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Hastings Council extractive industry resources : inventory report

phase I

HASTINGS COUNCIL

EXTRACTIVE INDUSTRY RESOURCES

INVENTORY REPORT – Phase I

by:

ENGINEERING GEOLOGY SPECIALISTS PTY LTD

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Re: State Environmental Planning Policy Nº 37 and enclosed Registration Form for Quarry Operators

FOREWORD

Council's Town Planning Department identified the need for an *EXTRACTIVE INDUSTRY RESOURCE INVENTORY* and wrote to all major quarry operators on the 7th June 1993 to seek their co-operation in the task.

Because of the complexity of the task, the project was broken into two phases. The first to study major known quarries.

The need for such a survey was initiated by the catastrophic decision of the Court of Appeal on 15th November 1991 (Vaughan Taylor v David Mitchell - Melcann Pty Ltd & Anor) which effectively prevented the quarrying and mining industry from carrying out lateral expansion into their reserve areas until they had carried out an environmental impact study and obtained approval of a fresh Development Application.

Following several public conferences on this and associated issues, the Minister for Planning, Mr Robert Webster MLC, instigated action which resulted in the introduction of State Environmental Planning Policy (SEPP) Nº 37 - Continued Mines and Extractive Industries, gazetted on 18th June 1993, and the release of the Department of Planning Circular Nº B33 on 22nd June 1993 to explain the background and purpose of the SEPP.

Under SEPP Nº 37, quarries (or mines) which have not been registered by the 18th September 1993 must cease operations. However, those which register may continue providing they obtain consent prior to 18th September 1995.

Only some of Council's own quarries can be registered before the 18th September 1993. Although the others must temporarily cease operations, it is still possible to lodge registration after the 18th September 1993 and they may continue if approval is sought before 18th September 1995.

Council's Planning Department prepared a "Brief" and sought expressions of interest from local geological firms in May 1993. Finally, by an exchange of letters dated 1st June 1993 and 12th July 1993, a contract was finalised, between Hastings Council and Engineering Geology Specialists Pty Ltd of Taree, for Phase I. This Phase involves:-

1. A field survey of Commercial Quarries (those being the only major quarries) and commencement of enquiries with the Geological Survey of New South Wales, Roads and Traffic Authority, Public Works Department, Council and private operators in the industry to gain a reserve estimate at the "Possible resource" level of accuracy.
2. Preliminary assessment of sites to categorise their planning status.
3. Calculation of "possible reserves" of known resources by site, category, material type and quality (if obtainable without drilling, sampling or laboratory testing).
4. Preliminary prediction of 20 year volume demand for construction materials and a preliminary assessment of known resources to meet 20 year demand for each type of material.
5. Preliminary recommendations for protecting known resources.
6. Assessment of geological setting to predict areas for potential resource investigation with priority of investigation to be the identified rural residential circles, then the remainder of the Council area.
7. Preliminary recommendations for protecting potential resources.

The style or format for this Technical report was not specified but it adopts the best aspects of publishers such as The Standards Association of Australia; The Royal Society of New South Wales and The Geological Society of Australia Inc.

The opinions expressed are those of the author and do not necessarily reflect the opinions or policy of the Hastings Council who are the client seeking information and opinion in the form of this report.

SUMMARY

A preliminary assessment of all major commercial quarries in relation to the S.E.P.P. has been completed for this inventory.

The three dry land operators have all invested large amounts of time and money with the aim of securing future quarry reserves. However it is clear, when studying the objections raised to frustrate these efforts, that QUARRIES ARE AN ENDANGERED SPECIES and in need of protection.

The approved hard rock (RIVER GRAVEL) sources in the Hastings Council area will on present evidence be extinct in 2 years, sand in 6 years and road-base in about 17 years. Consequently there is a need to give urgent attention to approving new areas and protecting existing quarries from sterilization by encircling development.

Some future areas of reserves have been identified and a SIMPLIFIED GEOLOGICAL MAP on a scale of 1:150,000 is provided with the inventory showing both Commercial and Council quarries.

Major projects such as freeways have not been considered in detail as the R.T.A. have not yet responded to our correspondence.

The Department of Minerals and Energy also are concerned that the spread of rural residential development could sterilize some of their mineral prospects or limit the development of new industries.

The investigations carried out for this inventory have revealed that there are potential opportunities for several new industries in the Hastings area.

An early warning of serious cost increases for hard rock (presently river gravel is the principal source) may be averted if the remedies outlined in this report can be implemented.

The location of the data in this report is given in the CONTENTS and the general nature of the information is amplified in the INTRODUCTION.

SECTION 1

INTRODUCTION

1. Introduction

1.1.1 The need for this report is discussed in the FOREWORD. The latter also contains an outline of the brief for PHASE 1. The Study Objectives are:

(a) to guarantee supply of consturction material at reasonable cost to satisfy foreseeable demand (at least 20 years); and

(b) to ensure development (particularly rural residential devleopment) does not sterilise necessary resources to satisfy foreseeable demand.

1.1.2 Field inspection reports for each major commercial quarry or dredging operation in Hastings Municipality are included in *Section 2* of this inventory for PHASE I. Within these field reports the first sub-section in each case discusses the available evidence concerning their date of commencement. Usually the main independant evidence is the date on which the aerial photography was flown for the preparation of the 1:25000 topographic map used to locate the quarry. This is relevant to item 2 of Council's letter of instruction of 12th July 1993.

The extent of the operation can also be seen on the topographic maps.

Data from any D.A. lodged in connection with the quarry being assessed is noted in the first sub-section "Location" if available.

1.2 Possible resource volumes have been estimated either by direct measurement, or by reference to plans accompanying a D.A. However, it has not always been possible to obtain depth data supported by diamond core drilling or similar information.

Possible resource estimates are the lowest order of confidence. Proven reserve estimates are the highest order of confidence and probable reserve estimates are in between. This data for each quarry or prospect is given in the second sub-section of each quarry report in *Section 2* of this inventory.

Reserve estimates have been prepared on the premise that the quarries will only be working inside the 1986 boundaries unless a DA or EIS has been approved. More data on this aspect will become available when REGISTRATION forms are sent in by each quarry operator.

1.3 Under the sub-heading 'Quality', the nature and quality of the product or products has been noted in *Section 2* of this inventory. Hard rock such as river gravel is needed for aggregate. The specific end uses for armourstone and aggregate are mentioned in Section 2 and later in Section 9.1 (paragraph 4). Possible new industry opportunities are mentioned in 9.3.

Some construction materials which are produced in relatively small quantities such as Bago gravel for architectural purposes are not covered in Section 2. They may be reviewed in PHASE 2. Clay for tennis courts is produced in very small quantities and it remains to be seen whether any quarry is registered for this purpose. Only major quarries have been considered in PHASE 1.

1.4 The Life Expectancy of existing quarries is discussed in *Section 4* and the prediction of the 20 year tonnage demand is covered in *Section 5* of this report.

1.5 Preliminary recommendations for protecting known resources are set out in *Section 7* of this inventory.

1.6 The geology of each site examined is discussed in a sub-section of each quarry assessment contained in *Section 2* of this inventory.

1.7.1 The protection of potential resources will largely depend upon awakening public awareness to the need for such resources. However, zoning is a valuable option. These matters are discussed in *Section 7* of this report forming part of the inventory.

1.7.2 The areas within 5 km of the major towns in the Hastings Council are discussed in Section 7.2.

1.8 A list of Council's quarries and their accepted end use is given in *Section 8*.

1.9 The Geological setting of the Hastings Council area is briefly outlined in *Section 9* of the inventory.

1.10 The map, *Section 10*, has been used to show areas of potential resource interest which require fresh geological evaluation and further mapping.

SECTION 2

INDIVIDUAL ASSESSMENTS OF EACH MAJOR COMMERCIAL QUARRY, ARRANGED ACCORDING TO PRINCIPAL PRODUCT

Section 2.1

Road Base Producers

2.1.1.1

SITE: Sancrox Road Quarry
PROPRIETORS: CTK Constructions Pty Ltd
MANAGER: Mr Troy Terp.

1. Location and Planning Status

This quarry was first operated prior to 1969 judging by the 1978 topographical series of maps (Port Macquarie Sheet grid ref. 826:218) as the relevant area was mapped using the 1969 aerial photographs. At that time the quarry was already well established.

CTK began full time utilisation of this site in 1982 which indicates it has existing use rights dating from the use by the prior owners and operators. It is mentioned in the report by the School of Geography of the University of NSW (October 1990).

2. Possible Reserves (uncertain without drilling data)

A plane-table survey was conducted on the 30th June 1993 by the writer to determine the extent of the workings. Based on the assumption of existing use rights the quantity of conglomerate remaining to a depth of 57 metres (from station 7 level of our survey) is 425000 m^3 or approximately 1.1 million tonnes. This will require the working of five benches and assumes a 1 : 1 slope and 5 metre berms.

Originally it would have been feasible to extract 1.8 million m^3 (4.7 million tonnes). The limits of working are currently limited to the 1986 boundaries of the excavation.

3. Quality

The conglomerate being won is being crushed and tested by CTK to meet the RTA requirements for "Base" material. (ie. road-base)

Associated with the conglomerate are some mudstones, shales and coal measures the latter of little significance. These are generally suitable only for use as fill unless stabilised.

4. Output

Approximately 77,000 tonnes per annum.

5. Geology

The area has been mapped by the NSW Geological Survey as belonging to the Byabarra Beds of the Carboniferous Period.

