherently stable sandstone cliffs, which will not be affected in any way by the proposed extraction.

The proposed sand extraction is not expected to have any significant effect on normal stream flows, flood flows, or to interfere with the river alignment. We do not anticipate any adverse effects on wetlands, oyster farms or commercial or recreational fishing grounds.

REFERENCES

1. "N.S.W. Coastal Rivers Flood Plain Management Studies - Hawkesbury River", Gutteridge Haskins & Davey Pty. Ltd., December, 1980.



Looking north-west at proposed extraction site (ridge).
Small watercourse at base of ridge drains from right to
left. Note sandstone cliffs in background, which form
the left bank of the Hawkesbury River.



Looking south-west across proposed extraction site. Fence line defines limit of work adjacent to right bank of Hawkesbury River. Left bank of Hawkesbury River is in background (note sandstone cliffs).

PART C:

LIST OF CONSULTED GOVERNMENT AUTHORITIES

1. Baulkham Hills Shire Council
2. Department of Mineral Resources
3. State Pollution Control Commission
4. Soil Conservation Service
5. National Parks and Wildlife Service
6. Department of Agriculture
7. Public Works Department
8. Department of Water Resources
9. Hawkesbury Shire Council
10. Department of Environment and Planning

TELEPHONE

634-1111

ALL COMMUNICATIONS
TO BE ADDRESSED TO
THE SHIRE CLERK
P.O. BOX 75,
CASTLE HILL, 2154.



RWS:rs

PLEASE QUOTE FILE NO.

P6471/13423/1

IN YOUR REPLY

Council Chambers
CASTLE HILL.

NSW.

18th December, 1986

Messrs John Hancock & Associates,
Suite 3,
24 Lane Drive,
GOSFORD N.S.W. 2250

Dear Sirs,

Lots 1, 2 & 3, D.P.634989, and
Lot 1, D.P.535947,
Sackville-Maroota Road, Sackville Ferry

I acknowledge receipt of your letter dated 9th December, 1986 advising that you have been instructed by the owners of the above land to make the necessary application for development consent for the carrying on of an extractive industry on the land.

You are advised that Council considers the removal of sand to constitute an extractive industry, such a use being designated development, and accordingly it will be necessary for you to prepare a full environmental impact statement in accordance with the provisions of the relevant legislation. Upon preparation of the environmental impact statement, a minimum of ten (10) copies should be referred to the Council with the development application and any other documents you wish the Council to consider.

Your attention is drawn to the fact that the Council has resolved to have prepared a Plan of Management for extractive industry in the Shire of Baulkham Hills and Council is presently interviewing consultants in this regard with a view to having the Plan of Management prepared during the early part of 1987. I am unable at this time to advise you of any details in respect of the Plan of Management.

It is noted that the subject land is located on land at the extremity of the Shire, such land being effectively bounded on three sides by the Hawkesbury River. It is also noted that existing vehicular access to the land is provided in one direction by Sackville Ferry Road and in the other direction by the Sackville Ferry itself. Specific details would need to be submitted in the environmental impact statement regarding the proposed transportation routes and the manner in which the amenity of the area would be protected having regard to the fact that the operations would be visible from Sackville Ferry Road and the Hawkesbury River.

Council will await receipt of advice from the Department that you have carried out the necessary consultation.

Yours faithfully,

Barry F. Pullinger
BARRY F. PULLINGER
SHIRE CLERK



Department of Mineral Resources



John Hancock & Associates
 Suite 3
 24 Dane Drive
 GOSFORD NSW 2250 66

8-18 Bent Street
 Sydney
 Postal Address
 G.P.O. Box 5228
 Sydney, N.S.W. 2001
 Telex 447487

Classification M87/0072

Administrative

Project name DC Jones

File number 4199

Dear Sir

RE: LOTS 1, 2, AND 3 DP634989
 AND LOT 1 DP535947
 SACKVILLE-MAROOKA ROAD
 SACKVILLE FERRY VIA WINDSOR

Reference is made to your letters of 9 December 1986 and 21 January 1987, concerning the above matter.

It should be noted that sand is not a proclaimed mineral under the Mining Act (1973) and therefore the Department has no statutory responsibility relating to its extraction, although the Department is the principal government agency responsible for providing advice to the Government on the management of sand and other extractive resources.

