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DUNOON ROAD PLANNING STUDY

for
**LISMORE CITY
COUNCIL**

August 1994



**NORTHERN RIVERS ENGINEERS
PLANNERS & SCIENTISTS**

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- ☐ JP Collins (Feb. 1994) Dunoon Road Planning Study, Stage 1, Preliminary Archaeological Assessment.
- ☐ JP Collins (May 1994) Dunoon Road Planning Study, Stage 2 Archaeological Survey.
- ☐ James Warren (March 1994) Preliminary Flora and Fauna Assessment for Dunoon Road Planning Study.
- ☐ Letters from fifteen (15) Government Authorities or Agencies.

1.0 INTRODUCTION

1.1 Background

Northern Rivers Engineers, Planners and Scientists (NREPS) has been engaged by Lismore City Council to undertake a Planning Study to examine the feasibility of rezoning land west of the Dunoon Road and north west of the City of Lismore. The study area is approximately 200 hectares in area and is located 2 to 3kms north west of the Lismore Central Business District, on the western side of the Dunoon Road. It is in the ownership of a number of landowners, including Lismore City Council.

The study has been prepared in order to assess future landuse options for the site including urban residential development and rural residential development. The study has involved an examination of the various relevant statutory planning instruments relating to the site, analysis of the physical and human environments, engineering opportunities and constraints, and community and recreational facilities infrastructure requirements. These factors are considered in relation to development options and recommendations to Council for rezoning.

Most of the study area has been identified as a 1(d) Investigation Area in the Lismore Local Environmental Plan 1992. This zoning recognises the inherent characteristics of the land as having a potential for future higher order development.

The focus of residential development in Lismore in recent years has centred on the elevated land to the east of the city. Due to the constraints of the Wilsons River floodplain, this area which comprises Lismore Heights and Goonellabah/Hill Top has been growing rapidly in recent years and absorbed 77% of the 1986 - 1991 intercensal population increase for the Lismore City Council area. However the rapid development of these areas has resulted in an infrastructure lag with facilities for children and youth lacking, while infrastructure in the established areas of Lismore is adequate but residences flood affected. (LCC Community Profile:1992)

A submission to Lismore City Council in 1990 by consulting engineers, Ian Hill & Associates Pty Ltd on behalf of the Sexton Family, seeking rezoning to rural residential of part of the study area, was made available to the study team.

Lismore City Council is at present undertaking the preparation of a "Lismore 2020 Strategic Plan" through Council's Strategic Planning Unit. The plateau lands on Dunoon Road north of the saleyards (ie: the study area) were cited as a potential future residential area, as indicated in the Revised Summary Report of Community Consultations (Lismore City Council, Dec 1993).

The Study Team involving Northern Rivers Engineers Planners & Scientists (NREPS) comprised:

- Ian Pickles, Study Team Leader and Town Planner;
- Greg Alderson, Civil Engineer, Local Government Specialist & Traffic Assessment;
- Toby (H.J.) Fiander, Civil Engineer & Specialist in Hydrology Services and Wastewater Management;
- Wayne Moffitt, Environmental Planner; and
- Greg Mashiah, Professional Engineer.

Specialist consultants involved in the preparation of this report, other than those nominated in the NREPS team included:

- John Wade Engineering Surveyor
- Roger Dwyer Mapping and Aerial Photography
- Dr John Smith Geologist, Centre for Coastal Management, Southern Cross University
- Ted Houston Geologist, Centre for Coastal Management, Southern Cross University
- James Warren Biological and Environmental Consultant
- Jacqueline Collins Archaeologist

7.2 and 7.3 of this report (relating to reticulated and sewer services) have been prepared by Lismore City Council's Engineering Services Division.

1.2 Study Area within the Regional Context

The site is located on the plateau immediately to the north west of the City of Lismore, Northern New South Wales. The Lismore Local Government Area (LGA) is 1,267km² in area with a total population of 41,268 persons. (ABS:1991 figures from Lismore LGA Community Profile:1994). The LGA consists of the major urban areas of Lismore/Goonellabah and a number of villages including Nimbin, Clunes, Dunoon, Modanville and Wyrallah.

Lismore was identified as a "Regional Centre" in the Draft North Coast Urban Planning Strategy, defined as a Centre providing services and facilities for a major urban population and having the capacity for significant population growth, either zoned or potentially suitable for urban expansion.

In its capacity as a Regional Centre Lismore accommodates 2 major hospitals, a number of Commonwealth and State Government Departments, a number of financial and tertiary institutions and legal services including the Family Law Court and the District Court. Southern Cross University based in Lismore has an enrolment of some 5,700 students.

The Lismore LGA supports a diverse range of industries from all sectors. Rural industries include macadamia and tropical fruit propagation in the rich soils of the Alstonville plateau and around Dunoon. While dairying and beef cattle grazing supply the raw components to two of the largest processing industries on the North Coast, NORCO at Lismore and CASSINO at Casino.

The non-rural industries, apart from retail are linked to the role Lismore plays as a regional centre. The service industries which include public utilities, public administration and community services employ 38.1% of the Lismore LGA workforce, wholesale/retail industries employ 21% of the workforce, while manufacturing and rural industries employ 9.5% and 7.3% respectively. The construction industries employs 6.4% of the workforce. (Lismore LGA Community Profile:1994)

Lismore is experiencing a significant housing shortage due to insufficient readily available land, a reducing occupancy rate and rapidly growing population attributable to the influx of immigrants seeking the desirable "North Coast" lifestyle and a growing student population enrolled at Southern Cross University. (Lismore LGA Community Profile :1994)

In November 1993, the Department of Housing had a list of 710 applicants seeking public housing accommodation (a family is recorded as one applicant). The shortage in available housing places increased pressures on the rental accommodation market resulting in high rental prices.

1.3 Study Site

The study site is some 200 hectares in size with the plateau above the 100m contour forming the focus for the study, (See Exhibit 2 - Study Area Location) this area is elliptical in shape, 3.2km long and up to 750m wide in places. The elevated nature of the land gives very good views of Lismore City and parts of Lismore Heights and Goonellabah to the east, and to the west and north west a panorama of excellent grazing and farming lands. The site itself is also visually prominent from many parts of Lismore. Vegetation is confined to the steeper slopes and gullies and to the interspersed rocky outcrops. The site is presently used for grazing.

A basalt rock quarry operated intermittently by Lismore City Council, occupying about seven (7) hectares, is located in the central southern portion of the site. Another smaller quarry is located at the southern end of the site.

The site comprises a number of separate lots and titles under separate ownership (See Exhibit 4 - Cadastral Map of Site).

1.4 Terms of Reference

The terms of reference for the study were determined by:

1. Lismore City Council's brief to the consultants for preparation of the study; and
2. the various statutory planning requirements and guidelines applying under the Environmental Planning and Assessment Act 1979, other relevant legislation, and Council policies.

1.5 Consultation

During the course of preparation of this study, the study team consulted with the following persons:

- Graham Meineke Strategic Planning Manager, Lismore City Council
- Wayne Franklin Water & Sewerage Services Manager, Lismore City Council
- Dick Smith Executive Engineer and Airport Controller, Lismore City Council
- Malcolm Hawkins Quarry Manager, Lismore City Council

- Chris Hennessy Design & Investigations Engineer, Lismore City Council
- Bill MacDonald Traffic Engineer, Lismore City Council
- David Kanaley Lismore 2020, Strategic Planning Consultant
- Bruce Blackford Strategic Planner, Lismore City Council
- Gary Rees Design Engineer, Lismore City Council
- Phil Newton Telecom Lismore
- Gary Wardrop Development and Design Engineer, Northern Rivers Electricity
- Brian Olds Mines Officer Lismore, Department of Mineral Resources
- Mark Stanton-Cook District Conservationist, Soil Conservation Services
- Geoff Brownlow Resource Officer Armidale, Department of Mineral Resources
- John Gibson/
Carol Standing North Coast National Show Society (North Lismore Showground)

Letters were forwarded to the following Government Authorities seeking their views concerning relevant aspects of the study:

- National Parks and Wildlife Service;
- Department of Water Resources;
- Environment Protection Authority;
- Roads and Traffic Authority;
- North Coast Public Health Unit (Department of Health);
- Telecom Australia;
- Department of Mineral Resources;
- NSW Public Works Department;
- Northern Rivers Electricity;
- Airport Controller - Lismore City Council;
- New South Wales Department of Community Services;
- Department of Conservation and Land Management;
- Civil Aviation Authority;
- NSW Agriculture; and
- Department of School Education.

Consultations with landowners and their representatives took place at a meeting held on 19 January 1994 at Lismore City Council offices, and also on site discussions with some individual landowners.

1.6 Aims and Objectives

Derived from the study brief, the planning context and our initial review of site and locational characteristics, the following aims and objectives have guided the study :

- a) to provide a specific bio-physical analysis of the study area in terms of terrain, fauna and flora, hydrology, soils, landuses, and quarry resources;
- b) to investigate and quantify engineering constraints and servicing requirements for future development of the site;
- c) to examine various options for higher order development of the site, focussing particularly on residential development opportunities;
- d) to recognise the environmental, physical, visual and archaeological constraints of the site and the potential for conflicting landuses;
- e) to ensure that adequate and economic access and utility services can be provided to the site if developed;
- f) to recognise the potential benefits of urban residential development on the western side of Lismore as a means of facilitating the centrality of the Lismore CBD; and
- g) to recommend to Council the most appropriate form of development for future rezoning having regard for the various statutory planning, environmental management and development control guidelines which are relevant.

2.0 PLANNING CONTEXT

2.1 Introduction

This section examines the various planning controls and policies which are relevant to this study and land. State, regional and local planning provisions and planning instruments are examined as well as the strategic planning policies of the Lismore City Council.

The various requirements and comments by Government Departments which have responsibility for matters of relevance to the study, are referenced under the relevant sections of the report.

2.2 Lismore Local Environmental Plan 1992

This site and all land within the bounds of Lismore City come under the ambit of the Lismore Local Environmental Plan, gazetted 1992 (Lismore LEP 1992). This shire-wide Plan sets out the aims, objectives and range of uses permissible or prohibited in various zones and the relevant development standards and merit considerations applying to particular types of land use or locations (see Exhibit 9 - Current Zoning of Area).

Much of the site falls within the 1(d) (Investigation) zoning, recognising its strategic location and potential suitability for future higher order development, such as residential. The objectives of this zone are:

1(d) Investigation Zone - Objectives

- (a) To identify land which is to be investigated in respect of its suitability for rezoning.
- (b) To ensure that development within the zone is compatible with the anticipated future development of the land.
- (c) To ensure that development maintains the existing character of the locality and minimises disturbance to the scenic value of the landscape through clearing, earthworks, access roads and construction of buildings.
- (d) To ensure that development does not create unreasonable or uneconomic demands, or both, for the provision or the extension of public amenities or services.

Adjacent farmland and the fringes of the study area are zoned either 1(a) (General Rural Zone) or 1(r) (Riverlands Zone). A small cemetery site to the south has a zoning of 5 (Special Uses) while the urban areas south of the site within North Lismore consist of 2(f) (Residential (Flood Liable) Zone), 6(a) (Recreation zone), and 6(b) (Private Recreation zone).

Options for proposed zones include 1(c) Rural Residential Zone and 2(a) Residential Zone, the objectives for each of these zones are laid out below:

1(c) Rural Residential Zone - Objectives

- (a) to provide opportunities for rural residential living in areas in close proximity to existing villages and urban areas where services are readily and economically accessible;
- (b) to minimise the cost development to the general community by requiring persons benefiting from rural residential development to both pay for and provide their own on-site utility services, where appropriate;
- (c) to preserve and enhance the amenity of the rural residential area requiring the preparation of an environmental impact report or development control plan where the council deems necessary prior to the development of the land; and
- (d) to ensure a variety of lot sizes which are compatible with existing land use and reflect land capability.

2(a) Residential Zone - Objectives

- (a) to encourage a wide range of housing densities and types to ensure a maximisation of infrastructure and equitable distribution of housing densities;
- (b) to ensure the development of all land adequately provides for the demand for physical services and community facilities created by the additional population;
- (c) to permit development for other than residential purposes except where the scale, type and traffic generating aspects of the development will significantly alter the landscaping character or amenity of the surrounding residential area; and
- (d) to ensure the design quality of new development is compatible with the character of each residential area.

2.3 Residential Development Strategies

In 1988, Lismore City Council prepared two strategies as a basis for growth of planning of the city, namely:

- the Lismore City 1988 Residential Development Strategy; and
- 1988 Rural Residential Strategy.

In 1991 Council prepared an **Interim Residential Development Strategy Review for Urban Residential and Villages**. This review predicted a housing land/supply balance sheet, which forecast that short term deficits in land supply would occur in the fast growing Goonellabah/Hill Top corridor, and East Lismore, with a medium term deficit at Lismore Heights.

The **Interim Residential Strategy Review (1991)** recommended incremental rezoning of additional land at Goonellabah and East Lismore, and that 6% of overall growth be accommodated in the expanded villages of Clunes, Nimbin, Dunoon and Wyrallah subject to further study.