However, a fault divides the quarry into a southern part which is very heavily folded (some overfolding) and a northern part with simpler folding and a strike which is almost at right angles to that of the southern area. The presence of conglomerate containing granite pebbles and the association of thin coal laminae suggests the beds are at least of the lower Carboniferous Period.

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2.1.1.2

SITE: "BAGO Prospect", Milligans Road, Herons Creek (being part Portion 137) Municipality of Hastings

PROPRIETORS: C.T.K. CONSTRUCTIONS PTY. LIMITED

1. Location and Planning Status

Figure 1 of the EIS shows the location of the deposit and Figure 9 of the E.I.S. dated June 1991 shows property boundaries..

The quarry site is located in a valley surrounded by State Forest with only three homesteads within 1.5 kilometres. Two of these dwellings belong to the family that sold the quarry site to CTK and consequently knew of the proposed development, according to the present owners of portion 137.

The haulage route from the quarry to the Pacific Highway is relatively short (ie 4km) and passes only occasional residences (all set well back from the road).

Given the isolation of the site and the short haulage route through mostly undeveloped land to the highway, the quarry is ideally situated to minimise inconvenience and carry out a viable operation.

The initial D.A. was approved by Council on the 17th July 1992, but rejected by the Court following objection.

A revised quarry management plan is being prepared.

Figure 11 of the E.I.S. June 1991 shows the relationship spacially of this "BAGO" quarry to other quarries in the area from Nabiac to Kempsey.

2. Reserve Estimate

Figure 2 of the June 1991 E.I.S. is being revised by the Proprietors. However, making the assumption that the face is started in the northern half of the north–south part of Portion 137 so that the face advances south or south–east, it would be possible to win up to 3 million cubic metres of DACITE rock (about 7,800,000t). This estimate is of PROBABLE STATUS only requiring a management plan and D.A. approval to put it in the PROVEN CATEGORY.

3. **Quality**

Section 9.3 of the June 1991 E.I.S. includes:

(i) a microscopic examination report which classifies the rock as a DACITE;

(ii) R.T.A. test reports on aggregate friction value, sulphate soundness, plasticity of a crushed sample, density, absorption and strength and is summarised below:–

TEST METHOD	PROPERTY		DATA	
T108	Liquid Limit	%	25	
T109	Plastic Limit	%	25	
	Plastic Index		N.P.	
T215	10 per cent fines			
	Dry strength	kN	236	
	Wet strength	kN	193	
	Variation	%	18	
T266	Sulphate soundness	(% loss)	0.4	
T209	Bulk Density	t/m^3	2.44	
	Water absorption	%	2.9	
T204	Los Angeles Abrasion	%	18	(H grading)
T230	Resistance to stripping:–			
	as received		9	% stripped
	Clean and dry		0	% stripped
	Dusty		2	% stripped
	Saturated surface dry		2	% stripped
	Saturated surface wet		9	% stripped
AS1141 parts 41 & 42	P.A.F.V. (Polished aggregate friction value)			63

These data show that the crushed rock from the proposed quarry when graded can be used to meet Australian Standard Specifications for concrete aggregate and sealing aggregate. In addition it should meet R.T.A. requirements for first class BASE (road-base) also for filter media, making the allowance for the absorption value.

Owing to the relatively close jointing it is less suited to use as ARMOURSTONE but could provide for smaller sizes (up to about 1 tonne).

4. Output

Annual output is non-existent as yet but is forecast at 100,000t/annum.

5. Geology

This deposit is not shown on the Geological Survey 1:250,000 Geological map TAMWORTH-HASTINGS sheet but lies within an area designated as Triassic Sedimentary rocks. It is probably an associate of the Three Brothers Triassic Granitoids and is thus shown on the map accompanying this survey.

6. General Remarks

Providing the quarry is better planned than in the original E.I.S., I consider this to be a reserve well placed and of great value to the HASTINGS area and consider it to be essential to future development of the Highway and public roads system. Also, there are few sites left in the Hastings Municipality to provide concrete aggregate and this is a significant reserve.

2.1.2.1

SITE: Grants Head Quarry
PROPRIETORS: HURD HAULAGE Pty Ltd (PO Box 118 Laurieton)
MANAGER: Mr Wick Hurd

1. Location and Planning Status

The 1:25000 scale topographic map by the Central Mapping Authority is based on aerial photography taken in 1969. Ground revisions were last made in 1972 for the first edition. The quarry can be seen to have been well developed in 1969, from the map and photos.

Outcrops extend for 375 m from east to west and approximately 250 m from north to south. It is considered that this quarry has continuing use status.

2. Reserve estimates

It is proposed to work this deposit to a depth of 8 metres below swamp level and to reinstate the area finally as a wetland. Water testing has been carried out by Golders to Show that this is feasible. A development application was being prepared at the date the quarry was visited.

From the contour map it is considered that the possible reserves were originally about 2.5 million tonnes of sandstone and conglomerate. The possible future reserves contained within an area of 700 m x 200 m are estimated at 3.7 million tonnes allowing for a depth of working of 14 m below the floor and providing for safe batter angles and berms of 5 m between benches. The 'original' estimate is based on the outcrops above the swamp level, before working commenced.

No drilling data has been sighted.

It is assumed that this quarry has continuing use status and that Hurd Haulage Pty Ltd would be entitled to apply for extension of working under the SEPP as the quarry has been in operation since about 1967.

Drilling for rutile has been conducted to 24 m.

3. Quality

The crushed conglomerate meets the 10% fines durability test requirements of the RTA and Standards Association of Australia.

It is widely used for base (road-base) although the grading varies slightly from the RTA project specifications. In fact it is accepted for use by the RTA.

4. Output

Current output is approximately 55,000 m^3/year (about 121,000 t/annum).

5. Geology

The conglomerates and sandstones seen in this quarry are considered to be part of the Camden Haven Group which are of Triassic age. They form part of the eastern side of a basin shaped structure having relatively shallow dips which formed as a fresh water lake.

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2.1.2.2

SITE: Taylors Pit

PROPRIETORS: HURD HAULAGE Pty Ltd,
PO Box 118
LAURIETON NSW 2443

MANAGER: Mr Wick Hurd (Managing Director)

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1. Location and date of establishment.

This quarry is located near Kew on the northern side of the Laurieton Road (Lorne Sheet grid ref 742 : 998, Topographic map 1:25,000; published in 1987, based on aerial photography 1981, ground revision 1986.

The existing quarry within the conglomerate does not appear to have significantly extended laterally since the 1986 period of development.

However an area of Trachyte lying west of the existing quarries will require an EIS.

A DA for advertised development would appear to be adequate for the existing conglomerate quarries.

This area is under a private 10 year lease.

2. Reserve estimates

The existing rate of use is about 35,000 tonnes/annum from an area of 75 m x 300 m.

Within the permitted area the remaining reserves are approximately 154,000 m^3 or 400,000 tonnes.

3. Quality

No test reports have been sighted but this quarry is producing material of at least sub-base quality.

4. Output

Approximately 35000 t/annum

5. Geology

Part of the Camden Haven Group of the Triassic Period.

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2.1.3.1

SITE: Maxwell's Quarry
(Portion 5) Nº 1 (Rosewood)

PROPRIETORS: Maxwell Bros Pty Ltd
Quarry Road
WAUCHOPE

MANAGERS: J & C Maxwell

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1. Location and Planning Status

The location of the existing quarry is 5km by road west of Wauchope on Quarry Road (1:25000 topographic map grid reference is 700:190).

The location is within Portion 5 as shown on the topographic map.

It is shown on the first edition of the Wauchope 1:25000 topographic sheet from the Central Mapping Authority. Consequently, the quarry was established in 1969 when the air photos were taken for the first edition. It is stated to have commenced in 1942.

Maxwell's have a Deed of Agreement with Hastings Municipal Council for Portion 5 and are presumed to have a "continuing operation".

There is a new housing development bordering the quarry on the east.

2. Reserve Estimate

The existing quarry which provides BASE (D.G.B. 20 to R.T.A. Standard) is limited in its future operation to about 760,000 tonnes.

3. Quality

The 10% fines variation ranges from 10 to 35% indicating good quality.

4. Output

Approximately 47,000 t/annum

5. Geology

The rock is a silicified siltstone forming part of the Byabarra Beds of the Carboniferous Period.

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2.1.3.1

SITE: Maxwell's Quarry (Portion 5) Nº 2 (Extension of Nº 1)

1. **Location and Planning Status**

Lying within the northern part of Portion 5 is an area of volcanic rock which has been drilled but is as yet undeveloped.

Quarrying on this part of the property will no doubt be regarded as an extension of the CONTINUED OPERATION. However, this can be clarified when the proposal is registered under S.E.P.P. Nº 37.

2. **Reserve Estimate**

The probable status reserve estimate is 770,000 tonnes in the expanded area.

3. **Quality**

The material examined appears to be of suitable strength and durability for concrete aggregate but tests had not yet been made when the quarry area was inspected in June 1993.

4. **Geology**

This area is shown by the Geological Survey of N.S.W. as Carboniferous. No volcanic rocks have been mapped in this immediate vicinity.

2.1.3.2

SITE: Maxwell's Proposed Quarry (Portion 7) Nº 3 (Prospect)

1. **Location and Planning Status**

This prospect was inspected with the Maxwell manager. A ridge rises to 70m within Portion 7 but is buffered by tree cover.