The environmental impact statement should include information of the quality and quantity of the resources and details of any testing that has been undertaken. It should also be indicated whether loam (soil) will be produced in addition to sand.

In addition, the environmental impact statement should discuss the proposed end use of, and market for, the material to be extracted, and the need for the resource to be extracted.

In summary, the Department has no objections in principle to this proposal at this stage and requests that a copy of the completed EIS be forwarded for comment. Should you have any queries concerning this matter please contact Mr D Jones of the Geological Survey Branch on (02) 240 4199.

Yours faithfully

NL Markham
 for Secretary



State Pollution Control Commission



Mr. D. Coleman,
John Hancock and Associates,
Suite 3,
24 Dane Drive,
GOSFORD N.S.W. 2250 66

157 Liverpool Street
Sydney 2000
G.P.O. Box 4036
Sydney 2001

Our reference: 708972 PG:ML

Your reference:

Telephone: (02) 265 8888
Telex Head Office: AA 72254

Dear Mr. Coleman,

Lots 1, 2 and 3 DP 634989 and Lot 1
DP 535947 Sackville-Maroota Road,
Sackville Ferry via Windsor

Reference is made to your letter of 9th December, 1986, seeking our comments on the above. The following information relates to the air, water and noise aspects of the proposal.

Air Pollution

The proposal makes no mention of crushing or screening of materials. It is therefore assumed that the premises will not be scheduled under the Clean Air Act, otherwise the proponent would be required to obtain our approval before work commences on the site.

Since the site lies immediately north of the Sackville ferry, on fairly low level land, there are a number of nearby residences which could be effected by dust, particularly from vehicle movement on unsealed roads.

If asked by the council we will recommend that the following points be made conditions of any development consent that may be issued:

- No waste is to be disposed of by open burning.
- Fixed water sprays be utilized on all roadways whenever the surfaces are not sufficiently damp to suppress dust emission.
- Stabilization or revegetation of areas disturbed by earthworks or subjected to stockpiling be carried out as soon as is practicable in order to minimize dust emissions.
- Crushing of materials will not be carried out on site.
- Any screening of sand will be carried out utilizing water as the medium.

Water Pollution

The proponent will be required to seek the Commission's approval under the Clean Waters Act for the water pollution control measures to be used on the site. The following conditions are likely to be incorporated in any approval or subsequent licence that may be issued:

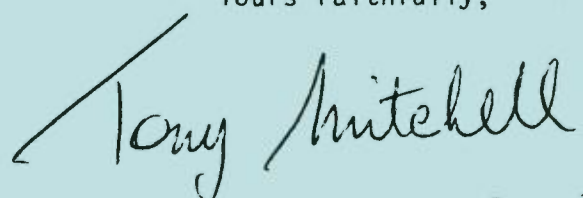
- Only a cutter-suction dredge shall be used for the extraction of sand from "waters".
- All wastewater from the dredge and sand washing plant shall be directed to sedimentation ponds.
- The sedimentation ponds shall be large enough to hold at least two days volume of wastewater and shall have a minimum depth of 1 metre.
- Effluent discharges to sedimentation ponds shall cease during desilting activities.
- The ponds shall be desilted regularly so as to maintain a minimum capacity as approved by the Commission, and minimum depth of 1.0 metres.
- All oils and greases stored on site shall be contained in an impervious bunded area with the volume of the bund being 110 o/o of the volume of the largest tank held in the bund.
- All uncontaminated stormwater runoff shall be directed away from the sedimentation ponds and stockpile area.
- Runoff from stockpile areas shall be drained to the sedimentation ponds.
- All process water shall be recycled and where practicable process water shall be drawn from the sedimentation ponds.
- The outlet from the sedimentation ponds shall be provided with a suitable baffle to ensure that wastewaters are withdrawn from below the surface so as to prevent the carryover of floatables.

Noise Pollution

The premises will be scheduled under the Noise Control Act and the proponent will need to seek our approval prior to work commencing on the site. A full noise impact statement should be submitted with the application.

We believe that a considerable amount of acoustic treatment will need to be carried out on the site before approval can be given.