Any rezoning of land at the study area would need to be preceded by or accompanied by the formal revision of the Residential Development Strategy.

2.4 Draft North Coast Urban Planning Strategy 1993

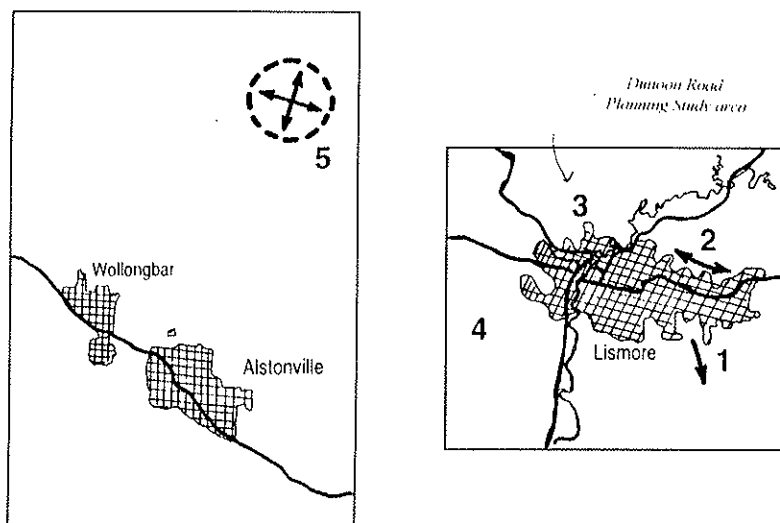
The Draft North Coast Draft Urban Planning Strategy 1993 has been prepared by the NSW Department of Planning in an attempt to accommodate the North Coast's significant population growth in the most economic, efficient and environmental sustainable manner while creating pleasant, safe and convenient places to live.

The document proposes that urban land release strategies for new areas are to:

"include measures to achieve better utilisation of urban land and a range of housing options - aiming to achieve a gross density of 15 dwelling units per hectare in new release areas, particularly in areas experiencing high rates of growth"; and

"guide growth firstly to those areas which can be readily provided with reticulated water and sewerage services. Where land is proposed for release which cannot be readily provided with such services, the strategy must demonstrate that a program is in place to provide those services within a reasonable time. The strategy should include details of how any new works are to be financed".

The diagrams in this draft strategy document (see below) indicate that Lismore has a range of opportunities for urban expansion beyond existing zoned land and a range of opportunities for urban infill and redevelopment within existing zoned areas. However opportunities for rural residential within and/or beyond existing zoned land is limited due to land stability, servicing or urban expansion issues. The range of urban residential development options for Lismore are outlined below:



Diagrams from Draft North Coast Urban Planning Strategy 1993.
(Department Of Planning)

1. Development of land south of the present Goonellabah urban area towards Wyrallah

Our Comments: Koala habitat, remnant patches of rainforest, conflict with agricultural activities, and land instability appear to be major considerations in the development of this land for urban development.

2. Infill development on the East Lismore-Goonellabah ridge

Our Comments: This option is feasible but the area does not have the capacity to absorb the expected demand for new housing and limits the choice of house sites for new residents.

Southern Cross University (formerly UNENR) is expected to increase its student population to over 6,000 persons by 1996. (Lismore LGA Community Profile:1994) The East Lismore- Goonellabah area is in close proximity to the University, an important consideration for transport disadvantaged students. The older style residences typically found in East Lismore also tend to serve the lower end of the residential market, a factor also considered by students generally requiring and desiring this level of accommodation. (Draft Interim Residential Strategy Review - Urban Residential and Villages: LCC:1991)

3. Possible new urban area out of the floodplain and north of Lismore

Our Comments: The Dunoon Road site falls within this area. It is flood free, close to the CBD, is not good agricultural land and has no significant flora remnants or areas of habitat potential. Development of this area will assist in maintaining the centrality of the present Central Business District.

4. Possible new urban area on the Canaiba Plateau

Our Comments: This area has been the focus of a study by Outline Planning Consultants in association with Christopher Murray and Associates. The study investigated the rezoning of Lots 11,12 and 13 D.P.808562, Frederick Road, Canaiba. Council decided not to proceed with rezoning this land due mainly to the high costs of servicing.

5. The fifth option is for a third village on the Alstonville Plateau

Our Comments: This area has long been considered for a third village, however good agricultural land is a major restriction to large scale expansion of existing urban areas and is a factor to consider in association with environmental constraints in the establishment of a new village.

2.5 Applicable Development Control Plans

A number of Development Control Plans prepared and adopted by Lismore City Council have some applicability to this Planning Study.

Development Control Plan No. 7 - Development of Flood Prone Land is applicable only in relation to site access.

Development Control Plan No. 14 - Residential Development has some relevance in that it sets down

design guidelines for residential buildings and medium density development.

Development Control Plan No. 25 - Lismore Urban Arterial Road System is relevant in relation to traffic access. This is discussed in Section 7.2 - Traffic and Access of this study.

Development Control Plan No. 27 - Buffer Areas is relevant in relation to North Lismore Quarry and potential conflicting landuses in the area, e.g. showground, stock saleyards, grazing lands.

Development Control Plan No. 29 - Extractive Industry is relevant in relation to any continuing use of the North Lismore Quarry. This is discussed in Section 7.8 - Quarry and Section 9.5 - Quarry Buffer of this study.

Council has adopted a number of Section 94 Contributions Plans for upgrading of services and facilities which also have some bearing on infrastructure provision in new release areas. These are now consolidated in a new Draft S.94 Contributions Plan exhibited in May 1994.

2.6 North Coast Regional Environmental Plan 1988

The North Coast Regional Environmental Plan (REP) applies to all land in Lismore City and other Local Government Areas on the North Coast of New South Wales. The Regional Environmental Plan is the principal planning instrument specifying Regional and State Planning Policies and as such embodies and consolidates many other policies of the Government into one (1) document. Councils are required to take into account the various relevant requirements of the Regional Environmental plan when rezoning land.

A number of alterations are proposed to be made to the REP by way of the "North Coast Regional Environmental Plan Draft Amendment No. 2". Objectives and Clauses of the Consolidated REP contained within this document and relevant to this planning study are outlined below:

Issue	Clause No.
Agricultural Resources	6, 12
Catchment Management	15
Geological Resources	16, 17
The Natural Environment	28,29
Heritage	34, 35, 36
Strategic Development	37, 38, 39, 40
Urban Housing	41, 42, 43
Environmental Hazards	44, 45, 45A
Commercial and Industrial Development	46, 47
Tall Buildings	49, 50, 51
Transport	52-56, 56A
Utility Services	57, 58
Health and Education	60, 61, 63
Community Services	64, 65, 66
Recreation	77, 78, 80, 82
Miscellaneous	83

2.7 State Environmental Planning Policies

State Environmental Planning Policies (SEPP) having some relevance to the assessment of this site, or to future residential developments options, include:

- State Environmental Planning Policy No. 6 - Height of Buildings;
- State Environmental Planning Policy No. 11- Traffic Generating Developments;
- State Environmental Planning Policy No. 25 - Residential Lot Sizes and Dual Occupancy Development; and
- Draft State Environmental Planning Policy - Subdivision.

2.8 Ministers Section 117 Directions

In the preparation of a Draft Local Environmental Plan, Council's are required to ensure that the proposed plan will be consistent with the relevant directions and determinations issued by the Minister for Planning on the format, content, principles and matters to be addressed in the plan. Most of these directions have been consolidated and embodied in the North Coast Regional Environmental Plan 1988. The following remaining directions have relevance to the preparation of any plan for rezoning of the study area:

G25 Flood Liable Land - This direction provides limitations on rezoning of land for urban purposes which is flood affected (Note: the study area is not subject to flooding, however, access to the area is flood liable).

G26 Residential Allotment Sizes - This direction requires that residential subdivision provisions of a plan for an urban area, will not prevent subdivision of land into allotments of less than 450m² for the erection of dwelling houses nor the development for the purposes of integrated housing involving the subdivision of land of not less than 5 lots, each with an area of not less than 232m².

G27 Bus Services - This requires that adequate account be taken of the need for and the feasibility for likely routes of bus services in the rezoning process.

S25 Development Near Licensed Aerodromes - In preparing a draft plan involving land in the vicinity of a licensed aerodrome, Council is required to control the height of buildings taking into account the Obstacle Limitation Surface for the particular licensed aerodrome and minimise the risk of obstacles to aircraft such as bird strike, by requiring consent for development in the vicinity of aerodromes which may increase risk.

2.9 Other Relevant Legislation

Other legislation having potential relevance to future use and development of the area could include the following:

- Environmental Offences and Penalties Act;
- Commonwealth Native Titles Act;
- Environment Protection Act;
- Local Government Act;
- Endangered Fauna(Interim Protection) Act;
- Water Supply Authorities Act; and
- Roads Act.

3.0 BIO-PHYSICAL ENVIRONMENT

3.1 Topography, Terrain and Soils

The main topographic feature of the site is a ridge line extending generally in a north-south direction from the floodplain of Leycester Creek in the south to the hill lands north of the Lismore urban area. The site rises from 12m AHD along Dunoon Road to 147m AHD on the ridgeline next to the North Lismore Quarry (Exhibit 3 - Site Contour Map).

The site is composed of four (4) distinct topographic components (See Exhibit 8 - Terrain Types):

1. **The flats (or lands of low relief) to the west of Dunoon Road**
The defining feature of this unit is the gradient, being less than 6%. These flats vary from less than 100m to several hundred metres wide before merging with the adjacent ridge to the west. These flats are subject to flooding during periods of intense or prolonged rainfall.
2. **The escarpment slopes to the ridgeline**
The escarpment slopes adjoin the western boundary of the flats and from this point rise rapidly to the plateau some 80m above. The escarpment slopes form the circumference of the plateau. Gradients on the escarpment slopes vary from 6-20% in the footslopes to 20-33% for much of the remainder. However, there are pockets with slopes in excess of 33%.
3. **The plateau**
This topographic unit is the focus of the study area. The plateau is approximately 140 hectares in size with gradients of between 6-20%.
4. **The ridgecrests**
The ridgecrests are a narrow band of land running through the centre of the site having both an easterly and westerly aspect. Small sections of the ridgecrests are flat with slopes of less than 6%. Pockets of vegetation remain on parts of these lands and are visually important to the site.

3.2 Geology and Soils

Geologically the site is dominated by the Lismore Basalt Group (Mt Warning volcanics) overlying Walloon Coal measures at depth. The flows were extensive and covered most of the region north and east of the present Richmond River. The material varies in type according to location and time of flow. It ranges in type from fine grained, almost tachylitic, types through even textured dolorites to porphyritic basalts with abundant large vitreous feldspars. (Richmond Valley Naturalists Club and Lismore Gem and Mineral Society:1975)

Lismore City Council has extracted some of this basalt from two sites in the south of the study area. Over the years in the order of 750 000m³ of material has been extracted and removed from the main North Lismore quarry (See Section 7.8 of this report).

On the upper slopes and on the plateau chocolate soils would dominate, with small pockets of Kraznozem soils also present. The chocolate soils have developed from the tertiary basalts such as the

Lismore group. The soils are generally chocolate coloured and have a clay to clay-loam top soil and a sticky clay subsoil that restricts drainage. According to Hartz (1982) the profile of the chocolate soils is generally quite shallow (less than 2 metres) but are generally well structured. The "A" horizon is typically composed of dark brown clay loams which gradually merge to darker brown clay subsoils. Carbonates are usually not present in the solum and subsoils are acid to neutral. (Planning Workshop Pty.Ltd:1983) The chocolate soils are crumbly in structure and frequently contain large rocks or floaters.(J.W. McGarity:1956)

Small areas of Krasnozom, (the "Big Scrub") soils are also present on the plateau. The krasnozom soils have dark red -brown to red - brown clay loam topsoils up to 30cm of medium crumb structure overlying a deep friable crumb to sub - singular blocky red or red - brown clay.

Loose basalt floaters are common on the site but distribution is variable depending on location. In places their presence is a severe restriction to grazing while in other areas they occur only as scattered surface rock. The presence of surface rock is an indication of the underlying geological structure. On the flats along Dunoon Road fertile black earths predominate.

Soil samples at eight (8) sites within the plateau study area were taken by the study team, and the area was inspected by geologists from the Centre for Coastal Management (Southern Cross University). Laboratory tests carried out on the samples by the Centre for Coastal Management, enabling classification of the soils using the Unified Soils Classification System. These results are indicated in the table with Exhibit 16.

The soils can generally be classified as "Moderately Reactive" clayey soils as per AS 2870.1 - 1988, the standard for design of residential slabs and footings. The footings designed to the normal footing construction type in the standard should be adequate, subject to detailed assessment at subdivision and building application stage.

3.3 Meteorology, Hydrology and Flooding

Lismore City is situated within the sub-tropical climatic zone and can be described as humid sub-tropical. Climatic regimes vary according to factors such as topography, altitude, aspect and exposure.