2. **Reserve Estimate**

This estimate is in the "POSSIBLE" category. However, the figure calculated is an area of 46,000m^2 which appears capable of being worked to at least an average 15m. Hence the volume is 686,000m^3 and at 2.6t per cubic metre, there is a possible reserve of 1.8million tonnes.

3. **Quality**

Whilst yet to be tested, my opinion is that the rock is suitable for BASE and possibly for use as concrete aggregate.

4. **Geology**

Samples of a fine grained igneous rock (possibly RHYOLITE) were taken. Although as yet unidentified, this is clearly a good prospect.

5. **General Comment**

This is a very important potential quarry area which should be protected by planning measures if possible. It lies within the 5km radius of Wauchope township. This matter is addressed in a separate section of this report.

Section 2.2

River Gravel Producers

2.2.1

SITE: Hastings River Sand and Gravel
Lease Nº P.O. 1980/13, Wauchope (Rocks Crossing)
PROPRIETORS: Hastings Sand and Gravel Pty Ltd
MANAGER: Mr David Hayes (85 1200)

1. Location and Planning Status

Dredging by Hastings Sand and Gravel Pty Ltd dates back to 1948 according to Mr David Hayes.

It is presently operated under the tenure of P.O. 1980/13. This area is actually broken into two parts where the vehicular punt was originally located. A bridge is now in use.

Depth of operation has been arbitarily limited by the P.W.D. to 6 metres below mean high water mark.

Twenty three years ago Mr Bill Hayes (who was then the manager) states that dredging was carried down to 60 feet (18.3m).

There is a survey of this section of the river dated June 1910. According to observations by the locals the only known changes to parts above water are stated to be due to a severe flood. Deep dredging has actually reduced erosion on the northern bank opposite Portion 1. Again this observation has been made by locals.

2. Reserve Estimate

When fully replenished by a heavy flood, this sand and gravel "lease" would contain about 0.6 million cubic metres of sand and gravel across the full width to a depth of 6m below mean high water. At present the reserve is almost depleted down to that level.

3. Quality

The bulk of the products are supplied to concrete plants but the R.T.A. do purchase crushed river gravel for sealing aggregate. Pioneer purchase aggregate for hotmix from Hastings Sand & Gravel Pty Ltd and Hastings Council use gravel from this company. Asphaltic concrete and hot–mix are similar products.

Sized river rock would sometimes be used for 'Gabions" or ornamental stone. Other uses include drainage works (filter media).

4. Output

The rate of production and royalties are set out in the figures supplied by the company attached as:

1989 – 90	37,192 tonnes	1990 – 91	55,821 tonnes
1990 – 92	45,706 tonnes	1992 – 93	43,434 tonnes

(**Note**: these totals are comprised of 33% gravel sizes and 66% of sand.

5. Geology

The deposit consists of alluvial sand and gravel of the QUATERNARY PERIOD. Rock has been encountered at 60 feet (18.3m).

There appears to be no reason why the alluvium could not be worked to 18.3m along the middle third part of the river which would increase the reserves to approximately 1.4 million cubic metres.

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2.2.2

SITE: Wilson River

OPERATORS: Boral Resources (Country) Pty Ltd

1. Location and Planning Status

The portion of the Wilson River presently worked by Boral Resources (Country) Pty Ltd lies west of Telegraph Point where shown on the Geological map in Section 10.

We were unable to contact the Manager but contact was made with Dr Ian Wallace of BORAL RESOURCES at Wentworthville (Sydney) who stated that they were phasing out the Wilson River operation. Their Middle Brother Quarry (GTCC) will be providing some of their future needs.

2.2.3

SITE: Koree Island Lease

OPERATORS: C.T.K. Constructions Pty Ltd

1. Location and Planning Status

Located on Koree Island on the Hastings River. Will be phased out when the lease terminates next year.

2.2.4

SITE: Beechwood Quarry

OPERATORS: Maxwell Bros. Quarry Pty Ltd

1. Location and Planning Status

This area near Beechwood on the Hastings River is held by the Maxwell family. It is not being reported in detail at this stage as the productive report is quite small.

Section 2.3

Sand Producers

2.3.1

SITE:	Dunbogan Sand Pit, Portions 102, 132 and 154 Parish Camden Haven
LAND OWNER:	20 year Lease held by Hurd Haulage Pty Ltd
OPERATOR:	Hurd Haulage Pty Ltd (PO Box 118 Laurieton)
QUARRY MANAGER:	Mr Wick Hurd

1. Location and Date of Establishment

The location of pits, being operated in 1986, was shown on the 1:25,000 Topographic Sheets (Department of Lands, N.S.W.) as being within Portions 154 and 102.

The designated Development Application dated March 1988 provided a plan and a Landscaping Proposal which indicates an average width of about 40m. The working width appears to be greater on the 1:25,000 map. The length is estimated at 625m but no drilling data is available in the Designated Development Application. It is understood that this has been approved.

A new Development Application is being prepared for a dredging proposal, (E.I.S.).

2. Reserve Estimate

On the basis of the Landscaping plan and sections, Portion 132 will, at completion, have yielded 60,000m^3 or 96,000t. The scales shown on the plan and sections are not correct. A bar scale was not provided on the plans.

The data is insufficient to give a "PROVEN" reserve estimate.

On our estimates, the probable reserves to a depth of 7m total 600,000t or about 7 years at present rates of consumption.

The future proposed area is indicated as adequate to meet the company requirements for 20 years at least, at the present production rate.

3. Quality

The sand is a medium to fine sand capable of providing first quality concrete sand when processed. Screened sand, washed sand and filling sand are sold from this source. Sand for bricklaying mortar is supplied from this site.

4. Output

Mr Wick Hurd quotes current production at about 80,000t per year. The registered production statistics appear in a separate section on "STATISTICS".

5. Geology

These are clearly dune sands of probably Quaternary age forming part of the inner barrier behind the foredune system.

Previously mined areas such as these are shown on the 1:250,000 scale TAMWORTH–HASTINGS metaliferous geology map by the Geological Survey.

2.3.2

SITE: Hastings River and Confluence of the Maria and Hastings River, and Limeburners Creek and Hastings River.
SAND DREDGING

PROPRIETORS and OPERATORS: Crown Land to be operated by
BIRDON GROUP PTY LTD
Glen Ewan Road, Port Macquarie
(Lot 1 DP 225413)

1. Location and Planning Status

The location of the SAND DREDGING operations are shown in *Fig 1* of E.I.S. dated June 1992.

This application is understood to have been approved.

2. Extraction Rates and Extraction Methods

The Birdon Group Pty Ltd were supplying at the rate of 50,000 to 60,000 tonnes per annum in 1992. They are presently operating at a rate of an average of 36,000 tonnes per annum (see also section 5.2.3 of E.I.S.). Hastings Council area currently consumes 125,000 tonnes per annum, according to the EIS.

3. Quality

Medium to coarse washed river sand for concrete production is produced from the Hastings River Limeburners Creek lease and FILL SAND (containing some impurities) is obtained from the two Maria River leases.

The EIS provides test results showing the sand is of medium to fine grading and can be processed to provide clean concrete quality sand..

4. Reserves

Since the creeks and Hastings River replenish at the rate of one third of the existing reserves, the data is flexible. However, the E.I.S. gives 70,000 tonnes in the Limeburners Creek lease area and 150,000 tonnes in the Maria River. The life estimated is 10 years in the E.I.S. but accumulated replenishments plus original reserves total 340,000 tonnes which indicates at the present rate of production a life of 9 years.

5. Geology

Essentially, the sands being extracted belong to the QUATERNARY PERIOD. The GEOLOGY of the area is shown in *Fig 19* of the E.I.S. together with a report by Mr R Myson.

DIRECTOR: E.J. MINTY, MSc., 1 Cedar Close, TAREE 2430 Ph: (065) 52 4469

Section 2.4

Armourstone (RIP–RAP Producers)

2.4.1

SITE: PELICAN POINT QUARRY

PROPRIETORS: Public Works Department

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1. Location and date of Establishment

This quarry is shown in the north eastern quadrant of the Port Macquarie 1:25,000 scale topographic map which is based on aerial photography flown in 1969. Consequently, the date of establishment is prior to 1969.

The topographic map shows this as an abandoned site but the P.W.D., when contacted, regard the quarry as active.

2. Reserve Estimate

It is difficult to estimate the quantity available as the present lease boundaries are not known at this stage.

3. Quality

The rock appears to have given reasonable service on the breakwater for which it was established.

4. Output

About 100,000 tonnes of metadolerite was removed from this area for use on the breakwater up to 1972.

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2.4.2

SITE: Laurieton Public Works Department Quarry

PROPRIETORS: Crown Land, under control of Public Works Department

OPERATOR: Public Works Department

1. Location and date of Establishment

This quarry was originally established when the breakwaters were first constructed. Two separate quarries close together can be identified on the 1:25,000 topographic map for which photography was flown in 1981. The walls were built well before that time.

It is not clear whether an E.I.S. will be required for this quarry but the P.W.D. will no doubt clarify that question when they lodge registration for the quarry under (SEPP Nº 37) as gazetted on 18th June 1993.

The quarry is located 150 metres from the western end of Mill Street, Laurieton.

Houses have been allowed to be built within 200m of the quarry. Future working will probably be limited to about 75m due to the existing lease boundary and close proximity to Hanley Street.

2. Reserve Estimate

The quarry is approximately 45m x 45m and the maximum face height is 15m.