Yours faithfully,



A.D. MITCHELL
for Secretary

20.2.87



Soil Conservation Service



John Hancock & Associates,
Suite 3,
24 Dane Drive,
GOSFORD. 2250

P.O. Box 1416,
PARRAMATTA. 2150

Telephone: 689-5748

13th January, 1987

Contact:

Our reference: M.162/III

Your reference:

Dear Sir,

Re: Lots 1, 2 & 3 DP 634989 and Lot 1 DP 535947
Sackville-Maroota Road, Sackville Ferry
via Windsor.
Your correspondence of 9th December, 1986.

I wish to advise that the Soil Conservation Service has no objection to the extraction of sand from the abovementioned site.

However, I wish to bring the following points to your attention:-

(i) the area of extraction is adjacent to a prescribed stream (Hawkesbury River) and as such, may be subject to conditons applied under Section 26D of the Water Act, 1912. Section 26D of this Act states, in part, that:

(1) The provision of this section shall apply to any river or lake or section of a river which may be prescribed.

(2) A person shall not, except with the permission of the Catchment Areas Protection Board-

(a) ringbark, cut down, fell, poison or otherwise destroy, or cause to be ringbarked, cut down, felled, poisoned or otherwise destroyed; or

(b) top, lop, remove or injure, or cause to be topped lopped, removed or injured,

any tree situated within, or within 20 metres of, the bed or bank of any river or lake or section of a river to which this section applies.

(6) In this section and section 26DA-

"Bank" means the limit of the bed of any river or lake.

"Bed" means the whole of the soil of the channel in which a river flows or the soil forming the bottom of a lake including that portion thereof which is alternatively covered and left bare as there may be an increase or diminution in the supply of water and which is adequate to contain it at its average or mean stage without reference to extraordinary freshets in time of flood or to extreme droughts.

"Catchment Areas Protection Board" means the Catchment Areas Protection Board constituted under the Soil Conservation Act, 1938.

"Owner", in relation to land, includes every person who jointly or severally, whether at law or in equity-

- (a) is entitled to the land for any estate of freehold in possession;
- (b) is a person to whom the Crown has lawfully contracted to grant the fee simple under the Crown Lands Acts or any other Act relating to the alienation of lands of the Crown;
- (c) is entitled to receive, or is in receipt of, or if the land were let to a tenant would be entitled to receive, the rents and profits thereof, whether as beneficial owner, trustee, mortgagee in possession or otherwise; or
- (d) is the holder of any lease granted under the Crown Lands Acts or any other Act relating to the disposition of lands of the Crown.

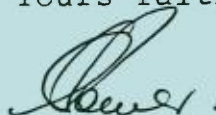
"Tree" includes sapling, shrub and scrub.

An application under this Section of the Act must be made well in advance of the expected commencement of operations.

- (ii) The Service should review all aspects of the development associated with erosion control and rehabilitation techniques. e.g. relevant sections of an E.I.S. prepared to accompany the development application and all associated construction and rehabilitation plans.

Should you require further information, please don't hesitate to contact me at this office.

Yours faithfully,



G.A. POWER,
District Soil Conservationist,
 Metropolitan.



National Parks and Wildlife Service



CENTRAL REGION

John Hancock and Associates,
Suite 3,
Lane Drive,
GOSFORD. N.S.W. 2250

Lee Nash House
7 Charles Street
Parramatta

P.O. Box 95
Parramatta 2150

Our reference: CR/784 BC:JI

Your reference:

Telephone: 689 5008

Dear Sir/Madam,

ARCHAEOLOGICAL SURVEY, SACKVILLE

The report of the abovementioned survey has been assessed by an archaeologist from the Service.

As no Aboriginal sites were located there are no objections, on archaeological grounds, to the proposed development.

Yours faithfully,

B. Conyers.

B. Conyers,
for Director.

20th May, 1987.



National Parks and Wildlife Service

NORTH METROPOLITAN DISTRICT



John Hancock & Associates,
Suite 3, 24 Dane Drive,
GOSFORD N.S.W. 2250

Ku-ring-gai Chase National
Park Bobbin Head, via
Turramurra, N.S.W. 2074

Our reference: IRB:JM M1508

Your reference:

Telephone: 457 9322

4th March, 1987.