Rainfall is seasonally distributed with peak rainfall occurring in late summer and into autumn. This seasonal rainfall pattern correlates with the cyclone season which extends from December to April, during these events the city may be subject to gale force winds and torrential rainfall for a number of days.

Rain may also occur in the form of localised thunderstorms which bring strong winds, hail and short periods of intense rainfall. Storms of this nature may occur at any time of the year but are most common from September to January, with November and December being the most likely months.

Late winter and early spring are typically the "dry months".

**Total Average Annual and Monthly Rainfall for the City of Lismore
(mm units)**

Month	Jan	Feb	Mar	Apr	May	June	
Totals	157.0	183.5	202.3	140.8	116.6	102.6	
Month	Jul	Aug	Sep	Oct	Nov	Dec	Total
Totals	77.7	56.9	41.3	85.8	103.9	133.8	104

Source: Bureau of Meteorology:1994)

The site experiences mild to hot temperatures throughout the year. During summer conditions are warm to hot while winters are cool to mild.

SURFACE WIND DATA FOR LISMORE

Month	Time (Hrs)	Modal Direction	Month	Time (Hrs)	Modal Direction
January	0900 1500	SW NE	July	0900 1500	SW SW
February	0900 1500	SW SE	August	0900 1500	SW SE
March	0900 1500	SW SE	September	0900 1500	SW SE/NE
April	0900 1500	SW SE	October	0900 1500	SW NE
May	0900 1500	SW SE	November	0900 1500	SW N

Source: Bureau of Meteorology

The estimated 1% flood level affecting the southeastern valley flats below the study area is 12.9 metres AHD and the "flood line" actually forms the boundary between the Riverland 1(r) and General Rural 1(a) zones. The study area itself is elevated above the floodplain.

The landform of the site also ensures that runoff from the site is relatively rapid. Water drains down moderately steep, thickly vegetated gullies on both sides of the plateau to either Wilsons River or Leycester Creek. There are four defined watercourses draining away to the east of the site and seven watercourses draining away to the west of the site. A number of the watercourses have been dammed to provide water for cattle grazing the plateau.

Although not directly affecting the site, flooding may restrict access to the site through North Lismore. Minor flooding events in North Lismore are caused by flood waters overtopping the stream banks of Wilsons River. Below a gauge height of eight metres flooding effects are minimal. Floods with a gauge height of 9.5 metres and above become increasingly severe. In major floods of 11 metres or

floods can enter North Lismore from Leycester Creek.

3.4 Vegetation and Habitats

The fauna/flora assessment of the site was undertaken by James Warren, Biological and Environmental Consultant. The aims of the study were to provide:

- (a) a habitat assessment of the study site;
- (b) a habitat conservation assessment of the study site;
- (c) an assessment of impact on endangered fauna; and
- (d) recommendations so as to ameliorate any impacts on flora and fauna.

3.4.1 Vegetation

An assessment of vegetation occurring on-site was undertaken in February 1994. Mapping of the vegetation was achieved utilising a 1994 colour aerial photograph of the site, vegetation boundaries were confirmed by ground truthing.

Five (5) distinct vegetation communities were identified as occurring on site, these are described in the following table. The distribution of each community is shown in Exhibit 10.

DESCRIPTION OF VEGETATION COMMUNITIES

Community Name	Structure	Habitat	Dominant Species Present
COMMUNITY 1			
Closed Forest (Dry) Rainforest	Trees to 14m Shrubs to 5m Herbs to 0.2m Climbers present	Slight to steeply sloping land on thin rocky red/brown krasnozem soil.	<i>Guioa semiglauc</i> <i>Mallotus claoxyloides</i> <i>Mallotus phillippensis</i> <i>Cupaniopsis parnifolia</i> <i>Jagera pseudohus</i> <i>Anytera divaricata</i> <i>Aphananthe philipensis</i> <i>Pentaceras australe</i> <i>Cinnamomum camphora</i>
COMMUNITY 2			
Closed Forest (Camphor Laurel - Dry Rainforest)	Trees to 16m Shrubs to 5m	Slight to steeply sloping land on thin rocky red/brown krasnazem soil.	<i>Cinnamomum camphora</i> <i>Guioa semiglauc</i> <i>Mallotus phillippensis</i> <i>Cupaniopsis parviflora</i> <i>Jagera pseudorhus</i> <i>Aryteras divaricata</i>
COMMUNITY 3			
Closed Forest (Hoop Pine - Camphor Laurel)	Trees to 25m Shrubs to 5m	Slight to steeply sloping land on thin rocky red/brown krasnozem soil.	<i>Araucaria cunninghamii</i> <i>Cinnamomum camphora</i> <i>Guioa semiglauc</i> <i>Mallotus phillippensis</i>
COMMUNITY 4			
Open Forest (Forest Red Gum)	Trees to 18m Shrubs to 5m	Slight to steeply sloping land on thin rocky red/brown krasnozem soil.	<i>Eucalyptus tereticornis</i> <i>Desmodium acanthocladum</i> <i>Croton verreauxii</i> <i>Lantana camera</i>
COMMUNITY 5			
Grassland	Trees to 20m Shrubs to 5m Grasses to 0.2m	Slight to steeply sloping land on thin rocky red/brown krasnozem soil.	Numerous aggressive exotic herb and grass species. <i>Cinnamomum camphora</i> <i>Desmodium acanthocladum</i> <i>Meliocope erythrococca</i>

These communities are analysed as follows:

Community 1 - Dry Rainforest

This community is in reasonable condition given that it is a regrowth community resulting from complete clearance. The canopy is comprised of species considered to be common pioneer/ regrowth species, no old growth trees remain. Opportunities will arise for the re-establishment of tertiary phase rainforest trees to take their place in the canopy, however the present simple canopy and understorey composition is expected to prevail for an extended period of time.

With reference to (Briggs and Leigh, 1988), one significant plant species was recorded in this community.

Acronychia baeuerlenii (Byron Bay Acronychia) (3RC)

Community 2 - Camphor Laurel - Dry Rainforest

This community is in poor condition relative to its original rainforest structure. The community has been completely cleared and subsequently invaded by the aggressive exotic, *Cinnanomum camphora* Camphor Laurel, to the exclusion of all rainforest species.

Another exotic problem species is *Lantana camara*, Lantana bush. This species occurs in high densities in parts of this community.

Reference to (Briggs and Leigh, 1988) revealed that there were three (3) significant plant species recorded in this community:

Acronychia baeuerlenii (Byron Bay Acronychia) 3RC

Tinospora tinoporoides (Arrow head vine) 3VC

Desmodium acanthocladum (Thorny Pea) 2V

In addition a regionally significant species (Williams & Harden 1984) namely, *Tinospora smilacina* (Tinospora vine), was located.

Community 3 - Hoop Pine - Camphor Laurel

This community is in poor condition relative to its former structure and status. Hoop pines would have originally occurred as emergent species in the dry rainforest on the study site generally.

No significant plant species were recorded in this community

Community 4 - Forest Red Gum

This community is in poor condition relative to its original structure and status. Rainforest shrubs would have originally comprised the understorey, with Forest Red Gums in a dense to mid-dense overstorey.

This community occurs along most of the NSW coast and into south east Queensland.

No significant plant species were recorded in this community.

Community 5 - Grassland

This community is in an extremely poor state relative to its original forested structure. It is dominated by aggressive exotic herb and grass species. Single trees or tree clumps occur, these are most commonly comprised of Camphor Laurel.

Reference to (Briggs and Leigh, 1988), revealed that one (1) significant plant species was recorded in this community:

Desmodium acanthocladum (Thorny Pea) (2V)

Thorny Pea occurs in high numbers in this community type, either as isolated shrubs, in conjunction with isolated regrowth, or on the margins of forested areas.

One (1) regionally significant plant species was recorded from this community:

Meliocope erythrococca (Tingleton) - Uncommon in NSW (Williams and Harden, 1984)

3.4.2 Fauna and Habitats

James Warren also carried out a fauna and habitat analysis of the site.

The methodology for this analysis was developed with a view to clarifying or identifying the occurrence of endangered fauna in the development area and the consequent potential impacts of the development on these species. The following methods were utilised:

Method 1: Perusing recent records

Records of endangered fauna expected to occur in the Lismore locality were obtained from a National Parks and Wildlife Service (NPWS) database search. The search revealed the following:

ENDANGERED FAUNA CONSIDERED LIKELY TO BE FOUND IN THE LISMORE LOCALITY

Common Name	Scientific Name
Koala	<i>Phascolarctos cinereus</i>
Black flying fox	<i>Pteropus alecto</i>
Marbled frogmouth	<i>Podargus ocellatus</i>
Black-necked stork	<i>Xenorhynchus asiaticus</i>
Wompoo fruit dove	<i>Ptilinopus magnificus</i>
Rose crowned fruit dove	<i>Ptilinopus regina</i>
Red tailed tropic bird	<i>Phaeton rubricauda</i>

The following species are considered as possible occurrences in the Lismore locality:

ENDANGERED FAUNA CONSIDERED AS POSSIBLE OCCURANCES IN THE LISMORE LOCALITY

Common Name	Scientific Name
Swift parrot	<i>Lathamus discolor</i>
Superb fruit dove	<i>Ptilinopus superbus</i>
Marbled frogmouth	<i>Podargus ocellatus</i>
Sooty owl	<i>Tyto ocellatus</i>
Hoary owl	<i>Chalinolobus nigrogriseus</i>
Bent-wing bats	<i>Miniopterus spp.</i>
Mastiff bats	<i>Mormopterus spp.</i>
Greater broad-nosed bat	<i>Nycticeius rueppellii</i>
Northern long-eared bat	<i>Nyctophilus bifax</i>
Yellow-bellied sheath-tail bat	<i>Taphozous flaviventris</i>
Yellow-bellied glider	<i>Petaurus australis</i>
Common planigale	<i>Planigale maculata</i>

Based on habitat requirements and ranging behaviour the following species are considered unlikely to occur on or near the subject site, or have any reliance on the habitat or portions contained within the site:

Xenophrynchus asiaticus (Black-Necked Stork)
Phaeton rubricauda (Red-Tailed Tropic Bird)
Ptilinopus magnificus (Wompoo fruit Dove)

The following species are considered as possible occurrences on or near the site or to have some reliance on habitats contained within the study area:

Planigale maculata (Common Planigale)
Pteropus alecto (Black Flying Fox)
Miniopterus spp. (Little Bent-Wing Bat)
Nycticeius rueppellii (Greater Broad-Nosed Bat)
Nyctophilus bifax (Northern Long-Eared Bat)
Chalinolobus nigrogriseus (Hoary Bat)

Method 2: Fauna Surveys

A fauna survey was carried out in January and February, 1994. It was anticipated that summer sampling would provide more data than a winter sampling program.

The fauna survey consisted of the following components:

- small mammal trapping program;
- hair tube program;
- bat ultrasound detection (Anabat II);
- tape recording frog calls during light rainfall in transects across the site;
- utilising playback tape techniques for endangered bird species, (ie: Powerful Owl, Masked Owl);
- spotlighting; and
- ground searches for bones, droppings, diggings, and tracks etc.

All traps and hair tubes were baited with peanut butter, honey, rolled oats and vanilla essence.

The faunal observations on the site recorded ten (10) amphibians, three (3) reptilian species, twenty three (23) bird species and eight (8) mammal [four (4) native] species. There were no indications of the presence of any endangered faunal species.

3.4.3 Habitat Conservation Assessment

Three categories were utilised by Mr Warren to prioritise the conservation value of the habitat of the various sites. The criteria for each of these categories and the implications of each for development are outlined below:

1. High Conservation Value

Criteria:

Good Forest Structure
Low degradation due to exotic plant invasion
Observed or good potential habitat for endangered fauna
Good diversity in habitat types
Above four (4) hectares in size
Is linked or provides links to other areas of habitat

Implications for Development:

No development should occur in this vegetation and a buffer to the vegetation should be provided. Buffers should generally be 20m in width. These buffer areas should be rehabilitated by ensuring exotic plants, lantana in particular, are removed and plantings of native species are carried out. No areas of High Conservation Value occur in the study area.

2. Medium Conservation Value

Criteria:

Some forest structure
Some degradation due to exotic species occurrence
Unlikely to provide habitat for endangered fauna
Low diversity of habitat types
1-4 hectares in size

Implications for Development:

Development can be carried out in this vegetation and a buffer to the vegetation should be provided. Conditions should include a complete restriction on the removal of old growth trees, particularly those with hollows. Any native tree over five metres in height which is removed as a result of development should be replaced at a ratio of 2:1, preferably with a species similar to that removed.

3. Low Conservation Value

Criteria:

Poor forest structure
Highly degraded due to exotic species and grazing and/or logging
Very highly unlikely to provide habitat for endangered fauna
Poor or no habitat diversity
Less than one hectare in size

Implications for Development:

Development should be allowed in the vegetation with no conditions.

Exhibit 11 shows the Conservation value allocated to the main habitats of the study site.

3.4.4 Conclusions

James Warren concluded that the effect of this proposal on the environment of endangered fauna is

not considered to be significant in terms of Section 4A. of the Environmental Planning and Assessment Act, 1979. Conservation categories and ameliorative measures are provided to assist in reducing any impacts which may occur as a result of this development.