Consequently the present bench when advanced 75m in a southerly direction could produce about 70,000 tonnes of microgranite. The next bench could produce 82,000 tonnes (at a face height of 10m) but pumping would be needed to drain the quarry unless further land was resumed to provide drainage into the creek which lies south of the lease.

It would be relatively difficult to extract blocks of armourstone by going down into the floor without lateral expansion and the quantity would be very small.

3. Quality

The wider joint spacings in this granite rock mass are more suitable for producing large blocks of armourstone than any other rock types in the area of Hastings Shire.

For durability, the selected boulders away from the weathered surface layers (which are quite shallow) will provide armourstone having a life of sufficient duration (a block of one metre diameter would survive to ½ life, for 2,000 years). The background data for this estimate will be found in a paper by MINTY, E.J. and SHIPWAY, C.H., Development Of A New Quarry at Stewart's River, N.S.W. published by the Geological Society of Australia in COLLECTED CASE STUDIES IN ENGINEERING GEOLOGY, HYDROGEOLOGY AND ENVIRONMENTAL GEOLOGY, 1983.

4. Output

The output is erratic as it depends largely on storm damage. About 37,000 tonnes was used from the main quarry for the construction of the breakwater. Probably 5,000–6,000 tonnes would be required over a 5 year period.

5. Geology

The North Brother Mountain is classified by the Geological Survey of N.S.W. as a GRANITOID ROCK of the TRIASSIC PERIOD.

According to Engineering Geological classification (MINTY Thesis 1961 and Standards Association AS2758.1–1985 Appendix B page 15), the rock is a microgranite.

SECTION 3

SOURCES OF PRODUCTION DATA AND SUMMARISED DATA

3. Sources of Production Data and Summarised data

3.1 From the R. Daniels report (Uni. of N.S.W. 1990) the statistics for 1988/89 have been extracted to provide a background from which to determine the trend over the three years to 1991/92.

3.2 The Department of Minerals and Energy QUARRY PRODUCTION STATISTICS – COFFS HARBOUR MINING DISTRICT have been used to compile the summary set out as Section 3.5.

3.3 Reports from discussions with the Quarry Managers of each commercial operation are included in *Section 2* if they were obtained.

3.4 Comments on the data

The Department of Minerals and Energy data had one major omission in the SAND section and several errors where cubic metres were entered as tonnes.

The Department of Conservation and Land Management wrote to Council on the 14th July 1993 concerning producers of sand and/or gravel from Crown Land. They listed Hastings Sand and Gravel Pty Ltd, Hurd Haulange Pty Ltd and Birdon Sands Pty Ltd but stated they had no knowledge of the operation on the Wilson River (Boral Resources (Country) Pty Ltd).

3.5 Summary of Data

PRODUCTION DATA* FOR QUARRIES IN HASTINGS MUNICIPAL COUNCIL AREA

**Based on Dept Minerals & Energy Records*

PRODUCER	PRODUCT	YEAR 1988–89 (t)	YEAR 1991–92 (t)
Hurd Haulage Pty Ltd	Sand	79.300ϕ	63700ϕ
BMG/Boral Resources Country Pty Ltd	"	12600	7542
Birdon Sands Pty Ltd	"	{25100*	{31591*
		{40160ϕ	{50546ϕ
Neruso Pty Ltd (Maxwell Bros Pty Ltd)	"	–	3881
CTK Constructions Pty Ltd	"	11400	671
Hastings Sand & Gravel Pty Ltd	"	–	–
TOTAL		143460	126340
Hastings Sand & Gravel Pty Ltd	River Gravel	35000	68457
BMG/Boral Resources Country Pty Ltd	"	30400	29433
Neruso/Maxwell Bros Pty Ltd	"	–	2470
CTK Constructions Pty Ltd	"	24100	21119
TOTAL		89500	121479
Hastings Municipal Council	Road Gravel	120000	{59936*
			{76213ϕ
Forestry Commission (Wauchope)	"	4100	4200
Hurd Haulage Pty Ltd	Crushed Rock } for Road Base }	85800ϕ	76900
Neruso/Maxwell Bros Pty Ltd	"	–	46795
CTK Constructions Pty Ltd	"	97400	77364
TOTAL	Road Base	307300	280419
Cusato Quarry	Fill	Clay/ shale etc –	7000
CTK Constructions Pty Ltd	"	" 31500	15642
Neruso/Maxwell Bros Pty Ltd	"	" –	102
Hastings Municipal Council	"	" –	2250
RTA	"	" –	1400000
Boral Resources Country Pty Ltd	"	" –	738
TOTAL	"	" 31500	1425732
TOTAL excluding RTA	"	" 31500	25732

NB: CORRECTIONS {Based on information from the producer} ϕ ϕ

GRAVEL DATA

HASTINGS MUNICIPAL COUNCIL

1992/1993

Quarry Name	Total m³
Allan Road	112
Babbios	328
Bago Road "Stockpile"	556
Borganna Q	112
Bottle Brush	1092
Bowds	547
Butlers Paddock	-1984
Byatts	88
CTK	1117
Commerce St	8
Ducks	3641
Ellisons	136
Forestry Houston)	
Mitchell Dr)	392
Foxes Creek	1373
Fowlers	448
Frenchs Q	448
Galloways	480
R & G Hamilton	128
Hurds	9064
Maxwells	5549
Moorland	456
Nelsons	4643
J Noakes	969
O'Neils	368
Patersons	846
Port Macquarie Tip	816
Red Hill	468
Claudia Ringlands	780
Roadside	954
Rudders Q	1758
Schubert's (Elands Rd)	1393
Wades (Ellisons Land)	304
Peter Wallace	304
Wallis Q	224
Woodlands Q)	
Maria River)	524
TOTAL	42409

GRAVEL DATA

HASTINGS MUNICIPAL COUNCIL

1991/1992

Quarry Name	Total m³
Averys Bridge	204.00
Babick	38.5
Bago Stockpile	976.00
Blackbutt Sub	168.00
Brill Brill Rd	96.00
Burton	64.5
Butlers	2109.00
Cedar Ck	1103.00
CTK – Sancrox	1005.00
CTK Koree Isl	1227.00
Ducks	7312.00
Forestry	1208.00
Foxs Ck	2258.5
Gilfillans Q	1736.00
Goods Crossing	88.00
Hastings Sand & Gravel	18.00
Herons Cr. Tip	352.00
Hurd's Qu. Haulage	6277.00
Hurd's	1032.00
Maxwells Beechwood	692.00
Jim Maxwell }	
Maxwell Bros }	6147.00
Maxwells Rosewood }	1950.5
MR575	4344.00
J.G. Noakes	1760.00
Red Hill	648.5
R.G. Rolland Plains	72.00
Roadside	1880.00
Rudders	3552.00
Stoney Creek Road	783.00
Thurlings	1016.00
Tilbaroo Road	4896.00
Wades	672.00
Ellisons Byabarra	544.00
Wallaces Q	160.00
TOTAL	54438

SECTION 4

LIFE EXPECTANCY OF EXISTING QUARRIES

4. Life expectancy of existing quarries

Three general groups of products form the core of demand, in the Hastings Municipal Council area, for the raw materials of extractive industry. These are:

A. ROAD-BASE(called "BASE" by engineers)
B. RIVER-GRAVEL
C. SAND

Clay and shale are used for fill but there does not appear to be any manufacturer of clay (or shale) fired bricks in the Municipality. There is one manufacturer listed in yellow pages in Wingham (outside the Municipality) and several concrete block manufacturers who also handle imported clay fired bricks. Clay and shale are abundant in the area.

Limestone has been located in the Municipality but the nearest quarry is at Kempsey.

4.1 Road - base

4.1.1 Weathered rock colluvium, alluvial terraces and crushed rock provide sources of road-base material.

The Council is itself a major producer of road-base and was the third in quantity of production in 1991-92. Life of Council's Quarries is yet to be determined in PHASE 2 of the inventory.

4.1.2 C.T.K. Constructions Pty Ltd were listed as the largest producer in 1991-92. With possible reserves of 1.1 million tonnes and a production rate of 77,000 t/annum, the life expectancy of the quarry at SANCROX Road is 14 years at most.

4.1.3 *Hurd Haulage Pty Ltd - GRANTS HEAD QUARRY*

The estimated above swamp level reserve is a probable 1.6 million tonnes which at a production rate of 77,000 t/annum indicates a life of 21 years.

There is however a possible 2.1 million tonnes, below swamp level, in addition to the available reserves.

4.1.4 *Maxwell Bros. Quarry Pty Ltd - QUARRY ROAD (Rosewood Quarry), Wauchope*

The existing quarry has a possible 760,000 tonnes of approved reserves in quarry area Nº 1. At a rate of production (recorded in Dept. Minerals and Energy Records for 1991/92) of 47,000 t/annum the life expectancy is 16 years.

4.1.5 *Composite Life Expectancy*

The composite life of the major approved quarries is therefore only about 17 years at 1991/92 rates of DEMAND.

4.2 River Gravel

4.2.1 *Hastings Sand & Gravel Pty Ltd*
ROCKS CROSSING DREDGING LEASE

Unless floods occur there is only sufficient reserves left in the lease to last for two years at the present rate of demand (20,246m^3 or 30,369 t/annum @1.5t/m^3) as set out in section 2.2.1 of this report. The total sand and gravel output has been combined by the Dept. Minerals and Energy in their statistics.