Dear Sir,

Proposed extraction of sand: Sackville Ferry
Lots 1,2 & 3 D.P. 634989 and Lot 1, D.P. 535847

Because of the location of the site, on a sand deposit adjacent to the Hawkesbury River, there is a likelihood that Aboriginal sites occur. All Aboriginal sites and relics are protected under the National Parks and Wildlife Act.

I therefore request that an archaeological survey be undertaken by a qualified archaeologist. The Australian Association of Consulting Archaeologists maintains a register of practitioners. Their address is P.O. Box 214, Holme Building, University of Sydney.

Yours faithfully,


G.D. Spencer,
for the Director



Department of Agriculture



John Hancock and Associates,
Town Planners Land Development and
Building Design Consultants,
Suite 3,
24 Dane Drive,
GOSFORD 2250

McKell Building
Rawson Place
Sydney 2000
P.O. Box K220 Haymarket 2000

Our reference **RC.WLC**

Your reference:

Telephone 217 6666
Extension

3rd March 1987

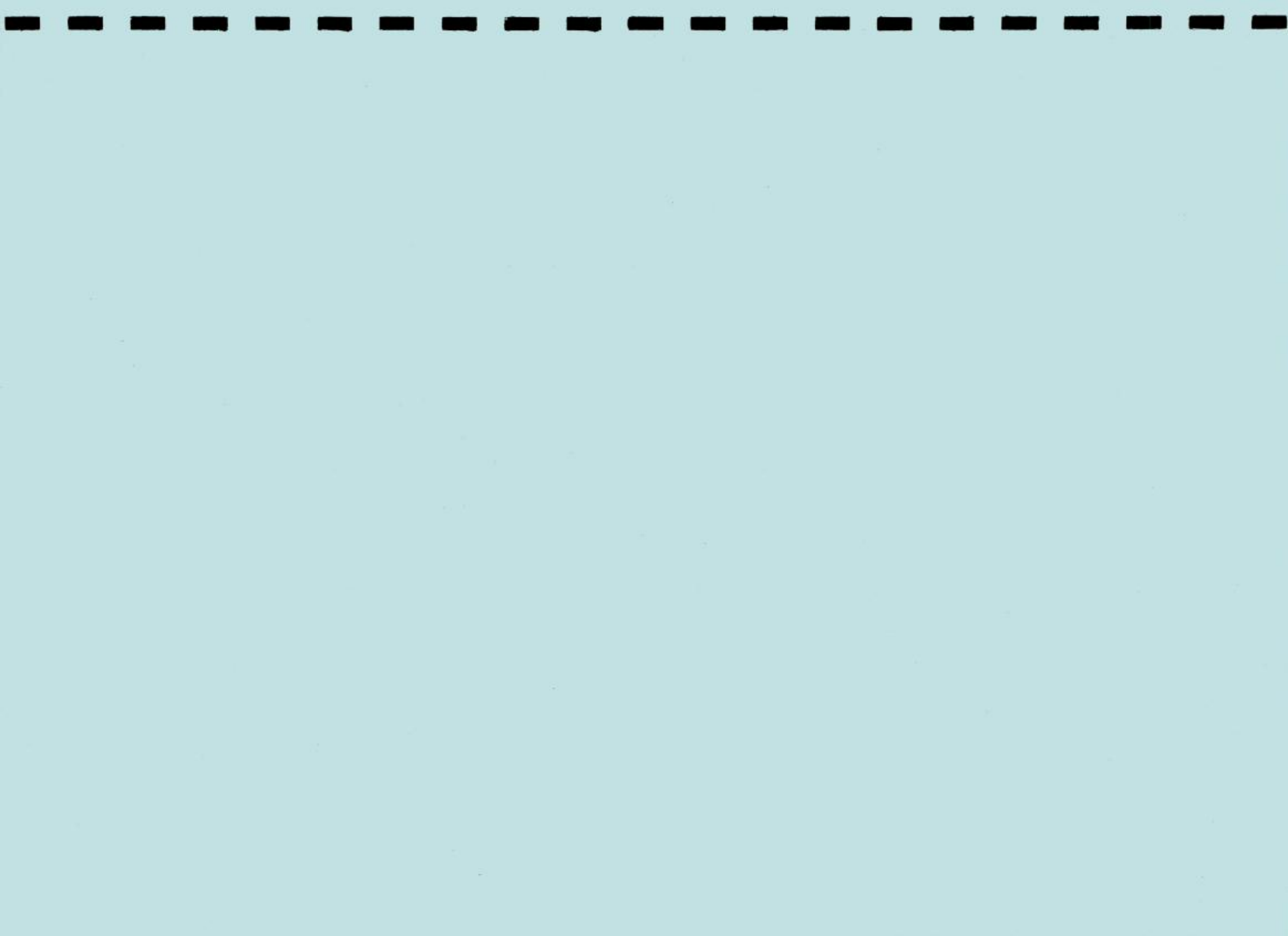
Dear Sir,

re: Lots 1, 2 and 3 D.P. 634 989 Lot 1 D.P. 535 947
Sackville-Marooata Road, Sackville Ferry via Windsor

I refer to the copy of your letter 9th December 1986 regarding the above development proposal. Unfortunately, the original letter was not received by this Department.

Following inspection of the proposed sand extraction site the Department wishes to make the following comments.

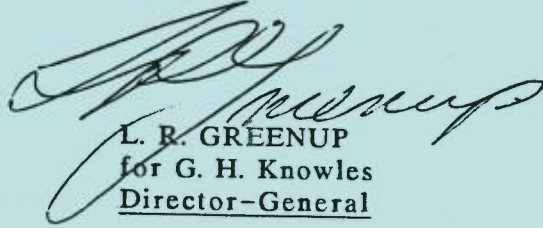
- * The land in question is currently used accommodation facilities for a water skiing club. A mature citrus orchard occupies the area between the eastern arm of the Hawkesbury River and the proposed site and has been identified by the Department as Class 3 Agricultural land.
- * It is the Department's policy to encourage the retention of Class 1, 2 and 3 agricultural land and specialist uses as identified in the Rural Land Evaluation Manual.