In terms of development constraints, no part of the site has high habitat or vegetation conservation value. However, the various vegetation communities identified by James Warren as being of medium value require careful design of development, and the opportunity for siting public and private open space and bushland regeneration spaces within and between such areas. Exhibit 11 shows the area recommended by James Warren which could be the focus of conservation and rehabilitation.

4.0 HUMAN ENVIRONMENT

4.1 Past Landuses and Occupations

Aboriginal people are thought to have occupied the general region for some 22 000 years (Neal & Stock:1986). It is thought that some 4 000 years ago Aboriginal numbers began to dramatically increase in the area. As the population grew groups split and moved into previously uninhabited areas. The group which inhabited the Lismore area were part of a larger linguistic unit known as the Bundjalung, a group which occupied the area between the Clarence and the Logan Rivers. Refer to Section 4.5 of this report for more details.

The first European inhabitants of the Lismore area, as in many other regions were the cedar getters.

"Lismore grew where cables were strung across Wilsons and Leycester Creeks. The first survey of the town site in 1855 showed the huts of cedar getters located at the site of the future town".(Department of Planning :1989).

When the supply of cedar was near to exhaustion much land was cleared for dairy farming purposes. Dairying prospered for many years but declined drastically in the 1970s with many farmers forced to convert to beef cattle production and horticultural industries to remain viable.

Anecdotal evidence suggests that this site was used for dairying and some small crop production.

4.2 Existing Landuses

The slopes and flats below the 100m contour interval and the plateau above this level are generally cleared lands planted under native and exotic pastures and used for beef cattle grazing. Reference to the site plan reveals properties ranging from small holdings 2 hectares in size to medium sized grazing properties up to 58 hectares in area. An assessment of agricultural potential of this site and surrounding lands has been undertaken in section 4.4.

A large quarry located in the central southern portion of the site is known as the North Lismore quarry. Until 1972 annual production averaged 30 000 tonnes, after 1972 annual production was significantly reduced to 1 000 tonnes. Since 1986 yearly production figures have been as follows:

- 1/7/86 - 30/6/87 less than 100m3;
- 1/7/87 - 30/6/88 less than 100m3;
- 1/7/88 - 30/6/89 less than 100m3;
- 1/7/89 - 30/6/90 less than 100m3;
- 1/7/90 - 30/6/91 less than 100m3;
- 1/7/91 - 30/6/92 990m3; and
- 1/7/92 - 30/6/93 2500m3.

The North Lismore Quarry is designated as a "Minor Quarry" with an annual production of less than 5 000m3. (Development Control Plan No. 29 Extractive Industries: Lismore City Council:May 1994)

In accordance with the requirements of State Environmental Planning Policy (SEPP) No. 37 - Continued Mines and Extractive Industries, the quarry was formally registered in September 1993, the annual extraction capacity of the quarry was set at 2 000m³.

The material from the quarry is primarily used within the city urban area with a radius of up to 10 kilometres. (Source: SEPP No. 37 Registration for North Lismore Quarry, Lismore City Council, September 1993)

The quarry is currently classed as a "Minor Quarry" (DCP No. 29: LCC:1994), requiring a 300 metre primary buffer and a 400 metre secondary buffer. However, as indicated in Section 7.8 of this report, preliminary investigations on behalf of Lismore City Council, owner of the quarry, confirm an extractible basalt rock resource, probably suitable for use in flood levee bank construction.

4.3 Surrounding Landuses

To the south east of the site and across Wilsons River lies the CBD of the City of Lismore. The city has a population of 41 268 persons. This area provides a very large range of retail goods and provides a variety of services including legal, banking and those provided by the State and Federal Governments.

The 1991 Census populations of Central, North and South Lismore areas close to the Study Area, and of Urban Lismore, were as follows:

- Urban Lismore - total 26,800 persons;
- Central Lismore - total 4,600 persons;
- North Lismore - total 1,366 persons; and
- South Lismore - total 3,147 persons.

(Lismore City Council, 1994: Lismore Local Government Area Community Profile)

This area is susceptible to flooding, this threat will however be reduced with the emplacement of the proposed flood levees.

The Lismore showgrounds are located adjacent to Dunoon road, east of the site. These grounds are the location for the annual North Coast National Show in September each year and provide facilities for a number of other agricultural demonstration days throughout the year. The showground also serves as a raceway for the local speedway club. Races are held an average once a month. Section 10.7 gives further information on the showground activities.

North of the showgrounds and adjacent to Dunoon road lies the racetrack for the Lismore Go-Cart Club.

The Lismore saleyards are located on the western side of Dunoon road. Cattle sales are held here most Thursdays during the year.

Macauley's Lane industrial area in North Lismore lies directly below the study site, industries in this area include concrete manufacture, stonemasonry, hardware, mechanical repairers and a small number of houses.

The remainder of the land to the east of the site is generally agricultural in nature.

To the south of the site and over Leycester Creek lies the residential area of South Lismore, the Lismore Industrial Estate and Lismore airport. Like North Lismore, South Lismore is susceptible to regular flooding. This area is also affected by DCP 7 (Development of Flood Prone Land) and should see a slow decline in population unless flood mitigation measures are put in place.

Lismore Airport to the south has been the focus of correspondence with the Civil Aviation Authority and the LCC as the airport owner. Correspondence from Council noted that the noise exposure contours were based on existing traffic and anticipated aircraft traffic up until the year 2 000. It also noted that the subject development is clear of the 20 A.N.E.F (Australian Noise Exposure Forecast) and should not present a problem in relation to most aircraft movements. However when the wind direction is predominantly from the south, light aircraft fly over the subject land as a part of their approach to the airport. (See Exhibit 20)

With reference to Council's Development Control Plan No. 27 (Buffer Areas) the site falls within the 4 000m radius from the end of the runway where no structure or installation is to be erected without the specific approval of the CAA . The natural ground levels of the ridge also conflict with the basic requirement of the CAA. Therefore any development on the ridge anticipated to be of a height greater than that of the surrounding trees, such as a radio mast or similar, or high rise residential buildings would be of concern to council and not likely to receive approval.

4.4 Agricultural Assessment

Based on the Land Agricultural Classification System (Dept. of Planning:1988) and taking account of site features, the plateau could generally be considered to be Class 4 land. Isolated pockets do exhibit some of the characteristics of Class 3 land, however, their size is insufficient to warrant actual Class 3 designation.

Exhibit 12 indicates the Agricultural Land Classification by the Department of Agriculture (1983 Rural Lands Study - Lismore City Council).

Class 4 lands are defined as:

"Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques. Production may be seasonally high but the overall level of production is low as a result of major environmental constraints."

Class 3 lands are defined as:

"Grazing land or land well suited to pasture improvement. It may be cultivated or cropped in rotation with pasture. The overall production level is moderate because of edaphic or environmental constraints. Erosion hazard, soil structural breakdown or other factors including climate may limit the capacity for cultivation and soil conservation or drainage works may be required. "

Certain parts of the plateau could be considered as rather poor Class 4 land due to the severe nature of the rock intrusion. In some cases the degree of surface rock is severe enough to limit grazing and pasture management practices such as slashing, and would most definitely preclude any type of cultivation.

In other areas, where the underlying geology is more favourable the degree of surface rock intrusion is minimal and limited cultivation is known to have taken place. However, in the long term the degree of difficulty in getting machinery from the lower slopes to the plateau and the limited size of suitable sites for cultivation may restrict these areas to being the better grazing lands of the plateau rather than potential sites for cultivation.

The grazing quality of the land is also restricted due to the availability of water on the plateau. Rainfall in the five (5) months over which the study was undertaken was relatively abundant. However, the water level in the dams on the plateau become depleted during the spring - summer dry season, forcing cattle to travel between the pastures of the plateau and a permanent dam on the footslopes of the ridge.

Reference to the Map of Protected Lands, produced by the Catchment Areas Protection Board reveals that the steeply sloping land also fall within the ambit of Paragraph (a) of Section 21(b) of the Soil Conservation Act, 1938. These are lands which have slopes of greater than 18% from horizontal.

Certain restrictions are placed on the removal of vegetation on restricted lands under the Soil Conservation Act 1938, administered by the Department of Conservation and Land Management (CALM) and, the Endangered Fauna(Interim Protection) 1992, administered by the N.S.W National Parks and Wildlife Service (NPWS).

Based on the Land Capability Classification of 7 (Soil Conservation Service), and taking into account the features of these slopes, an Agricultural Suitability of 5 is appropriate for these steeply sloping lands.

Class 5 Agricultural land is defined as:

"Land unsuitable for agriculture or at best only suited to light grazing. Agricultural product is very low or zero as a result of severe constraints, including economic factors, which preclude land improvement."

The North Coast Regional Environmental Plan, 1988, (North Coast REP) aims to retain land for agricultural pursuits if it is prime crop or pasture land, defined as land identified by the Director General of Agriculture as comprising Classes 1, 2 or 3 of a classification set out in the Rural Evaluation Manual. No land at this site is considered to be in Classes 1, 2 or 3, and therefore the agricultural status or potential of the land is not a constraint to rural residential or residential use.

To the west of the site the flood prone nature of the low lying lands associated with Boerie and Leycester Creeks is suited to grazing or cropping, but would preclude the development of intensive animal husbandry facilities such as feedlots, dairies and piggeries.

4.5 Archaeology and Heritage

Consulting archaeologist J.P. Collins undertook a preliminary archaeological assessment of the site in February 1994 (Stage 1 Study) based on documented archaeological evidence for the Lismore area and preliminary consultation with Elders from the Ngulingah Local Aboriginal Land Council. This was followed by a more detailed archaeological survey (Stage 2) which was the subject of a report dated May 1994 by J.P. Collins. Due the relative scarcity of Aboriginal archaeological sites within Big Scrub rainforest areas and the potential importance of the area to local Aboriginal people, any archaeological site which did exist would have potential significance given the paucity of known sites in similar environmental contexts.

The archaeological survey, which was conducted with the assistance of two representatives from the Ngulingah Local Aboriginal Land Council, failed to locate any evidence of Aboriginal activity on the formally rainforested ridge. While surface vegetation limited the survey to an inspection of available of exposures, the result accords with the general perception that rainforest exploration resulted in a low-level of cultural discard compared with areas supporting other vegetation types.

Whilst the whole North Lismore area in general is of importance to local Aboriginal people, much of this importance centres around the traditional values associated with the Lismore Showground area, and the heritage value of the post-contact campsite existing prior to the 1920's on the southern end of the study area above the Pioneer Memorial Cemetery. The archaeological survey report indicates the method of field investigation, consultations, and historical research.

Given the negative results of the survey, the likely low density of archaeological material which may remain undiscovered, and extensive European disturbance on the ridge, further archaeological survey/investigation or monitoring of the development-related activities is not considered warranted (see Archaeological Survey of Site, May 1994, J.P. Collins). There are no specific Aboriginal concerns for the rezoning proposal and J.P. Collins has recommended that no constraints be applied to the rezoning on grounds of Aboriginal archaeology.

One European historic site, a well-preserved section of dry stone wall approximately 300 metres in length was located during the survey in the northwestern part of the site. J.P. Collins considered this structure to date from the late 19th Century and as such constitutes a relic under the Heritage Act, having local historic significance and potential significance as an educational resource. J.P. Collins recommends that the design of any subdivision be undertaken to ensure the permanent insitu protection of this site. Apart from modern homes, there were no historic dwelling sites located within the study area.

Although not located within the actual survey area, the site of the first cemetery in Lismore (Pioneer Memorial Park) lies on the southern footslopes of the ridge. Being an integral part of the city's European heritage and a valuable resource for reconstructing the areas social, religious and economic history, J.P. Collins recommends that Council consider developing an appropriate strategy for protecting this site in the face of potential increased public visitation which may occur from nearby urban development.

4.6 Visual Assessment

Rural character is made up of the interrelationship between topography, vegetation, landuse patterns, structures, and the context and situation from which and by which the landscape is viewed. While the assessment of scenic quality is largely a subjective matter there are certain types of landscape preferred over others and certain elements which enhance or detract from a certain view. In the coastal slopes and tablelands of NSW areas of scenic quality may be identified with the assumption that quality increases as:

- relief and topographic ruggedness increases;
- vegetation patterns become more varied;
- the proportion of natural or agricultural landscapes (compared to urban landscapes) increases; and
- the incidence of waterforms and water area increases without becoming common.

Cultural items may endow a distinct character to an area and contribute significantly to scenic quality.

The Rural Evaluation Manual (Department of Planning, 1988) designates three (3) landscape quality units based on topography and vegetation:

- **High Scenic Quality Land** includes areas with features or landform or landcover which are of outstanding, unusual, distinctive or diverse character.
- **Moderate Scenic Quality Land** includes landform or landcover features which tend to be common throughout the region and not outstanding in visual quality.
- **Low Scenic Quality Land** includes those areas with features of minimal diversity or variety and includes those lands not found in the other classes.