4.2.2 Boral Resources (Country) Pty and C.T.K. Constructions Pty Ltd gravel deposits will not be operating by the end of next year and so are not counted.

4.2.3 Maxwell Bros. Quarries Pty Ltd, BEECHWOOD Quarry are credited with only 2,470 t/annum in 1991/92.

This deposit has not yet been examined being a minor deposit according to the Statistics (Section 3.5).

However, Jim Maxwell has indicated that the deposit covers 12 acres (about 4.8ha) and can be worked to about 3m depth.

The possible reserve figure is therefore 144,000m^3 or 216,000t. It has been operating since 1942 on land owned by the family.

4.2.4 *Composite Life Expectancy*

Adding Hastings Sand & Gravel Pty Ltd reserve of 600,000t (after floods) to the reserve at Beechwood (Maxwell's) the total is 816,000t which at 122,000 t/annum will only supply the demand for 6–7 years. However Maxwell's present output being so small there will be shortages within 2 years.

4.3 Sand

Sand at Dunbogan (see Section 2.3.1), Birdon Sands (see Section 2.3.2) and Hastings Sand & Gravel (see Section 2.2.1) will last 7 years, 9 years and 2 years respectively, according to the producers records for approved extraction.

The composite life is therefore 6 years during which time the annual demand is expected to exceed 126,000 tonnes per annum.

SECTION 5

FORECAST OF DEMAND FOR EXTRACTIVE INDUSTRY RESOURCES OVER NEXT TWENTY YEARS

5. Forecast of demand for Extractive Industry Resources over next TWENTY YEARS

Section 4 of this report will be used as a basis for determining the present resources and existing demand, rather than *Section 3*. The reason for this is that the data in Section 3 was flawed. That is to say the corrected data will be used.

As a basic guide, the total of all first class quarry products used in 1988/89 and 1991/92 will be taken as a guide.

In 1988/89 Total first class products used in Hastings was 540260t.

In 1991/92 Total first class products used in Hastings was 528240t.

This drop in use is reflected in the figures for Council's own quarries with 120,000 tonnes for 1988/89 and only 76,000 in 1991/92. Some producers believe the influx of new residents was greater in 1988/89. It could be an indication that the depression has reduced demand. The drop represents about 2.2%. Nevertheless the figure for 1991/92 represents a substantial demand for quarry products and the figures now being compiled for 1992/93 show some increases.

Population is a reasonable indicator. Dividing demand in tonnes by the 1991 population of 48,920 we get a demand per head of population of 10.8 tonnes. This is five times the demand rate in Sydney. One possible explanation is that the initial development in infrastructures such as roads, sewer treatment works and water works together with new offices, shops, factories and homes is still relatively high.

The Council's forecast of an increase in population of 66.6% by the year 2011 agrees closely with other forecasts.

This indicates the demand for Extractive Resources could grow to 880,000 tonnes in the year 2011. However, a growth in demand is only evident at present in River Gravel. This is probably indicative of an increased demand for concrete or filter materials both of which indicate a concentration of development effort on buildings or major public works rather than local roads. Highway and Freeway demands are too erratic to forecast at this stage without co-operation from the R.T.A. who have not replied to our letter.

If the population reaches 84,760 people in Hastings by 2013 then the author considers the minimum demand for Extractive Resources in the year 2013 would be 600,000 tonnes.

In the years 1993 to 2013 the Extractive Resources used will probably exceed 11.3 million tonnes of first class material and could be as high as 14 million tonnes.

The possible available commercial resources, assuming all current E.I.S. proposals are approved, is as follows:-

C.T.K. Constructions Pty Ltd		
Sancrox		1.10 million tonnes
Bago (new Milligans Road deposit)		7.80 million tonnes
Maxwell Bros. Quarry Pty Ltd		
Quarry Road (Rosewood)	Q. Nº 1	0.76 million tonnes
	Q. Nº 2	0.77 million tonnes
	Prospect 3	2.60 million tonnes

Hurd Haulage Pty Ltd		
Grants Head Q and E.I.S. area		3.70 million tonnes
Taylors Quarry		0.40 million tonnes
Taylors E.I.S. area (unknown)		
Hastings Sand and Gravel Pty Ltd	Rocks Crossing	0.06
	After flood	0.60 million tonnes
Hurd Haulage Pty Ltd	Dunbogan sand lease	0.60 million tonnes
	Dunbogan E.I.S. area	2.40 million tonnes
Birdon Sands Pty Ltd	Limeburners Creek and Maria River leases	0.34 million tonnes
	Replenishment over 20 years	1.70 million tonnes
		22.83 million tonnes
Without the E.I.S. areas		12.60 million tonnes

There is only enough material approved to supply the Municipality for 18 years unless the E.I.S. areas are approved. Even then the reserves can be expected to last less than 30 years.

It is clear that quarries are an endangered species and will require protection from encroaching development in the immediate future. Unless drastic action is taken development will be brought to a halt as resources are exhausted or sterilised for HOUSE BRICKS, PATHS, ROADS, DAMS SEPTIC TANKS, SEWERAGE TREATMENT PLANTS, BRIDGES, SEA-WALLS, BOWLING GREENS AND MANY OTHER END USES.

SECTION 6

TOTAL REQUIREMENTS OF EACH PRODUCT TYPE

6. Requirements for each type of product for period 1993 to 2013

PRODUCT TYPE	PRESENT AVAILABILITY	TOTAL DEMAND
Road Base	3.46 million tonnes	7.5 million tonnes
River Gravel (or graded crushed rock)	0.60 million tonnes	0.81 million tonnes
Sand	0.92 million tonnes	3.37 million tonnes
Fill	Not yet estimated	38 million tonnes (if the R.T.A. figure for 1991/92 is included)

SECTION 7

FUTURE RESERVES

7. Future Reserves

7.1 Recommendations on protecting future reserves

7.1.1 *Discussion.*
It has been suggested that land could be zoned to provide future quarry areas. Whilst this will work in completely undeveloped areas there are others in which this cannot be done as approval has already been given for housing development. Maxwell's Quarry Road (Rosewood) Quarry is already affected in this manner.

A secondary problem is that zoning will require a buffer of up to 500m to avoid future sterilization of the resource. Due to the failure to abate the nuisance of the flippant nature of many recent objections to quarry development and the low cost to the objector compared to the developer (about $300 to the objector and possibly $300,000 to the developer) at least one major development of great importance has been stalled for years.

7.1.2 It is recommended that some areas of fine grained igneous rock such as microgranite or Trachyte be selected for zoning for the future. The paper by R. Daniels et al (1990) of the University of N.S.W. has outlined some of the constraints on developing Extractive Industry sites. Figure 4.1 from that paper included with the geological map (Section 10).

Consideration should be given to making the selection of geologically suitable areas a major part of Phase 2 of this project.

7.1.3 The immediate need is to make the public aware of the need for raw materials with which to carry out public works (roads, bridges, water-supply works, etc) and for the public to build brick homes, concrete paths, floor slabs, septic tanks and drainage etc. This initiative may abate the nuisance caused by flippant objections. It may be necessary for council to obtain legal opinion on the possibility of seeking costs or damages from any person making irrelevant objections which do not impact on their own occupied property.

7.1.4 With new applications for housing or industrial development in the vicinity of existing quarries (as shown on the geological map in Section 10 of this inventory), Council possibly could make their approval conditional upon the purchasers of newly developed land being bound by a caveat not to object to quarrying in the areas specified. This does not mean that Council would not require environmental impacts such as ground vibration and noise to be controlled in accordance with Australian Standards and mining regulations (administered by the Inspector of Mines).

7.1.5 Council could give consideration to writing to all residents on newly approved rural residential development in the vicinity of existing quarries pointing out the need for the material being produced, particularly where it is used for the roads serving those residents. A policy of refusing further subdivision of any rural residential lot where present occupants lodge objections without prior negotiation, of a meaningful kind, would deter flippant objections to some extent.

Section 4 of this report clearly demonstrates the need for immediate action to avoid shortages of materials for public works and future housing development.

7.2 Prospective areas for the next 50 years

7.2.1 Currently the commercial quarries are clustered in the south–eastern quadrant of the Hastings Council area and mostly within 25km distance of Port Macquarie.

7.2.2 Areas within 5 km of the larger towns in the Hastings Council area have been considered and the following comments are offered:

WAUCHOPE: The known geology as mapped by the Geological Survey of NSW does not show any promise for hard rock quarries except for the Hastings River, the development of which is severely restricted by the Department of Water Resources. However a new resource has been identified by Maxwell Bros Quarry Pty Ltd (See 7.1.1)

LAURIETON: There are potential resources within 5 km of Laurieton which are shown on the geological map as Triassic granitoids (Rbg) and Camden Haven group (Rec) and also the dunes behind Dunbogan Beach. However reserves and existing development have already sterilised most of these resources with the exception of the dune sand (See Section 2.3.1)

KEW: The potential resources in this area consist of Triassic granitoid (Rbg) Lower Triassic volcanics (Rlv) and the Camden Haven group (Rec) containing some conglomerate. The most urgent is the small circle containing a newly discovered source of volcanic rock in Kew, see Section 2.1.2.2.

TELEGRAPH POINT: Only the Tertiary volcanics and the river gravel in the Wilson River have any special potential geologically. However these appear to have been sterilised by environmental considerations and existing development. There is however a possibility of a new quarry development north of Telegraph Point.

COMBOYNE: Comboyne is surrounded by basalt outcrops and parts of this potential will require protection to avoid sterilization by future development.