- * While the Department has no objections to the sand mining of the grassed ski site, such a development should not adversely affect the citrus orchard nor the aquatic environment of the Hawkesbury River.
- * The Department would therefore seek to have these matters fully investigated in the Environmental Impact Statement and suitable mitigation measures incorporated in any subsequent development to ensure that any adverse impacts are minimised.
- * The Department would be pleased to receive a copy of the Environmental Impact Statement for further comment in due course.



If you have any queries please do not hesitate to contact Mr Reece McDougall,
Advisory Officer (Land Use) on 02 217 5198.

Thank you for raising this matter with the Department.

Yours faithfully,



L. R. GREENUP
for G. H. Knowles
Director-General



Public Works Department

METROPOLITAN DISTRICT OFFICE

John Hancock and Associates,
Suite 3,
24 Dane Drive,
GOSFORD N.S.W. 2250.

174 Willoughby Road
St Leonards 2065
Please address all correspondence:
District Engineer
Box 47 P.O., St Leonards 2065

MD 5394/100SS:VP
Our reference:

Your reference:

Telephone: 466 6446
Contact: **Mr. S. Sarned**
Ext. 470

Dear Sir,

RE: LOTS 1,2 AND 3 D.P. 634989 AND
LOTS 1 D.P. 535947 SACKVILLE - MAROOTA ROAD,
SACKVILLE

Reference is made to your letter of 9th December, 1986 regarding extraction of sand from the above site.

It was understood during a telephone conversation with Mr. Hancock of your office that an Environmental Impact Statement (EIS) would be prepared for the proposed extraction.

An EIS should contain information on the effect of the proposal on flooding, sediment movement, tidal flows, bank erosion and possible change in the river course particularly during floods.

Your attention is drawn to the provisions of Section 23A of Rivers and Foreshore Improvement Act, 1948.

Yours faithfully,

V.M. TAYLOR,
District Engineer,
METROPOLITAN.