LANDSCAPE FEATURES AND VARIETY CLASSES

	Distinctive	Common	Minimal
Waterforms	Areas with foreground view of water bodies.	Areas with foreground views of water bodies.	Internal drainage patterns, intermittent streams and drainage swales.
Landforms	Rolling terrain slopes 15% + headlands, escarpments, cliffs and small beaches.	Undulating terrain, slopes 0% - 15%.	Plains and slopes 0% - 3%.
Landcover	Strongly defined patterns of vegetation, eg: dune, heath and forest, with forest >10m in height.	Predominately cleared with trees along watercourses. Grazing and pasture.	Cleared areas low heath grasslands, sedge. Hard paved surfaces.

Visual and landscape assessment of an area must be related to the points from which most observers will view the site. In this case the study area and in particularly the ridge scarp will be viewed most frequently from the south and southeast, that is, from Lismore City, Lismore Heights and East Lismore residential and business areas.

To quantify the visual exposure and sensitivity of the site, photographs were taken of the site from vantage points within the existing Lismore urban area, including the Ballina Road at Lismore Heights, High Street at Lismore Heights and King George Drive, East Lismore (see Exhibit 22A). To identify the visual impact of potential urban housing on the plateau when compared with the existing rural view of this area, a perspective sketch was prepared showing housing on the plateau when compared with the existing rural view of the area from Lismore Heights (Exhibit 22C).

Lismore City's setting is dominated and enclosed by green hills on three sides, with the substantial housing areas of Lismore Heights, Goonellabah and part of East Lismore located on the sides of the hills and the plateau.

The southeast facing slopes of the study area present as a partly treed green backdrop to the city, bringing the rural landscape to the city and giving a reminder of the former rainforest cover of the area.

The subject land itself includes four (4) clearly defined landscape types:

- i) the flats and lower slopes;
- ii) the mid and upper slopes which are classified as moderately to steeply sloping, most of these slopes are covered in vegetation, predominantly camphor laurel;
- iii) the main plateau which is generally flat to gently sloping land used for grazing; and
- iv) the ridgecrests.

The flats and lower slopes immediately westward of Dunoon Road are generally cleared of vegetation and used for grazing, the few shade trees that occur in this area generally occur as individuals in a "Sea of Grass". Views into and out of this area are restricted by the surrounding topography.

Moving westward from the lower slopes the land becomes steeper very quickly as the viewer approaches the mid and upper slopes. Visually, these slopes are the most important to the site as they are visible from areas of both lower and higher elevation. Much of the land in the mid slopes have gradients in excess of 20%, while much of the land of the upper slopes has gradients in excess of 33%. The mid and upper slopes are thickly vegetated. Camphor laurel overstorey dominating dry rainforest species is the most common forms of vegetation composition in these areas. However on the south eastern end of the site the camphor laurels give way to stands of large Forest Red Gums as the overstorey to the dry rainforest species. Further to the north the southerly and easterly slopes of one of the spurs contain a number of quite spectacular Hoop Pines. In places the Hoop Pines occur in almost pure stands, in others the pines tower above the camphor laurels and dry rainforest regrowth. The Forest Red Gums and the Hoop Pines of the Mid and Upper Slopes provide a pleasant change from "the monotony of the camphor", and form an integral element in the sites visual componentry.

Parts of these slopes have views out to Wilsons and Leycester Creeks to the south and south east and, while not being spectacular they do fulfil the requirements to be of a moderate scenic quality. The rolling terrain with slopes in excess of 15% contribute towards the formation of a distinctive landscape unit. While Camphor Laurel dominates these steeply sloping ridges in an almost monotonous pattern it does provide a landcover which is superior to grasslands. Where the camphor clears and the Forest Red Gums or Hoop Pines predominate the landcover could be considered distinctive.

The third visually prominent unit of the ridge is the plateau itself. The plateau is flat to gently sloping with vegetation generally restricted to the ridgecaps and associated rocky outcrops. The grasslands of the plateau could be considered to be of the common scenic variety. However small stands of vegetation are located at a number of points along the ridgeline, these areas are considered to be visually important to the site.

LANDSCAPE QUALITY AND MANAGEMENT PRINCIPLES

Unit No.	Description	Landscape Quality Visual Sensitivity	Management Principles
1.	Flat grazing land adjacent to Dunoon Road	Low. Enclosed valley floor with low visibility and little vegetation.	Retention of existing trees where possible. Replanting in public areas to be encouraged.
2.	Escarpment Slopes	Moderate to distinctive depending on vegetation cover. Slopes form a green backdrop to localities to the east of the site.	Clearing for services and roads should be avoided in the areas of distinctive vegetation, retain other vegetation where practicable. Replantings encouraged.
3.	Plateau	Moderate. Area has a moderate visibility but is lacking vegetation.	Retain existing trees where practicable. Replanting encouraged.
4.	Ridgecrests	High. Area has a high visibility. Despite lack of vegetation or variety in places, potential for high scenic quality is possible.	Retain and conserve existing tree cover. Limited clearing for services and roads. Replanting encouraged.

Areas with a high visual quality or visual sensitivity ranking (the ridgecrests) have the highest priority for landscape protection. Appropriate controls may include:

- maintenance of tree canopy and vegetation dominance. A program of camphor laurel replacement with appropriate species and replantings with compatible native species;
- great care in the siting, colour and height of any dwellings, with use of covenants and design control, use of earth-tone colours only, and avoidance of bright or light colours or reflective roofing, mandatory landscape plans for all subdivisions and developments; and
- disruption by roads and siteworks and other elements of infrastructure to be kept to a minimum.

For areas of low to medium visual quality ranking, which are less sensitive to disturbance by uses such as housing, appropriate controls may include:

- siteworks should disturb as little vegetation as possible;
- access roads should be sited to have minimal visual impact;
- site disturbance should be minimised; and
- additional landscaping should be encouraged. (Adapted from C.M Murray & Associates and Outline Planning Consultants:1993)

Subject to appropriate detailed design, density, site and landscape guidelines to reduce visual impact, housing development is not unduly constrained by visual sensitivity.

Whilst the visual impact of the site and potential development from the west (Nimbin & Kyogle Roads) does not effect nearly as many people, it is nevertheless important to include appropriate visual impact control guidelines for housing on the west side of the plateau.

4.7 Bushfire Assessment

The policy of the Department of Planning in relation to bushfires is set out in Planning Circular C10 "Planning in Fire Prone Areas". An assessment of the potential for fire occurrence on various parts of the site was also undertaken by reference to the Department of Planning's "Rural Evaluation Manual" 1988.

Planning Circular C10 notes that:

"in the preparation of a Draft Local Environmental Plan the Council shall take into consideration whether the land to which the draft plan applies is subject to bushfire hazard by reason of the vegetation on the land or on any adjacent land."

Exhibit No. 12 "Bushfire Hazard Assessment" indicated the results of this assessment, as follows:

- **Low hazard** - the gently sloping predominantly cleared plateau and ridge crest areas making up most of the site;
- **Medium hazard** - the moderate to steep slopes of the escarpment, cleared or wooded;
- **Medium to high hazard** - the wooded steep slopes of the escarpment; and
- **High hazard** - the small areas of eucalypt forest at the southern end of the site.

Future development should recognise this bushfire hazard risk in design and management measures.

4.8 Community Services and Facilities

The study area is within 2-3 kms of the Lismore Urban Area and the many local and regional community, education, welfare and health facilities of the Lismore Central Area.

The area is also accessible to limited rural community facilities, including the Tullera Public Hall and Tullera/Modanville and Blakebrook Bushfire Brigades.

North Lismore Public School and Richmond River High School are located within 2kms of the study area.

5.0 STRATEGIC PLANNING ASSESSMENT

5.1 Introduction

The purpose of this section is to assess population projections for the Lismore City Council area and assess the capacity of development in the study area to fulfil some of the growth requirements of the area, in terms of rural residential and urban residential housing.

The site is located within the City of Lismore, an area experiencing a high rate of growth both as a result of the growing economic importance of the city as a regional and education centre, and due to the proximity of attractive rural and coastal environments.

The fastest growing areas in Lismore City LGA are Goonellabah, Lismore Heights and the rural villages of Modanville, Clunes, Dunoon, Wyrallah, and Nimbin. (Lismore LGA Community profile:1994)

The population of Lismore City has grown from 34,950 persons in 1981 to 41,268 persons in 1991, this represents an increase of nearly 19%.

POPULATION GROWTH FOR THE CITY OF LISMORE* 1971-1991

Year	Population	5 Year Growth (Persons)	% Increase P.A.
1971	28 871		
1976	30 600	1 729	1.2%
1981	34 950	4 350	2.8%
1986	37 053	2 103	1.2%
1991	41 418	4 365	2.4%

* Population figures prior to 1986 are for the former LGAs of Terania and Gundurimba and Lismore, now a part of the City of Lismore. (Source: Christopher M. Murray and Associates and Outline Planning Consultants Pty. Ltd:1993)

In a more detailed analysis the urban and rural areas of the Lismore City LGA may be further broken down into a number of sub-areas, the subject site falls just within the boundaries of the Rural North West Sector. This precinct contains the Village of Nimbin and the communities of Goolmangar, Rock Valley, Keerong, Koonorigan, Coffee Camp, Jiggi Creek, Tuntable Creek, Terania Creek, Tuntable Falls, Blue Knob, Stoney Chute, Larnook, Georgica and Modanville.

The 1991 ABS census indicated that there were 1 979 persons living in the Rural North-west sector. This represents an increase of 440 residents or growth of 28.6% since 1986. The growth rate for the Lismore LGA over the same period of time was 11.8%. (North-west Community Services and Facilities Plan:LCC:1993)

5.2 Population Projections

By the year 2006 the population of the City of Lismore is expected to rise to 55,420 persons. It is predicted that 35,750 of these will reside in the urban areas and 19,670 will locate in rural areas.

EXPECTED SETTLEMENT PATTERNS FOR THE CITY OF LISMORE

Year	Urban Population	Rural Population	Total Population
1991	25 410	15 170	40 580
1995	27 360	16 070	43 930
1998	29 950	17 210	47 160
2001	32 130	18 070	50 200
2006	35 750	19 670	55 420

(Source: Lismore City LGA Community Profile:LCC:1992)

This fifteen (15) year projection is expected to see the urban share of the population rise from 62.5% to 64.5% while the village share of the growth is expected to remain constant at 6%. (LCC:1992)

Taking the projected urban and rural population figures into account while incorporating the following assumptions:

- i) density of 8 dwellings per hectare;
- ii) occupancy ratio of 2.4 persons per dwelling in urban areas;
- iii) 30% of available land is purchased but not built upon for speculative or retirement reasons; and
- iv) the occupancy ratio of 2.58 persons per dwelling in rural areas.

5,600 additional allotments will be required for urban residential developments, and an additional 2,267 lots will be required in rural areas to meet the population demands for the year 2006. (Lismore City LGA Community profile:LCC:1992)

Population projections for the Rural North-West sector based on land supply and an occupancy ratio of 2.8 persons per dwelling indicate an additional population of 266 in the five years following 1993. This increase of 11.8% represents an annual growth rate of 2.3% and will yield a total population of 2,245 by 1996. (North West Community Services and Facilities Plan:1993)

5.3 Stock of Urban Residential Land

As previously noted Lismore is experiencing a significant shortage due to the lack of readily available land, a reducing occupancy rate and a rapidly growing population. This shortfall is likely to become critical as various factors begin to restrict development in existing zoned areas.

North and South Lismore are likely to have a continuing population decline.

Development Control Plan No. 14 "Residential Development" (DCP No. 14) encourages infill development on sites approaching the end of their economic life. DCP No. 14 and the process of urban consolidation may see the population of the central city precinct rise slightly particularly if flood mitigation levees are provided.

The East Lismore area has a stock of older dwellings which may be redeveloped in accordance with the residential DCP No. 14. The proximity of the University may make this area an attractive locality for the student population. Suitably zoned land is expected to constrain future development.

The Goonellabah/Hill Top area has accounted for a large proportion (77%) of the intercensal increase in urban population. The elevated land is flood free, has good views and has been readily available for development, however the popularity of this area is expected to see the supply of land exhausted by 1995.

The majority of recent development in the Lismore Heights precinct has been in the form of student accommodation. Infill development and student accommodation type developments are likely to allow an increase in population in this area but there is little scope for the expansion of residential zoning.

The Interim Residential Strategy Review - Urban Residential and Villages (Lismore City Council, 1991) predicted that the residential land supply in East Lismore would be exhausted by 1995, in Goonellabah/Hill Top by 1996, and in Lismore Heights by 2000, with some 5,600 additional dwelling lots required throughout the local government area to meet demand by 2006.

The Interim Residential Strategy Review of 1991 also undertook an analysis of the ability of the LGA villages to cater for some of the expected demand for residential land. The villages examined were Nimbin, Dunoon, Clunes, Wyrallah, Bexhill, The Channon, North Woodburn, Eltham, South Gundarimba, and Goolmangar.

Flooding and access considerations have resulted in The Channon, Eltham, North Woodburn, South Gundarimba, and Goolmangar being excluded from serious consideration for further expansion.