The Triassic and Tertiary volcanics are probably the best source of future reserves in the 20 to 50 year period.

7.2.3 One serious problem is the encroachment of housing near the quarries established by the Department of Public Works to build and maintain the harbour breakwaters at Port Macquarie and North Haven. Only granitic rocks can usually provide the size of boulders required for the heavy duty areas of such harbour works.

7.2.4 Further field work is needed to remap newly found areas of igneous rock (mainly volcanic rock) in the general vicinity of circles shown on the map in *Section 10*.

7.2.5 Many of Council's existing quarries will require both expansion and relocation of the existing quarry faces as they have developed as temporary quarries alongside roads and at the bottom of hill slopes in many cases. This aspect requires attention in Phase 2 of this project.

7.2.6 Shale for use in fired clay bricks has not been developed by quarrying in the Hastings area. There appears to be potential in the rocks of the Lorne Basin for this purpose.

7.3 Commercial implications of the depletion of RIVER GRAVEL resources

The rapid depletion of RIVER GRAVEL in Hastings as set out in Section 4.2 has a serious commercial implication for Council. This arises because the only developed source of material within Hastings for uses as sealing aggregate, asphaltic concrete or hot mix aggregate, concrete aggregate or filter media is RIVER GRAVEL.

Within two years Council will be obliged to purchase aggregate for these purposes from outside the municipality unless at least one of the existing local quarry companies gains approval to develop a hard rock quarry. CTK Constructions Pty Ltd, Maxwell Bros Quarry Pty Ltd and Hurd Haulage Pty Ltd are all in the process of developing new hard rock quarries with great potential for supplying aggregate for the uses listed above. One of the remedies outlined in Section 7.1 may assist future development of a new resource.

The cost of buying aggregate from outside Hastings Municipality is indicated by the comparison of Hastings Sand & Gravel supply at around $20 per tonne compared to $40 per tonne for alternative supplies purchased by Council.

SECTION 8

LIST OF QUARRIES IN THE HASTINGS COUNCIL AREA

8. List of Quarries in Hastings Council Area

Nº	Map Ref.	Quarry Name	Location	Quarry Type	Gravel Quality
1.	R.9	C.T.K.	Sancrox Road	Commercial	Sealing
2.	R.4	Hurd Haulage	Ocean Drive, Bonny Hills	Commercial	Sealing
3.	P.8	Maxwells	Rosewood Rd	Commercial	Sealing
4.	Q.13	Babic's	Gum Scrub Rd	Private	Gravel road only
5.	G.4	Colling Pass	Elands Rd Bril Bril	Roadside	Gravel road only
6.	M.12	Bottle Brush	Bellangry Rd	Roadside	Gravel road only
7.	R.13	Bowds	Cooperabung Dve	Private	Sealing
8.	R.5	Butlers	Houston Mitchell Dve	Forestry	Sealing
9.	M.11	Fowlers	Sharkey's Rd	Private	Gravel road only
10.	M.5	Frenchs	Innes View Rd	Private	Gravel road only
11.	H.4	Schuberts	Boorgana Rd	Private	Sealing
12.	L.12	Wallaces	Cowal Ck Rd	Private	Gravel road only
13.	K.6	V. Ducks	Ponsford Rd	Private	Sealing
14.	P.6	M. Nelson	Milligan's Rd	Private	D.G.S. (sub-base)
15.	G.10	J. Noakes	Forbes River Rd	Private	Sealing
16.	K.9	Patterson's	Brombin-Kindee Rd	Private	Sealing
17.	Q.12	Red Hill	Red Hill Rd	Private	Sealing
18.	M.9	Rudder's	Brombin-Kindee Rd	Private	Sealing
19.	S.12	Woodlands	Off Maria River Rd	Private	Sealing
20.	P.5	Cedar Creek	Cedar Ck Rd	Forestry	Gravel road only
21.	E.10	Clissold's	Mt. Seaview Rd	Private	Fill gravel
22.	G.7	Costigans	Costigan Mtn Rd	Private	Gravel road only
23.	J.12	Flarretty's	Pappin Barra Rd	Roadside	Gravel road
24.	P.2	Foxes Ck on Middle Brother	Batar Ck Rd	Forestry	Sealing
25.	Q.8	Hastings Sand and Gravel	Rocks Ferry Rd	Commercial	Sand & aggregate
26.	J.9	Lindsay's	Toms Ck Rd	Private	Gravel road
27.	P.9	Lawsons	Mortons Ck Rd	Private	Fill gravel
28.	M2	Schroder	Stewarts River Rd	Private	Gravel road
29.	Q.11	Thurlings	MR.575	Forestry	Gravel road
30.	H.5	Toms Ck Mtn	Toms Ck Rd	Roadside	Gravel road
31.	P.9	Ringlands	Beechwood Rd	Private	River gravel
32.	H.6	Tilbaroo	Tilbaroo	Roadside	Sealing
33.	L.7	Wades	MR.112	Private	Sealing
34.	Q.5	Gilfillans	Innes View Rd	Private	Gravel road
35.	N.15	Littles	Littles Loop Rd	Private	Sealing
36.	K.8	O'Neill's	Oxley H'way	Private	Sealing
37.	N.14	Rodgers	Rollands Plain's Rd	Private	Sealing
38.	M.12	Russell's	The Cedars Rd	Private	Gravel road
39.	N.3	Tisdells	MR538 Lorne	Private	Fill gravel
40.	J.13	Pappin Barra	Pappin Barra Rd Ballen Garra	Roadside	Gravel only
41.	Q.12	Irvings	Bransdon Rd	Private	Sealing
42.	P.14	Galloways	Smiths Ck Rd	Private	Gravel only
43.	G.11	Coombes	Forbes River Rd	Private	Gravel road
44.	P.6	Bago	Milligans Rd	Private	Decorative
45.	M.8	Daleys	Oxley H'way	Private	Sealing
46.	L5	McIvers Rd	Playfords Rd	Forestry	Sealing
47.	M12	Forestry	Bellangary Bril Bril	Forestry	Sealing
48.	N12	Hamilton	Eastern Boundary	Private	Gravel road

SECTION 9

GEOLOGICAL FACTORS

9.1 Geological framework

Almost half of the Municipality is underlain by Carboniferous shaly sedimentary rock. In isolated patches there are some sandstones and conglomerates which can be used for road base material.

Volcanic rocks are generally the most durable source of first class crushed rock. In Hastings Municipality these are found principally in the far western part and the south-eastern quadrant (see the geological map in Section 10).

The area of the Municipality which has few constraints on quarry development is mainly barren of good prospects; however there are some volcanic rock areas of Tertiary and Triassic age in the south-eastern quadrant.

Recent finds of suitable rock for hard rock quarry development are:

(a) alongside the highway one kilometre south of the railway bridge adjacent to Ross Glen,

(b) CTK's prospect off Milligan's Road (Bago area) not to be confused with the old BAGO QUARRY,

(c) a large area near MAXWELLS ROSEWOOD QUARRY and

(d) a smaller area in Kew discovered by Hurd Haulage Pty.Ltd.

These latter finds could compensate for the depletion of river gravel aggregate which has been the main source of hard rock aggregate for concrete, hot-mix, sealing aggregate and filter media until now.

Alluvial sands are mainly confined to the coastal area but some are dredged from the Hastings River.

The most prospective future areas are:-

(i) In the vicinity of the new volcanic rock prospects shown on the map as small rings. A wider search among the mapped Triassic volcanics for suitable sites is needed.

(ii) The Comboyne volcanic area.

(iii) The Volcanics alongside the Oxley Highway in the far west of the Municipality.

(iv) The Microgranite west of Rolands Plains.

(v) Conglomerate and possible microgranite areas in the vicinity of Foxes Pit, providing the Forestry Commission will negotiate.

Limestone has been discovered and is subject of a mining lease application south-east of Wauchope in The Burrawan Forest. It is marked on the map with the symbol Ls.

The relationship between each quarry marked on the map in *Section 10* and the geology can be broadly evaluated by reading the map. Preliminary reports in *Section 2* give more detail but need expanding and Council Quarries are yet to be examined.

9.2 Historical Geological Events

In the Carboniferous period the Hastings region was covered by a shallow sea, basked in a warm climate, and had coral reefs near the shoreline. Tree ferns and conifer forests grew on the land adjacent to this shallow sea. There was then a considerable uplift of the area and glaciation affected the highlands in eastern NSW. The conglomerates which form a small part of the sediments shown as carboniferous on the map in Section 10 owe their origin to powerful rivers driven by the thaw of glaciers in summer and the gravitational force due to the high mountains shedding rainfall as swift streams which provided the cobbles and gravel to form these conglomerates. Intensive volcanic activity then occurred with a small outflow of lava but much ash which formed the tuffaceous sediments which helped to fill up the shallow carboniferous sea. Subsidence resulted in the deepening of the sea in the Permian Period. The sea floor was then thrust upwards to form mountains and lakes and the serpentine belts of Western Hastings resulted from sub-crustal intrusions of lava. During a period of further sedimentation the climate was moist and cold resulting in the formation of considerable thicknesses of coal from the accumulation and consolidation of peat. This was more prevalent further south near Newcastle.