John Brock
17/2/87



Water Resources Commission



John Hancock & Associates,
Town Planners,
Suite 3,
24 Dane Drive,
GOSFORD. N.S.W. 2250

Ibis House
201/211 Miller Street
Box 952, P.O.
North Sydney, N.S.W. 2060
Telegrams: "Aquacomm"
Telex: "Watcom" 21188

Contact: Name Dr S. Lees

Our reference 83/15094

15 JAN 1987

Telephone 922 0121
Extension 694

Dear Sirs,

Re: Lot 1, 2 & 3 DP 634989 & Lot 1 DP 535947
Sackville-Maroota Road, Sackville Ferry via Windsor

I refer to your letter dated 9th December 1986 regarding information in relation to development consent to extract sand from the subject site.

However, as this area comes under the jurisdiction of the Public Works Department, your request for information has been forwarded to that Department for reply direct.

Yours faithfully,

for I.F. Chivers
Secretary



HAWKESBURY SHIRE COUNCIL

Council Chambers, George Street, Windsor N.S.W. 2756

All communications to be addressed to The Shire Clerk
Office Hours: Monday-Friday 8.00 am to 4.30 pm

Phone: (045) 77 4822
Telex: 122336
DX 8601 Windsor

29th April, 1987
E78/JM-113/Plan

Mr John Hancock
John Hancock & Associates
Suite 3
24 Dane Drive
GOSFORD NSW 2250

Dear Mr Hancock,

Proposed Extraction of Sand: Lots 1, 2 and 3 DP634989 and Lot 1
DP535947 Sackville-Maroota Road, Sackville Ferry

Reference is made to your letter of 8th April, 1987 advising that you have been engaged to carry out investigations in the preparation of an Environmental Impact Statement for the extraction of sand from the above land. In this regard you seek any preliminary comments that Council may have.

The subject land is within the Shire of Baulkham Hills and as a consequence, that Council is the Consent Authority. However Hawkesbury Shire Council appreciates the opportunity you have provided to comment at an early stage of investigation.

Council considers that the following factors should be taken into consideration in the preparation of a Environmental Impact Statement. These factors are not listed in any order of importance.


1. The provision of a post extraction land form which is compatible with the river foreshore environs.
2. Screening of the extraction area from the Hawkesbury River and land within Hawkesbury Shire.
3. Retention of all wash water and surface drainage onsite. Such water not to be allowed to flow into the Hawkesbury River.
4. Transport of material from the site to be via Sackville North and the Wisemans Ferry/Old Northern Roads. Council would object to the use of the Sackville Ferry by laden or empty trucks servicing the operation.

.../2

5. Extraction to be undertaken in stages with restoration of each stage to be undertaken prior to commencement of work on the next stage.

The above considerations are by their nature general as Council has no information as to the volume of sand to be extracted or the life of the operation.

Yours faithfully,



For G.M. McCully,
SHIRE CLERK/GENERAL MANAGER

For enquiries please contact: Mr Michael Coulter



Department of Environment and Planning



Mr. J. Hancock,
John Hancock & Associates,
Suite 2/24 Lane Drive,
GOSFORD. N.S.W. 2250

Remington Centre
175 Liverpool Street, Sydney 2000
Box 3927 G.P.O. Sydney 2001
DX. 15 Sydney

Telephone: (02) 266 7111 Ext.7260

Contact: G. Davis

Our reference: 86/3176

Your reference:

DEAR SIR,

PROPOSED SAND EXTRACTION - LOTS 1-3, D.P. 634989 AND LOT 1,
D.P. 555947, SACKVILLE - MAROOTA ROAD, SACKVILLE FERRY.

Thank you for your letter of 9 December, 1986 indicating that you are consulting with the Director with regard to the preparation of an environmental impact statement (EIS) for the above development. The Department regrets the delay in replying to your letter.

2. As development consent is required for the proposal and it is a designated development within the meaning of Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, as amended, an EIS must accompany the development application to the Baulkham Hills Shire Council. The EIS shall be prepared in accordance with clause 34 of the Regulation and shall bear a certificate required by clause 26(1)(b) of the Regulation (see Attachment No.1).

3. In addition, pursuant to clause 35 of the Regulation, the Director requires that the following matters be specifically addressed in the EIS:

- . any possible effects of the proposal on the hydrodynamic and ecology of the Hawkesbury River and its foreshores, e.g. soil erosion, runoff, bank stability, flooding and water quality, with particular reference to any downstream effects on wetlands, cyclic fauna and commercial and recreational fishing grounds;
- . a full description of the quantity of materials to be extracted, proposed access arrangements, trial movements involved and effect on the regional transport network; and
- . any likely cumulative effects of the proposed operation when considered together with other operations in the vicinity.