Bexhill is affected not only by flooding but also by the central location of the brickworks, the poor aspect of the prospective land and the bisecting nature of Bangalow Road and the Casino - Murwillumbah railway line.

With these constraints taken into account the villages of Nimbin, Dunoon and Clunes were assessed as future population growth areas.

LAND DEMAND/SUPPLY BALANCE SHEET FOR NIMBIN, DUNOON AND CLUNES, 1988

Locality	Land Supply (total lots and en globo land)	Land Demand	Surplus/Deficit
Nimbin	17	62	-45
Dunoon	19	42	-23
Clunes	37	54	-17

By 1998 the demand for land in these villages will have significantly exceeded supply. By 2006 the lot deficit is projected to reach 143, 171 and 82 for Nimbin, Dunoon and Clunes respectively.

In addition the continued expansion of villages within the City of Lismore has arisen as a controversial planning issue. The leading story of "The Lismore Echo", February 3rd 1994, "Population growth threatens village charm", identified loss of good agricultural land, conflict over spray drift from neighbouring farms, loss of village character (or integrity), and threat to the purity of a rural lifestyle, including threats to water quality as reasons to limit further expansion of the rural villages.

5.4 Present Stock of Rural Residential Land

The supply of rural residential land within the City of Lismore is low. The cessation of planning provisions for concessional rural allotments under the 1992 LEP and the complete utilisation of existing concessional lots over time will further restrict supply. The supply of undeveloped rural residential 1(c1) zoned land at Dunoon, Modanville and Clunes was limited in 1991 to some 147 lots, many of which have been developed.

5.5 Conclusions

Supply of suitably zoned land is limited for both rural residential and urban residential while demand continues to increase.

The availability of suitably located land close to Lismore, free of significant environmental constraints and conflicting landuses, and able to be economically serviced, will be a critical factor in Lismore's continued prosperity as a regional centre.

For example, if an urban residential option for the Study Area was anticipated (say 1500 lots) this could take up about 30% of total residential lots, (5,600 lots) identified as being required 1991-2006 in Council's Interim Residential Strategy Review (LCC1991).

6.0 COMMUNITY AND RECREATIONAL FACILITIES INFRASTRUCTURE

6.1 Community Facilities

The North-West Community Services and Facilities Plan (LCC:1993) put forward a schedule of local community services and works required, including the provision or upgrading of community halls, tennis courts or pre-schools at Jiggi Rock Valley, Koonorigan, and The Channon. However, these facilities are unlikely to be used to a significant extent by residents of the study area, and future development would necessitate onsite provision of new facilities and contributions to city-wide facilities upgrading such as library extension, Memorial Baths, Art Gallery upgrading.

In order to provide a theoretical framework for the provision of appropriate community facilities the following table has been derived from a number of previous studies. The table, to be treated as a preliminary guide only, indicates the nature of the facility, the ratio of the population to the facility, the number required to service the projected population, the relevant standard in terms of the size of the facility or the land area required, and the lead time expected for the provision of the facility or facilities.

COMMUNITY FACILITY REQUIREMENTS

Facility	Ratio of Facility to Population	No. Required at Study Site for Max. Population	Area Required
Neighbourhood Commercial Centre	1 per 5 000	1	4.0 ha
Pre-School	1 per 2 500	1	0.2 ha
Play School	1 per 1 000	4	Uses other facility
After-School Care	1 per 5 000	1	Uses other facility
Public School (state)	1 per 5 000	1	3.0 ha
Public School (private)	1 per 8 000	1	3.0 ha
Community Health Centre (including baby health)	1 per 5 000	1	0.2ha
Neighbourhood Centre	1 per 4 000	1	0.2ha
Doctors	1 per 5 000	1	
Dentists	1 per 5 000	1	
Post Office	1 per 5 000	1	
Ambulance Station	1 per 5 000	1	
Police Station	1 per 5 000	1	
Fire Station	1 per 5 000	1	
Religious Centre	1 per 4,000	1	

Given that the uppermost population projection for this site is in the order of 4 000 persons, a number of the facilities listed above if provided could be expected to service areas of population growth surrounding the site in addition to the site itself.

6.2 Open Space/Recreation Requirements

Public open space provides opportunities for:

- **recreation** - both passive and active;
- **conservation** - protection or integration of natural features and cultural sites;
- **amenity** - greening of the urban environment and a spatial setting for urban housing; and
- **utility** - drainage provision.

Development of the Dunoon Road site for urban residential purposes will require the establishment of a comprehensive range of recreational facilities at the community level.

Existing Recreation Facilities: The central area of the City of Lismore caters for a diverse range of sporting facilities from small community playing fields, tennis and netball courts to large sporting fields of regional importance such as Oaks Oval. Closer to the site are the sporting facilities associated with Richmond River High School and Richmond Park.

In accordance with Lismore City Council's Section 94 Contribution Plan No. 1 - Public Open Space, additional public open space for new development in the Lismore urban area should be based on the following:

3.0 hectares of open space per 1 000 persons is required, this is to be made up of:

- 2.0 hectares for the purposes of active open space;
- 0.5 hectares for the purposes of larger scale district parks; and
- 0.5 hectares for the purpose of play grounds and small parks.

Provision of, or contributions towards the cost of urban bushland parks is also required.

Council's Draft Section 94 Contributions Plan 1994 proposes 42 hectares of urban bushland be provided or acquired on the Goonellabah northern ridges, and 80 hectares of urban bushland for the balance of the urban area, at a land cost of \$4,000 per hectare, with a contribution to be required of \$450 to \$650 per residential lot to off-set these costs.

For rural residential development new residents are likely to utilise active open space areas at a similar rate to their counterparts in urban areas. However the use rate of passive open space in the rural areas would be considerably less than in urban areas due to the roomy, open nature of development in these areas. As such rates of contribution applying to rural residential development for improvement of passive open space, are discounted (see Draft Lismore S.94 Contributions Plan; May 1994).

Contributions for street tree planting are also be required.

On the basis of the above contributions rate and assuming the estimated maximum 4,000 persons at the site, the following open space needs will apply.

OPEN SPACE REQUIREMENTS, EXCLUDING URBAN BUSHLAND

DEVELOPMENT OPTIONS	Active	Large Parks	Small Parks	Total Open Space
Urban Residential	4.0 hectares	2.0 hectares	2.0 hectares	8.0 hectares

In accordance with the Australian Model Code for Residential Development (AMCORD) Open space provision is recommended not to be less than 6% of the site area and:

- is to be of fair and reasonable quality relative to the total land in the subdivision;
- is located in such a way that each allotment in the subdivision is within 500 metres safe walking distance of any existing or proposed public open space in the vicinity; and
- comprises reserves of at least 1 hectare in area, and if less than 0.5 hectares in area, forms a corridor or connection.

6.3 Retail and Commercial Facilities

Retail and Commercial Facilities are required for the convenience of residential communities, with land needs per head of population increasing with the overall size of the new community. The "Perradenya Estate" Rezoning Study prepared in 1993 for Lismore City Council recommended 4.0 hectares commercial for a 5,000 person community.

The NCDC (National Capital Development Commission) in 1986 established a standard for retail development of 1.4m² gross floor area per person, with 0.9m² to be provided in town centre, 0.3m² in group centre and 0.2m² in local/neighbourhood centre. A site area of 1 hectare per 12,000m² gross floor area has been recommended in "Canberra - A New Vision - Gungahlin Urban Village" (Canberra Land P/L et al;1992). The Albert Corridor Study (Draft 1993 - Kinhill Cameron McNamara Pty Ltd - DCP 5) suggests 0.75m² of site per person for retail.

Section 10.2 of the report discusses this issue in more detail in terms of the development options.

7.0 ENGINEERING ASSESSMENT

7.1 Preamble

The specific purpose of this section of the report is to assess the capacity of the existing utility services and the options for augmentation of the services for the expected population of 4000EP if rezoning were to proceed on the study area. The services involved are water, sewerage, electricity and telephone.

In accordance with the brief, Lismore City Council's Engineering Services Division (Water and Sewerage Section) has undertaken the investigations and supplied the content of sections 7.2 and 7.3 of this report.

7.2 Water

7.2.1 Summary

Council's Water and Sewerage Department has supplied this section of the study report.

Several alternatives supply routes to the proposed development (Urban Residential Option) have been investigated.

For Stage 1 of the development, the cheaper option is a supply from Tullera Reservoir via a 300 millimetre diameter main to be constructed along Dunoon Road, McLeay Road and across the northern section of the subject land to Stage 1.

The pressure residual available to lots above RL 125m AHD will be less than normally accepted standard. This pressure residual can be improved by installation of a temporary booster pump near the McLeay Road - Dunoon Road intersection. Indicative costs are \$2830/lot.

Restriction of development to below RL 125m AHD would obviate the need to boost the pressure residual but would greatly reduce the lot yield and would also require major revision of the road layout.

The resultant peak day demand of Stage 1 on Tullera Reservoir will exceed the capacity of the reservoir by 0.5ML. A proposed 0.5ML High Level reservoir for future stages may need to be constructed prior to full development of Stage 1.

The alternative supply option from the High Street service reservoirs via North Lismore would require the construction of a 300 millimetre diameter main, 2.5 kilometres long, from the pumping station to the subject land. This option would present many construction difficulties and would have a high capital cost and high operating costs. For these reasons it has been discounted.

Two long-term supply options were identified for supply to the fully developed site.

The cheaper option comprises the construction of a 5 ML low level reservoir, pumping station and 0.5M elevated reservoir on the subject land. This option would present many construction difficulties and would have a high capital cost and high operating costs. For these reasons it has been discounted.

Two long-term supply options were identified for supply to the fully developed site.

The cheaper option comprises the construction of a 5ML low level reservoir, pumping station and 0.5ML elevated reservoir on the subject land with a 400 millimetre diameter supply main from the Rous County Council trunk mains at Howards Grass pumping station. Indicative costs are \$3,900/lot.

The alternative option consists of the construction of a 5ML low level reservoir, pumping station and 0.5ML elevated reservoir adjacent to the existing Tullera Reservoir and a 450 millimetre diameter main to the subject land. It would also be necessary for Rous County Council to construct a 400mm diameter mains augmentations between Howards Grass station and Tullera Reservoir at the developers cost.

7.2.2 Introduction

Lismore City Council has received an application to develop an area of approximately 100 hectares of land along the ridge above Dunoon Road, North Lismore. It is proposed to develop approximately 1,300 lots on the site, yielding a population of 4,000 for the development. The location of the subject land is shown on Exhibit 15A.

The land to be developed is generally above RL 100m AHD and is thus more than 80 metres higher than existing development on the North Lismore floodplain. The land is some 30 metres above top water level of the High Street service reservoirs which supply North Lismore, South Lismore and most of the Lismore urban area.

Council draws water from the Rous County Council reservoir at Tullera, 2 kilometres north-east of the subject land, to supply the village of Tullera and a number of rural properties along Dunoon Road and McLeay Road which abuts the northern boundary of the subject land. The top water level of Tullera Reservoir is RL 147.4m AHD.

The subject land is to be developed in stages with the first stage catering for a population of 1,000, comprising approximately 350 lots located in the central position of the subject land (full details of proposed demands are outlined in Section 7.3.2)

It is possible to supply Stage 1 of the development from Tullera Reservoir.

This report describes the investigation of works augmentations required to provide a satisfactory water supply to Stage 1 of the development and the scope of works required for full development of the subject land.

The investigation did not include analysis of mains amplifications required for the Rous County Council bulk supply to Tullera Reservoir. Rous County Council could construct all amplifications required to satisfy demands on the bulk supply system. Additional costs to those presented in this report could be incurred by the developer for the Rous County Council amplification works.

7.2.3 Stage 1 Water Supply

7.2.3.1 Stage 1 - Option 1 - Supply from Tullera Reservoir

The works augmentations required for the proposed development were determined by network modelling using Council's copy of the WATSYS computer network model. The model extended from the Tullera service reservoir to the subject land included the existing mains along Dunoon Road and McLeay Road.

Public Works Department (PWD) guidelines suggest design allowances as follows:

- peak day demand 4 kL/tenement; and
- peak instantaneous demand 0.15 L/s/tenement.

Analysis of the consumption data for the Tullera supply zone indicated that a peak day demand of 4 kL/tenement was appropriate. A peak hour of demand of approximately 0.1 L/s/tenement was used. This demand is equivalent to one half of consumers at the peak instantaneous rate and one half of consumers at the average peak day rate. These demands have been observed in similar areas of Brisbane and were adopted for the trunk main analysis.

The network analysis indicates that the peak day demand for Stage 1 of the proposed development will be approximately 1.35 MLD, while the peak hour demand will be 33 L/s (2.8 MLD).

There is an existing 150/100 millimetre demand main land along Dunoon Road and McLeay Road to the northern boundary of the subject land. These mains are fully committed to servicing the existing consumers along the mains.

The modelling results show that it will be necessary to construct a 300 millimetre diameter main from Tullera Reservoir to Stage 1 of the development to satisfy the predicted demands, as shown on Exhibit 15B.

The calculated peak hour minimum residual pressure in the mains for the higher areas of Stage 1 is less than 4 metres. This residual pressure is well below the minimum acceptable residual of 15 metres.