Subsidence then formed depressions in the Lorne area which became large fresh water lakes. This was the Mesozoic period – the age of the Reptiles during which the sediments which later consolidated to form conglomerates (from cobbles and gravel), sandstones (from sand, silt and clay) and shales (from silt and clay) were then washed down the rivers eastwards from the mountains of Bowen uplift into the Lorne basin (Lake). This was followed by further powerful uplift and the intrusion of molten rock into the sedimentary rocks to form the Three Brothers, North Brother, South Brother and Middle Brother and also the other granitoid rocks north west of Middle Brother. The 'sills' (flat to mushroom shaped bodies of once Molten rock intruded along the bedding planes of the sediments. These sills are composed of fine grained volcanic rocks some are 'Trachyte' and others may be 'rhyolite'. Some of this volcanic rock has been found north west of Herons Creek.

A later uplift (the 'Kosiusko') formed the Comboyne Plateau and Blue Mountains. This was followed by an outpouring of basalt lava in the Tertiary period. Further glaciation on the highlands was the next event and it was accompanied by a small fall in sea level which has left its mark on coastal sand deposits. With the end of glaciation the sea level rose again due to melting of the ice caps and resulted in Tasmania being cut off from the mainland. The coastal river valleys were flooded subjecting them to tidal influence.

9.3 Possible opportunities for new INDUSTRY

9.3.1 As a direct result of this inventory being made it has been noted that (clay) bricks being sold in Hastings Municipality are not manufactured in the Council area. Kempsey and Wingham are the closest sources of bricks made from clay in the Mid-North Coast region: Boral and other companies still import many from Sydney. There are shales in the municipality as yet undeveloped which have potential for fired clay bricks whilst the Timber industry can supply fuel in the form of offcuts.

9.3.2 The Geological Survey of NSW have noted a potential source of limestone near Wauchope which is marked on the map accompanying this report.

Limestone crushed is a source of 'agricultural lime' or fired yields 'quicklime'. This is another opportunity for a new industry.

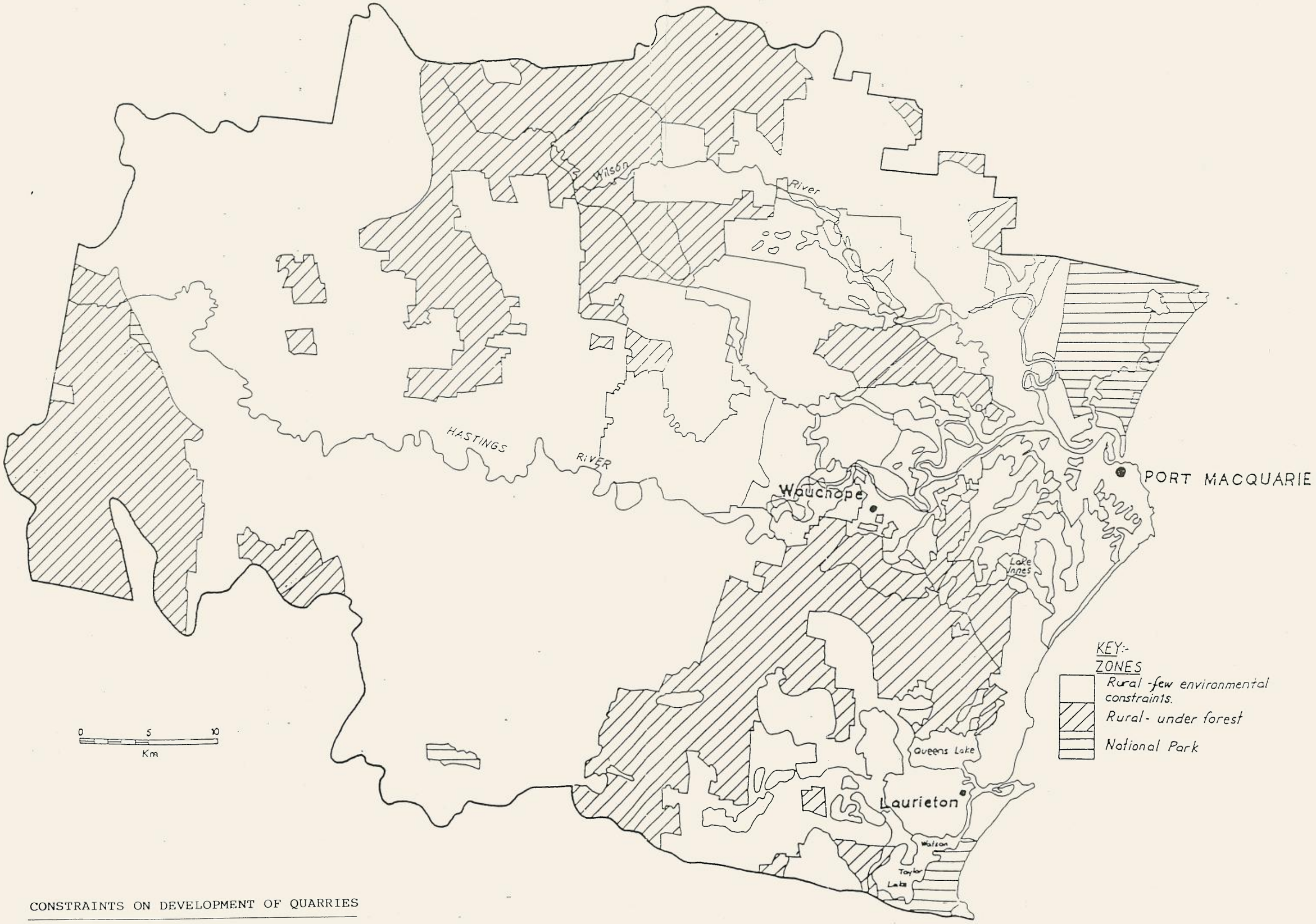
9.3.3 Whilst it has not yet been quarried, Serpentine is a potential source of 'bush rock'. In fact some has already been used on the town waterfront. This could grow into a significant industry.

Serpentine has been used as a building stone in some parts of the world but little is quarried in Australia. There might be suitable rock in the areas shown on the geological map of Hastings. It should be noted that surface outcrops are generally very strongly weathered.

9.3.4 There do not appear to be any significant 'loam' pits.

Birdon sands do produce small quantities of silt as a by–product of their sand operation but the main suppliers of soil are in Kempsey and Forster.

This absence of substantial pits suggests there is a possible need for local supplies but the demand would require a market analysis to verify this assumption.



CONSTRAINTS ON DEVELOPMENT OF QUARRIES

SECTION 10

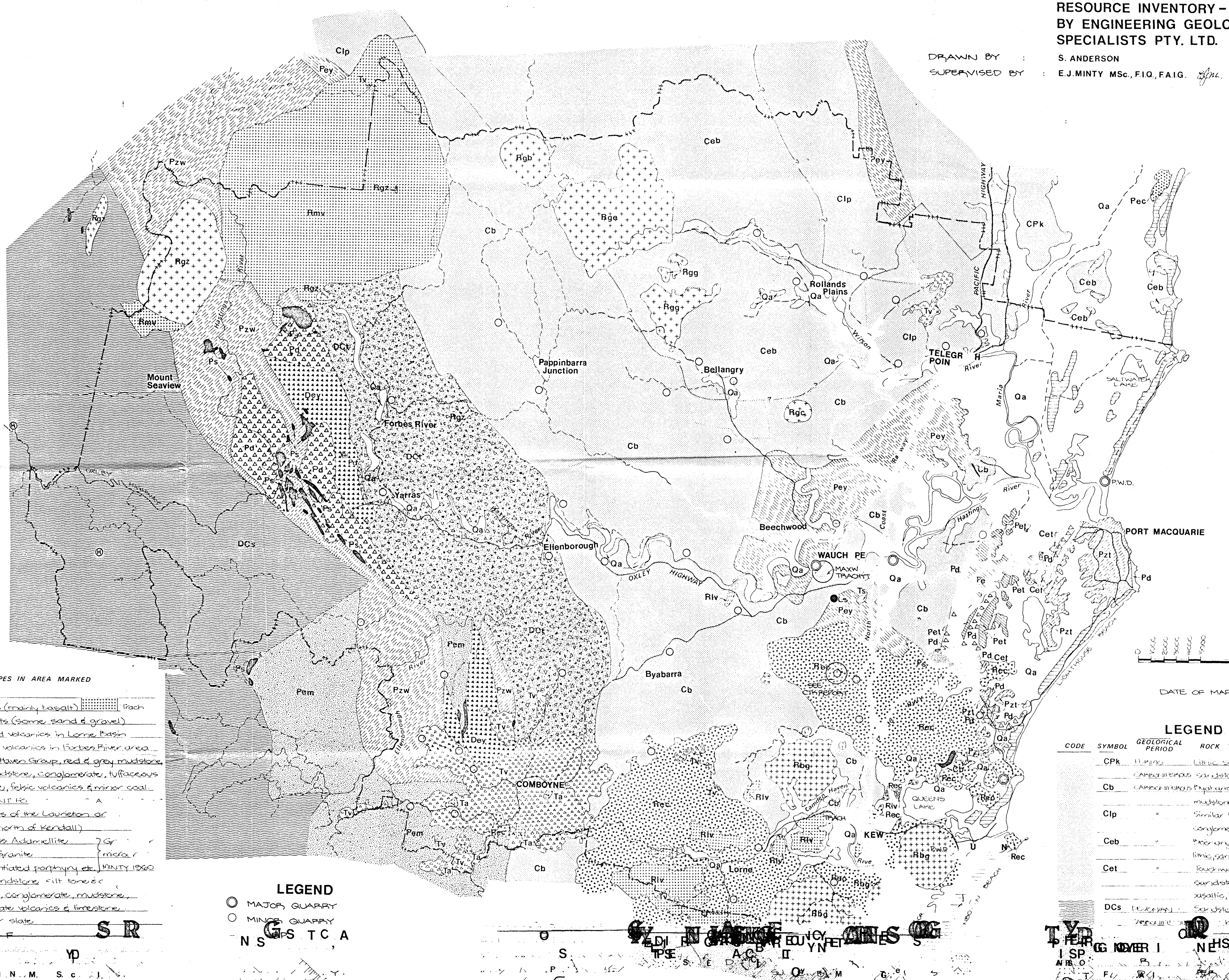
GEOLOGICAL MAP

QUARRY LOCATIONS AND GEOLOGY IN HASTINGS MUNICIPALITY

PREPARED FOR : HASTINGS COUNCIL, TO ACCOMPANY "A REPORT ON THE EXTRACTIVE INDUSTRIES RESOURCE INVENTORY - PHASE 1", BY ENGINEERING GEOLOGY SPECIALISTS PTY. LTD.