4. It should be noted that Regional Environmental Plan No. 9 for Extractive Industry has been prepared which controls extractive industries in specific areas in the Sydney Region. The provisions of Regional Environmental Plan No. 9 should be considered when assessing the likely environmental impact of the proposal. In addition, a draft Regional Environmental Plan for Hawkesbury/Nepean Valley is being prepared which may have implications for the proposed development. Accordingly, we suggest you liaise with the Western Sydney Regional Office of this Department (Hawkesbury/Nepean REP Team) before you proceed with the preparation of an environmental impact statement to accompany any development application you may wish to lodge with Council.

5. Attachment No.2 is a guide to the type of information you are likely to be relevant to the development you propose; not all of the matters raised therein may be appropriate for consideration in the EIS for your proposal; equally, the guide is not exhaustive.

6. In preparing your EIS you should approach Hawkesbury Shire Council and take into account any comments Council considers may apply to its determination of the proposal. In addition, you should also consult the Public Works Department in respect of any key issues they consider relevant to the proposal.

7. Should you require any further information regarding this matter please do not hesitate to contact us again.

Yours faithfully,



C. J. Wright

Manager, Assessments Branch
Delegate for the Director

DEPARTMENT OF ENVIRONMENT AND PLANNING
ATTACHMENT No.1

STATUTORY REQUIREMENTS FOR ENVIRONMENTAL IMPACT STATEMENTS.

In accordance with Part IV of the Environmental Planning and Assessment Act, 1979, an environmental impact statement (EIS) must meet the following requirements:

Pursuant to clause 34 of the Environmental Planning and Assessment Regulation, 1980, as amended, the contents of an EIS shall include the following matters:

- (a) full description of the designated development proposed by the development application;
- (b) a statement of the objectives of the proposed designated development;
- (c) a full description of the existing environment likely to be affected by the proposed designated development, if carried out;
- (d) identification and analysis of the likely environmental interactions between the proposed designated development and the environment;
- (e) analysis of the likely environmental impacts or consequences of carrying out the proposed designated development (including implications for use and conservation of energy);
- (f) justification of the proposed designated development in terms of environmental, economic and social considerations,
- (g) measures to be taken in conjunction with the proposed designated development to protect the environment and an assessment of the likely effectiveness of those measures;
- (g1) details of energy requirements of the proposed development and measures to be taken to conserve energy;
- (h) any feasible alternatives to the carrying out of the proposed designated development and reasons for choosing the latter; and
- (i) consequences of not carrying out the proposed development.

The EIS must also take into account any matters required by the Director of Environment and Planning pursuant to clause 35 of the Regulation, which may be included in the attached letter.

The EIS must bear a certificate as required by clause 26(1)(b) of the Regulation.

DEPARTMENT OF ENVIRONMENT AND PLANNING
ATTACHMENT No.2

ADVICE ON THE PREPARATION OF AN ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR AN EXTRACTIVE INDUSTRY.

A definition of extractive industry may be found in paragraph (n) to Schedule 3 of the Environmental Planning and Assessment Regulation, 1980, (as amended). These industries are operations undertaken for the purpose of winning sand, gravel, clay, turf, soil, rock, stone or similar substances. The definition of extractive industry specifically excludes coal, petroleum or minerals which are prescribed under the Mining Act, 1973. Extractive industries may take the form of dredging operations, quarrying operations, turf farms or various forms of land excavation etc. Processing of extracted material on the same site as the winning of the material may also constitute an extractive industry.

Extractive industries have prompted considerable public controversy in the past since, among other things, they affect visual amenity, generate heavy vehicle movements, raise dust and cause disturbance through noise and blasting. This is the prime reason for designation of extractive industries under the Environmental Planning and Assessment Act, 1979.

The purpose of this paper is to outline various issues relevant to the preparation and consideration of an EIS for extractive industries. It is intended to assist the preparation of the EIS. However, it is the applicant's responsibility to identify and address as fully as possible the matters relevant to the specific development proposal in complying with the requirements for EIS preparation (see Attachment No.1).