There are 2 technical options to ensure that a satisfactory pressure residual is available to all lots in Stage 1, as discussed below.

A temporary booster pump could be installed between Tullera Reservoir and the subject land to increase the pressure residual. A suitable site for the booster pump is near the McLeay Road-Dunoon Road intersection. The duty point for the booster pump is 33 L/s at 12 metre minimum pump head.

The 2nd option would be to restrict development to below RL 125m AHD to avoid the need to boost the pressure residual. This would require significant relocation of roads and greatly reduce the lot yield for the development. The ridgeline would remain undisturbed, thus providing a lesser visual impact for the development.

This analysis was based on the supply to Stage 1 being provided from McLeay Road as shown on Exhibit 15B. This would require the 300 millimetre diameter main to be laid across land to be developed at a later date. Thus, the route of this main should, ideally, conform to the road layout for these later stages.

An alternative supply route can be provided by laying the 300 millimetre diameter main along Dunoon Road from Tullera Reservoir to the access road and along the access road to Stage 1.

This route is approximately 1.2 kilometres longer and would result in additional headloss, thus requiring increased pumping. The access road entry off Dunoon Road is located on the valley floor where the residual pressure in the mains would be approximately 130 metres.

This option is significantly more expensive in capital costs due to the longer length of mains involved

and the higher class mains required for the low-lying section.

The estimated peak day demand for Stage 1 of the proposed development is 1.35 MLD, while the existing peak demand on Tullera Reservoir is 0.15 MLD. The capacity of Tullera Reservoir is 1 ML. Thus, the capacity of Tullera Reservoir is only two-thirds of the total predicted peak day demand of 1.5 ML. This is less than Council's adopted minimum capacity equivalent to the peak day demand.

The estimated costs for the alternative supply routes are set out at in the Table at the end of Section 7.2.4 of this report.

7.2.3.3 Stage 1 - Option 2 - Supply from High Street Reservoirs

Stage 1 of the development is located approximately 2.4 kilometres from the existing reticulation mains in North Lismore. North Lismore is supplied from the High Street service reservoirs which have a top water level approximately 70 metres lower than the subject land.

PWD network modelling for the Lismore area in 1984 indicate a general residual pressure of 17 to 20 metres in North Lismore.

In order to supply the proposed development from North Lismore, it would be necessary to pump from North Lismore to the subject land. This would require a pump head in excess of 120 metres. The required 300 millimetre diameter main from the pumping station to the subject land would pass through sparse development.

It would also be necessary to construct a 300 millimetre diameter main from the High Street service reservoir to the pumping station in North Lismore to supply the proposed development without adversely affecting the existing supply to consumers in North Lismore and South Lismore.

This main would be approximately 3.5 kilometres long and would be laid through high density urban development. It may be possible to find a more direct route. This would require a crossing under the Wilsons River.

This alternative supply option is shown on Exhibit 15C. The estimated cost for this option is set out in the table in the following section,

7.2.4 Supply of Water to Future Stages

7.2.4.1 Option A

The estimated peak day demand for full development of the subject land is 6 MLD. It will be necessary to construct additional service reservoir capacity to satisfy the demand. The required service reservoir could be located on the subject land or, adjacent to Tullera Reservoir.

It would also be necessary to construct an elevated reservoir and associated pumping station to provide a satisfactory pressure residual to all lots within the proposed development. This would then allow the McLeay Road booster pump proposed for Stage 1 to be decommissioned.

An elevated reservoir supply has been proposed to supply the lots above RL 125 m AHD.

It would be necessary to construct a 450 millimetre diameter main from the Tullera reservoir to the subject land to augment the 300 millimetre diameter main proposed for Stage 1 of the development. It would also be necessary for Rous County Council to construct a 400mm mains augmentations to

Tullera Reservoir.

7.2.4.2 Option B

The required additional storage, elevated reservoir and pumping station could be constructed on the subject land and be supplied from the Rous County Council trunk mains at Howards Grass pumping station. A 400 millimetre diameter main at least 4.5 kilometres long would be required.

Option B is more direct and entails the construction of a significantly shorter length of trunk mains. The diameter of the main required is smaller as it is required to convey average peak day flow compared to peak hour flow for the mains between Tullera Reservoir and the proposed development.

The estimated costs for each of the above options are summarised the following Table.

These long term supply strategies are shown on Exhibits 15D and 15E.

OPTION 1 COSTINGS - WATER SUPPLY

Option 1.1 Supply from Tullera Reservoir	
300mm main x 3500m long from Tullera Reserve	\$630,000
Pumping station	80,000
Chlorinator	10,000
Electrical	10,000
Site works/access	10,000
Landscaping	10,000
Land purchase	10,000
	<u>760,000</u>
SID 15%	114,000
Contingency 15%	114,000
	<u>\$ 988,000</u>
350 lots - \$2823/lot say \$2830/lot	
Option 1.2 - Supply from Tullera via Access Road	
300mm main x 4600m long	\$ 828,000
Pumping station costs as above	130,000
	<u>\$ 958,000</u>
SID 15%	143,700
Contingency 15%	143,700
	<u>\$1,245,400</u>

Option 2 - Supply from Hight Street Reservoirs	
300m x 5000m long main High Street to Stage 1	\$900,000
Rail crossing	30,000
River crossing	40,000
Easement (allowance)	20,000
Booster pumping station	200,000
	<u>\$1,190,000</u>
SID 15%	178,500
Contingencies 15%	178,000
	<u>\$1,547,000</u>
FUTURE STAGES - COSTING	
Option A - Supply via Tullera Reservoir	
400 x 3500 long trunk main Howard's Grass to Tullera	\$ 962,000
450 x 3500 main Tullera to site	1,050,000
5ML Service reservoir	1,000,000
0.5ML elevated reservoir	600,000
Pumping station	200,000
	<u>3,812,000</u>
SID 15%	571,875
Contingencies 15%	571,875
	<u>\$4,956,250</u>
Option B - Supply from Howard's Grass	
400mm x 4800 long trunk main Howards Grass to site	\$1,320,000
Reservoirs and pump station as above	1,800,000
	<u>3,120,000</u>
SID 15%	468,000
Contingencies 15%	468,000
	<u>\$ 4,056,000</u>
1040 lots - \$3,900/lot	

7.3 Sewerage

7.3.1 Summary

Council's Water and Sewerage Department has reviewed the alternatives for the provision of sewerage services to the site, and has supplied this section of the study report.

The investigation showed the following alternatives to be technically feasible.

Option 1 - A new treatment works within the study area.

Option 2 - Transfer of existing sewerage load from South Lismore Treatment Works to East Lismore Treatment Works thus providing capacity at South Lismore Works for the subject development.

Option 3 - Installation of additional treatment capacity at South Lismore Treatment Works.

For each of the options the sewerage reticulation within the subdivision would be either very similar or identical and, therefore, this factor is not considered further. Council would require the developer(s) of the subdivision to provide the internal reticulation as part of the development of the subdivision. All in accordance with the Water Supply Authorities Act, 1987.

Consideration of the treatment options shows Option 1, a new treatment works within the study area to not be acceptable to Council. Comments about this option are given in Section 7.3.3.1.

Therefore, the future provision of sewerage services to the site is dependent on transporting the sewage to South Lismore Treatment Works. Of the two options involving treatment at South Lismore Treatment Works Option 3, the provision of additional treatment capacity, has the least cost.

The trunk main system from the study area to the treatment works at South Lismore are identical for both options 2 and 3 and comprise at least one pump station located adjacent to the intersection of Terania Street and Wilson Street and a rising main to the treatment works.

This cost is based on the assumption that sewerage trunk main and treatment capacity is provided in two equivalent stages of 2000 E.P. each. The costings have been provided without detailed survey and investigation work and are subject to confirmation.

The study area is not included in the current long term sewerage plan adopted by Council. Before Council could consider funding headworks for sewerage it would need to reassess its long term plan and determine the priority of the study area in relation to other forward works. Should Council not wish to fund the provision of sewerage infrastructure and recoup the expenditure through headworks levies it would be necessary for the developers to provide the required infrastructure to Council in accordance with the Water Supply Authorities Act 1987.

7.3.2 Sewerage Loadings

Each option has been assessed utilising the following loadings:

Stage 1 1000 E.P.
Stage 2 1500 E.P.
Stage 3 1500 E.P.

An occupancy ratio of 2.9 persons has been assumed yielding:

Stage 1 350 tenements
Stage 2 520 tenements
Stage 3 520 tenements

The occupancy ratio is consistent with the current sewerage study for the Lismore urban area but it is recognised that the actual allotment numbers may be varied following preparation of engineering drawings.

7.3.3 Sewage Treatment

A discussion of each of the Treatment Options are given below.

7.3.3.1 Option 1 - New Treatment Works in Study Area

Although this option is technically feasible, it is disfavoured for the following reasons:

- (a) There is considerable diseconomy of scale associated with the establishment and operation of small treatment works;
- (b) The study area geology would make construction costs high due to the shallow depth to rock;
- (c) The effluent disposal path is unclear. One scenario is that the effluent would have to be pumped to South Lismore Treatment Works for disposal through established practices as new discharge points may be unacceptable to the community;
- (d) It is likely that community concern and protest would disrupt and add cost to the provision of treatment capacity. If the treatment plant was constructed by the developer(s) and ownership transferred to Council following commissioning the developer may not be able to bear the economic consequence of prolonged delays; and
- (e) Council's quarry in the study area is classified as operational. Accordingly no use could be made of this site.

Detailed consideration of effluent reuse has not been undertaken whilst considering the establishment of a new treatment site. Initial consideration of a new site versus the existing one at South Lismore shows no benefit.

7.3.3.2 Option 2 - Transfer of load from South Lismore to East Lismore Treatment Works

This option involves the transfer of existing load from South Lismore Treatment Works to East Lismore Treatment Works, therefore, providing capacity at South Lismore for the study area.

This is Council's preferred strategy for long term optimisation of the treatment process as it allows East Lismore Treatment Plant to be increased to a size which would make more complex treatment processes economically viable.

Future large scale reuse options are also seen as being centred on this treatment works.

Previous investigation of this option in connection with another rezoning study show it to be more expensive than the provision of additional treatment capacity at South Lismore. It is, therefore, not costed for this study. Should this option be adopted, Council would give consideration to bearing the additional cost over Option 3.

7.3.3.3 Option 3 - Provision of additional treatment capacity at South Lismore Treatment Works

Although the development of the study area is proposed in three stages, the provision of additional treatment capacity would not be provided in discrete units to match each stage due to both the restriction in available land at the treatment works and the additional operating and maintenance costs in providing three process units. For the purposes of this study it is assumed that the treatment capacity would be provided in two stages each of 2000 E.P. capacity.

The provision of the treatment capacity has been costed on the assumption that it is to be provided

solely for the study area.

Indicative costs are \$1,320/E.T. The following two Tables show sewage treatment and sewerage transportation costs.

SEWAGE TREATMENT COST

Process unit(s) 2 x 2000 E.P.	\$700,000
Power supply	100,000
Road works and drainage	100,000
Site works	40,000
Inlet works	100,000
Pipework	50,000
Landscaping	150,000
Site water	15,000
Existing facilities (allow)	400,000
	\$ 1,515,000
+ 20% contingency	303,000
	\$ 1,818,000
SAY	\$ 1,820,000
	= \$ 455/E.P.
	455 x 2.9 = \$1,320/E.P.

SEWERAGE TRANSPORT

The major pump station(s) serving the study area would be located in the vicinity of the intersection of Terania and Wilson Streets, North Lismore. The pipeline route would be along Wilson Street, through Casino Street to Caniaba and along Caniaba to the existing sewer main easement between Caniaba Street and the Treatment Works. The existing easement would have to be widened to accept the new pipeline.

The length of rising main is approximately 3k depending on the final pump station location.

Pump Station and Rising Main

Flows in the system are estimated as follows:

Stage	Tenements	A.D.W.F. L/s	P.W.W.F. L/s	DETENTION VOLUME m3
1	350	3.8	30	27.36
2	870	9.5	75	68.40
3	1390	15.0	115	108.00
Stage	Pump Stn. Volume			
1	1.8m ³			
2	4.5m ³			
3	6.9m ³			

The static head between the pump station site and the inlet to the treatment works is assumed to be 5m. The dynamic head for the flows for each stage are:

Stage	Flow	Pipe	HL/km	Detention Time	Head
1	30	225	2.9	8.72 hrs	14
2	75	225	12.0	3.49 hrs	41
3	115	2 x 225	7.5	<3.49 hrs	28

The initial design assumption is that two identical pump stations would be built. The first serving the initial 2000 E.P. of development and the latter serving the final 2000 E.P. Such a staging would provide a balance between up front cost and economy of scale. The second pump station might be located away from the first to better serve the final development. This has not been included in the costing herewith.