DRAWN BY : S. ANDERSON

SUPERVISED BY : E.J. MINTY MSc., F.I.Q., F.A.I.G.



DATE OF MAP : JULY 1993

LEGEND

CODE	SYMBOL	GEOLOGICAL PER	ROCK TYPES IN AREA MARKED
	Qa	QUATERNARY	Alluvium
	Tv/Ta	TERTIARY	Volcanics (mainly basalt) Trach
	Ts	"	Sediments (some sand & gravel)
	Rlv	TRIASSIC	Unnamed volcanics in Lorne Basin
	Rmv	"	Unnamed volcanics in Forbes River area
	Rec	"	Camden Haven Group, red & grey mudstone, lithic sandstone, conglomerate, tuffaceous sandstone, felsic volcanics & minor coal.
			SIGNIFICANT FO A
	Rbg	TRIASSIC	Granitoids of the Laurieton ar
	Rbd	"	Diorite (north of Kendall)
	Rgc	"	Cairncross Adamellite } Gr
	Rgg	"	Gundle Granite } micro r
	Rgz	"	Undifferentiated porphyry etc. } MINTY 1960
	Pec	PERMIAN	Lithic sandstone silt tone &c
	Pem	"	Diamictite, conglomerate, mudstone, intermediate volcanics & limestone.
	Pet	"	Thr ter slate

LEGEND

◎ MAJOR QUARRY

○ MINOR QUARRY

LEGEND

CODE	SYMBOL	GEOLOGICAL PERIOD	ROCK TYPES IN AREA MARKED
	CPk	PERMO- CARBONIFEROUS	Lithic sandstone, mudstone, pebbly sandstone & minor conglomerates
	Cb	CARBONIFEROUS	Byabarra Beds (sandstone, siltstone, mudstone, limestone & some tuff)
	Clp	"	Similar to Byabarra Beds but includes conglomerate, diamictite, & some minor coa
	Ceb	"	Beeranghi Beds (Mudstone, laminite, lithic sandstone, tuff, minor limestone & conglomerate)
	Cet	"	Touchwood Formation (Siltstone, sandstone, paraconglomerate, basaltic, breccia & keratophyric andesi)
	DCs	DEVONIAN - CARBONIFE	Sandstone, schist, phyllite, slate, chert ... & amphibolite.

APPENDIX A

Letter from Hastings Council to Quarry Operators/Extractive Industries

This letter from Council has been distributed to each major Quarry Operator.

The letter was accompanied by a Registration Form.

HASTINGS MUNICIPAL COUNCIL

ALL COMMUNICATIONS TO BE ADDRESSED TO
THE GENERAL MANAGER/TOWN CLERK

P.O. BOX 84, PORT MACQUARIE 2444
DX 7415
FAX (065) 84 9367

IN REPLY PLEASE QUOTE

TB:T.200.240
E.350.90.210

20 JUL 1993

All Quarry Operators/Extractive Industries

STATE ENVIRONMENTAL PLANNING POLICY (SEPP) No. 37 - CONTINUED MINES AND EXTRACTIVE INDUSTRIES

SEPP 37 was gazetted on 18 June 1993. This Policy seeks to allow existing extractive industries to continue operating during a 2 year moratorium period, and provide opportunity for operators to obtain consent for quarries and other extractive industries.

The SEPP was introduced as a result of a court decision which effectively limited all quarry and extractive industry sites to not expand laterally beyond the area actually physically used as at February 1986. This was likely to cause most if not all quarries to cease operating until development consent was obtained. Since quarries and all extractive industries are classified as "designated development", the process of obtaining consent is usually protracted and an expensive procedure.

SEPP 37 allows the continued use of quarries beyond the area used as at February 1986, provided that:

1. The continued operation is registered before 18 September 1993.

2. Expansion does not exceed the annual average area of expansion from the period 1986-87 to 1990-91, or the expansion that occurred in the period 1990-91, whichever is the greater.

3. The amount of material produced during any 12 month period does not exceed the annual average amount produced from the period 1986-87 to 1990-91, or the amount produced in the period 1990-91, whichever is the greater.

4. Submission of 3 monthly reports detailing expansion and material produced during the previous 3 months.

5. Consent is obtained prior to 18 September 1995.

Council has prepared a registration form to assist operators. A copy is enclosed.

Council urges you to fill out the attached registration form and submit it to Council. You should also commence preparation of a development application at the earliest possible date. This will ensure that you will be able to continue operating your quarry after September 1995.

It should be noted that registration requires you to establish the date that your quarry commenced operation. To prevent future dispute, should they arise from complaints or environmental concerns, you should attempt to produce independant evidence such as licences or permits granted by Government authorities, annual returns etc.

Please contact Tony Blue of Council's Town Planning Department if you have any enquiries.

Yours faithfully

A G McNamara
Chief Town Planner

enc

STATE ENVIRONMENTAL PLANNING POLICY NO. 37

CONTINUED MINES AND EXTRACTIVE INDUSTRIES

Registration Form - Quarry Operators

If space on this form is insufficient, attach additional information.

1. Operator

   Name:

   Address:

2. Location of Quarry

   Road:

   Locality:

   Lot/Portion:

   DP/Parish:

   Land Area:

   NB: A map, drawn to scale, must be attached, showing the land boundaries and dimensions and location of water courses.

3. Planning Controls

   The planning instrument which introduced the requirement for development consent for quarries was (check with Council's Town Planning Department): Tick One:

   Port Macquarie Planning Scheme Ordinance - 2 August 1969 ☐

   Hastings Interim Development Order no. 1 - 26 May 1967 ☐

   The current planning instrument is (check with Council's Town Planning Department).

4. Nature of Operation Prior to Planning Controls

NB: Most quarry sites will be in the area covered by Hastings Interim Development Order no. 1 which was the old Hastings Shire Council Area. Consequently, to be able to continue without a development consent, it will be necessary to demonstrate the quarry commenced operation prior to 26 May 1967, which was the date of commencement of the Interim Development Order.

* Date that quarry originally commenced operations: _____

* Please attach any documents which verify this date, or the earliest date able to be verified.

* Location of operation as at 26 May 1967 (attach a plan of location and opertion):

* Quantity of material produced each year prior to 1967 (include information known, and where not known make an estimate and clearly indicate the figures which are known and the figures that are estimates).

_____

_____

_____

_____

* Method of operation, type and capacity of equipment used:

_____

_____

_____

_____

* Transport routes used to deliver material:

_____

_____

5. Nature of Operation Since Planning Controls (since 26 May 1967):

* Plans showing the location of extraction and stockpiling, and clearly showing the area and depth of operations will need to be submitted.

* Type of material produced: _____

QUANTITY OF MATERIAL PRODUCED ANNUALLY (INDICATE IF ESTIMATES):

1967-68	Tonnes	1976-77	Tonnes
1968-69	Tonnes	1977-78	Tonnes
1969-70	Tonnes	1978-79	Tonnes
1970-71	Tonnes	1979-80	Tonnes
1971-72	Tonnes	1980-81	Tonnes
1972-73	Tonnes	1981-82	Tonnes
1973-74	Tonnes	1982-83	Tonnes
1974-75	Tonnes	1983-84	Tonnes
1975-76	Tonnes	1984-85	Tonnes

* Treatment to material carried out (crushing, screening, etc)

_____

_____

_____

* Loading facilities: _____

_____

* Type and capacity of plant and machinery currently used on site: _____

_____

* Year of upgrade of equipment from equipment stated in Question 4: _____

_____

_____

* Type and capacity of vehicles for material transport: _____

_____

* Hours of Operation: _____

_____

* Environmental safeguards employed to minimise water pollution, noise, dust and soil erosion (include details on plans): _____

_____

_____

_____

_____

_____

* Land and rehabilitation measures, including plant species (include on plans): _____

_____

_____

_____

6. Basis for Operating Limits During the Moratorium Period

Plans to be submitted which delineate for each year 1 July 1986 to 30 June 1991 the additional areas of land actually physically used in carrying out the operation.

AREA OF LAND USED AND AMOUNT OF MATERIAL PRODUCED:

YEAR	AREA OF LAND USED	AMOUNT OF MATERIAL PRODUCED
1986-87	m^2	tonnes
1987-88	m^2	tonnes
1988-89	m^2	tonnes
1989-90	m^2	tonnes
1990-91	m^2	tonnes