The matters nominated in this paper are not intended as a comprehensive identification of all issues which may arise in respect of an extractive industry. Some of the issues nominated may not be relevant to a specific proposal. On the other hand, there may be other issues, not included, that are appropriate for consideration in the EIS.

Information provided should be clear, succinct and objective and where appropriate be supported by maps, plans, diagrams or other descriptive detail. The purpose of the EIS is to enable members of the public, the consent authority (usually the Council) and the Department of Environment and Planning to properly understand the environmental consequences of the proposed development.

1. Description of the proposal.

The description of the proposal should provide general background information on the location and extent of the works proposed, an indication of adjacent developments, and details of the site, land tenure, zonings and relevant forward planning proposals and any other land use constraints.

The EIS should address the compatibility of the proposal with any regional strategy for extractive industries in the area and with the provisions of the Local Environmental Plans for existing and proposed development.

This section should provide specific information on the nature, intent and form of the development. It should, as far as possible, include such details as the processes involved (highlighting any proposed crushing or blasting), disposal of wastes, landscaping and site rehabilitation. A description should also be provided of associated operations such as the transport of materials and use of the end product if likely to have environmental implications.

Particular details that may be relevant include:

- . Characteristics and economic significance of the resource
- . Possible availability of alternative resources.
- . Quantity of materials to be extracted.
- . Methods of extraction / plans of operations.
- . Details of any blasting and/or crushing.
- . Effects of vibrations.
- . Type of machinery and equipment to be used.
- . Expected life of the operation.
- . Number of persons to be employed.
- . Hours of operation.
- . Details of necessary stockpiling.
- . Access arrangements - truck routes, truck numbers etc.
- . Site drainage and erosion controls.
- . Proposals for rehabilitation.

2. Description of the Environment.

This should provide details of the environment in the vicinity of the development site and also of aspects of the environment likely to be affected by any facet of the proposal. In this regard, physical, natural, social, archaeological and economic aspects of the environment should be described to the extent necessary for assessment of the environmental impact of the proposed development.

3. Analysis of Environmental Impacts.

Environmental impacts usually associated with extractive industries are listed below. Where relevant to the specific proposal, these should be addressed in the EIS, taking into account the adequacy of safeguards proposed to minimise them.

- . The flow of any affected rivers or watercourses.
- . The effect of the extraction on the sediment transport rate of any affected rivers or watercourses.
- . The bed and bank stability of any affected rivers during and after completion of the operations.
- . Any possible siltation, sedimentation or downstream effects of the operation.
- . Any likely cumulative effects of the proposed operation when considered together with other operations in the vicinity.
- . Details of floods and any likely effects of the operation on flood liability of surrounding lands.
- . The possible effects of flooding on the operation.
- . Effects on flora and fauna.
- . The agricultural viability of the landholding.
- . Likely noise/vibration disturbance caused by the operations, including transport operations, on nearby residences.
- . Other impacts of trucking movements, including access over railways and onto highways.
- . Dust nuisance likely to be caused.
- . Effects on water quality of nearby watercourses.
- . Disposal of waste material.
- . Effects on the visual environment.
- . Any likely affectation of sites of Aboriginal archaeological or European heritage value if located in the vicinity of operations.

In addition, any potential for hazard or risks to public safety and any proposals to monitor and reduce environmental impacts should be included.

4. Contact with relevant Government Authorities.

In preparing the EIS, it is suggested that authorities, such as those listed below, should be consulted and their comments taken into account in the EIS.

- . The State Pollution Control Commission in regard to air, water and noise impacts and relevant pollution control legislation requirements;
- . The Soil Conservation Service regarding appropriate erosion control and rehabilitation procedures;
- . The Department of Agriculture if prime agricultural land may be affected by the proposal; and
- . The Heritage Council of NSW if the proposal is likely to affect any place or building having heritage significance for the State; the National Parks and Wildlife Service if aboriginal places or relics are likely to be affected.

It is the responsibility of the person preparing the EIS to determine those Departments relevant to the proposed development.

STRATTON BROTHERS PTY LTD AND

EIS

Proposed sand extraction Lot 1 DP

368

535947 and Lots 1, 2 and 3 DP

634989, Gackville Ferry Road, in the