PUMP STATION COST

Capacity 60L/s

Pump Station -

Pump Station	\$265,000
Land Matters	\$ 40,000
Power Supply	\$ 30,000
	\$335,000
SID & Cont. 30%	\$100,000
	\$435,000

Rising Main -

3000m 225 o @ \$120/m	\$360,000
Rail Crossing	\$ 30,000
River Crossing	\$ 40,000
Easement (allow)	\$ 20,000
	\$450,000
SID & Cont. @ 30%	\$ 90,000
	\$540,000

Total Cost \$975,000

Cost per E.P. \$975,000/2000 = \$490/E.P.

Cost per E.T. = \$1,410/E.T.

7.4 Onsite Waste Disposal Assessment

7.4.1 General Characteristics

The provision of "onsite" wastewater treatment and disposal is only an option for rural residential development.

There has been a marked upsurge in the number of septic tank disposal systems in the rural areas of the North Coast perhaps because of the pressures of development which have exceeded the economic ability of the area to provide sewer systems.

For the proper functioning of septic systems using a soil absorption field the land being used must be assessed in the following criteria:

- seasonal variation to the water table;
- evaporation, soil moisture and other climatic influences;
- the area available for an absorption field;
- soil depth and permeability;
- drainage conditions of the land including any seepage; and
- absorptive capacity of the soil to breakdown the chemical characteristics of the effluent.

The steeper sloped land does present problem for the absorption field and any land over 20% to 25% slope are considered unsuitable, for septic disposal systems involving soils absorption, regardless of the soil type.

7.4.2 Infiltration Test Results

The NSW Department of Health requires that all future subdivisions involving small lots of less than 1ha in area and provided with reticulated water must be sewered. However, Council is understood to be considering temporary use of on-site disposal facilities in certain areas as a temporary measure until a CED or other centralised scheme is possible.

Soil hydraulic properties were assessed by the method show in AS1547 (draft) and are shown in Exhibit 16. A new Australian Standard is to be released in the near future.

The test results obtain show high rates of infiltration which diminishes only slowly over time. This is characteristic of the clay soils of the area.

Some variation in the properties of the soil was noted over the area. The investigation required for this study shows that site-specific factors are the most likely cause in the variation of hydraulic properties noted. However, should the rural residential option be selected individual sites will require detailed examination.

All the auger holes showed clay of varying colour and texture to a depth of 0.6m. A soil classification for domestic structures appears elsewhere.

No rock was encountered in the auger holes. However, rocky outcrop areas were apparent in the northern part of the study area. Infiltration tests were not carried out in this area as it was clear that satisfactory on-site disposal of wastewater in this area is not possible.

*

7.4.3 Disposal Systems

Sullage Trenches: The use of a soakage trench to dispose of water is recommended for blocks over 8000m² or in an area where the following conditions are satisfied:

- the property downhill for at least 100m of vegetated slope is in the same holding; and
- adequate buffer areas to hillside stream lines; at least 100m width would be required.

Irrigation Disposal: Irrigation disposal can be undertaken on relatively small areas of land provided:

- there is adequate vegetation;
- water is applied only when the soil moisture is below field capacity; and
- adequate precautions are taken to safeguard health considerations (broadly those outlined in AS1547 draft).

Matching storage and irrigated area are required for irrigation disposal. For example, daily accounting of the soil moisture for the Lismore area shows that at least 20kL of storage and 2000m² block area (Toby Fiander & Associates, 1993) would be required for on-site disposal to ensure that water was not applied to the soil at inappropriate times except once every five years or so.

The storage required would need to be for treated effluent and a system of aerated wastewater treatment systems for each household would be required in addition to the storage. This type of system has been proposed for Stage 1 of the Jarlanbah subdivision at Nimbin and accepted for community title development.

Site-Specific Biological Systems: Systems involving secondary treatment, good disinfection, nutrient removal and disposal of water of high quality to the nearby drainage systems are feasible, but commercially available systems would have high capital cost.

Land area is less of limitation with this type of system and blocks areas as low as 1500m² would be feasible, although the capital cost of this type of system might not justify the reduction in area with the current state of accepted technology in this area.

7.5 Telephone, Electricity and Other Services

Telecom have advised that Telecom services can be provided to the area subject to certain criteria being addressed including:

- developer contribution to fibre optic network extension;
- Telecom distribution points (5m x 5m) being negotiated as development occurs;
- no charge for reticulation if shared trenching is available; and
- adequate lead time being given to Telecom to plan resources and services.

Northern Rivers Electricity advise that as with other residential subdivisions in the Lismore area, electricity services can be provided on a "user pays" basis noting existence of 11kv arterial feeder lines in the vicinity of the area. NRE recommend underground installation for reticulated electricity.

7.6 Traffic and Access

7.6.1 Existing Traffic Patterns

The purpose of this section of the report is to investigate existing traffic flows and conditions, and then to examine the effects of traffic generated by any rezoning of the study area. This effect will be examined for the existing road network and the access to and from the study area.

The Lismore City Council has been collecting traffic counts for the city area for some years and the relevant figures for the study area are in Dunoon Road near Cusack Road and Boorie Creek Road near the intersection with Nimbin Road.

Additional counts were carried out by the Council at our request in Nimbin Road and in Wilson Street at the Robert White bridge.

The results of these surveys are shown on Exhibit No.5

7.6.2 Standard of the Existing Roads

Dunoon Road: The Dunoon Road is to the east of the site and will probably be the road where most of the traffic accesses to the site is gained.

The existing construction is of bitumen seal with an average width of ranging from 6.5m to 7m. Shoulders are narrow and in places cannot hold a breakdown vehicle. The reserve width is a minimum of 20m.

Nimbin Road: The Nimbin Road is to the south of the study area and currently consists of a bitumen sealed road of average width 7m. The shoulder widths are similar to the Dunoon Road. The shoulder width is only 1.0m in sections, while the road reserve width is a minimum of 20m.

Boorie Creek and Hewitt Road: The Boorie Creek Road consists of a bitumen seal 4.5m wide. Hewitt Road is gravel of 4.5m average width.

McLeay Road: McLeay Road is a gravel road of approximately 4m width. The road reserve appears to be 20m wide.

The intersection of McLeay Road and the Dunoon Road is of particular importance in that it is a corner now having an acute angle and a steep grade. The position of the intersection is poor for sight distance for righthand turns from McLeay Road.

7.6.2 Backlog Roadworks

The standard recommended by the Roads and Traffic Authority for the construction of Rural Roads is based on the Austroads standard. (see pages 20 and 21 of that standard). For convenience a summary of the relevant standard is as follows:

The sealing of the shoulders may be provided. The sealing of the shoulders is suggested as a practice to reduce the maintenance costs and improve the moisture conditions under the pavement especially under the outer wheel path. It is also suggested that the sealing of the shoulder can improve the road safety. Width as low as 0.3m have been found to be adequate on the low volume roads to reduce edge wear, 0.5m is often used. In wetter areas a seal of 0.5m is desirable and 1.0m preferable. In the case of full or partial sealing of the shoulder the longitudinal

edge line should be marked. Otherwise the problem of edge "drop offs" and increased edge wear is just transferred to the new edge. (See Austroads, page 20)

PAVEMENT AND SHOULDER WIDTHS - AUSTRADS 1989

Design Traffic Volumes (Vehicles per day)	1 - 150	150 - 500	500 - 1000	Over 1000
Normal Lane Width (m)	1 Lane 3.5	2 Lanes 3.0	2 Lanes 3.0 - 3.5	2 Lanes 3.5
Normal Shoulder Width (m)	1.5 - 2.5	1.0 - 1.5	1.0 - 2.0	1.0 - 3.0
Calculation of the Total Carriageway Width (m)	6.5 - 8.5	8.0 - 9.0	8.0 - 10.0 9.0 - 11.0	9.0 - 13.0
Calculation of Total Seal Width (m).	4.1 - 4.5	6.6 - 7.0	7.0 - 8.0 8.0 - 9.0	8.0 - 9.0

The Lismore City Council's standard for rural road widths is contained in the Section 94 Contribution Plan for Rural Roads (No.4). This standard can be summarised in the following Table. The Council's standard has been converted to the same format as Austroads, to allow easy comparison.

RURAL ROAD DESIGN AND CONSTRUCTION STANDARD - LISMORE CITY COUNCIL

Traffic Volume (AADT)	Up to 50	50-150	150-550	500-1,000	1,000- 7,000	Over 7,000
Seal width (m)	5.0 gravel	3.6 bitumen	5.5 bitumen	6.0 bitumen	6.5 bitumen	7.5 bitumen
Formation width (m)	5.0	6.0	7.5	8.0	8.5	9.5
Design speed for alignment (kph)	40	40	60	80	80	100

Based on the Austroads standards and the current traffic volume figures supplied by Lismore City Council, Dunoon Road and Nimbin Road are currently in need of widening to 9.0m seal width and 13m total carriageway width.

The critical area of consideration is the width of the sealed shoulders. This can vary from 1 to 3m depending on the area and the standards preferred by the local Council.

Related to Council's rural roads standard, Dunoon Road and Nimbin Road are satisfactory to cater for current traffic volumes in terms of bitumen seal width, but are substandard in part in relation to formation width and alignment for the design speed. It is clear that allowance needs to be made for this situation in infrastructure costing by Council.

7.6.3 Traffic Generated From Study Area

The plateau area, when developed could yield up to 1400 allotments or Equivalent Tenements (ET).

For the purposes of this study we have assumed that the vehicle movements generation rate for each tenement is 9 vehicle movements per day. This figure is selected as it is assumed that there will be a local bus service in the area. A higher figure could be used if the area was considered to be rural residential without any public transport.

$$9 \times 1400 = 12,600\text{vpd (vehicles per day)}$$

Provision should be made for multiple accesses to the area. Three access points have been located following our site inspections and examination of previous site assessments (Ian Hill & Associates:1990)

7.6.4 Access to the Study Area

We have examined various location for the access to the site. The criteria for selection of the access points were:

- the absolute maximum slope should be no greater than 20%, this figure has been agreed with the Engineering staff of the Lismore City Council. The figure recommended by the RTA design manual is around 10%;
- avoidance of the gully area which could attract extra storm water and cause the road to washout;
- access is gained to each part of the area to be developed to equate with staging of development;
- good sight distance is available;
- room for the future construction of the correctly sized roundabout;
- opportunities for each property owner to develop without being dependent on the neighbour for access;
- access to and from the main desire point of Lismore is convenient and safe; and
- the cost of construction is realistic and the preferred option is not excessively expensive in relation to the staging of future housing land releases.

The location of these access points are depicted on Exhibit No. 18 and discussed later in this section.

7.6.5 Dunoon Road Deviation to McLeay Road

The first option to be considered is the northern most access which could be along an unmade road reserve which seems to be an extension of McLeay Road south to Dunoon Road. The maximum grade of this particular road is 20% over a small section only. McLeay Road itself would then form the remainder of the road to Dunoon.

The advantages of this particular option would seem to be that the windy section of the existing Dunoon Road with a pavement that is showing signs of failure could then be abandoned, thus saving Council costs for maintenance and augmentation.

Access to the study area could then be conveniently gained from the relatively level area above the 100m contour and sight distances for this intersection of the new access road to the McLeay Road would be good.

However, this access proposal would involve acquisition of an area of some 4,000 square metres of private land outside the study area. This proposed road route would sever an existing small rural holding, and options for creation of an additional lot or lots by rezoning could facilitate the implementation of this road route.

7.6.6 Sexton Road Extension

An option put forward by the Sexton family has been to extend the existing road across the flat and wind up the slope as shown in Exhibit No. 18. The advantages of this option are that there is only one owner involved and this owner is keen to develop.

The steepest grade in this proposal appears to be about 25% but this is in the first section of the road where it begins to rise up from the flat area. It is considered that this steep grade could be adjusted sufficiently to allow a maximum grade of 20%. This road alignment is able to be driven with a four wheel drive vehicle as there is currently an old track in the approximate location.

Erosion control measures will certainly need to be installed when the road is constructed as the natural surface grades are sufficiently steep to cause scouring.

The lower part of the road route would be marginally affected by flooding in a 1% flood event.

7.6.7 Western Access off Nimbin Road

The existing access for the quarry could be upgraded and made to conform to minimum design requirements. Tight bends are a particular problem as well as poor sight distance at the Nimbin Road intersection. This access could also be opportune as it will correspond with the requirement to complete the extraction of the quarry resource before development proceeds in the southern part of the study area.

7.6.8 Road Access to the Lismore Town Centre

A traffic study undertaken in 1992 for the Lismore Urban area and CBD by TEC Transportation Consultants was designed to investigate the following:

- a) the development of a computer model to simulate the existing road network and traffic conditions for urban Lismore;
- b) the establishment and simulation of future patterns for the medium term (5 to 10 years), and the long term (over 25 years);
- c) the evaluation and assessment of the need and suitability of the different Ring roads and link Roads identified by Council and their impact on the arterial road network; and
- d) establish a basis for developer contributions towards the upgrading and provision of the arterial road system.

The TEC study for the Lismore urban areas did not make any allowances for traffic from the study area the subject of this report.

The TEC study shows Terrania Street and Wilson Street as the Western By-pass which then links with a new bridge over the Wilson River between Pitt Street and Brunswick Street (Bangalow Road) to form the Northern By-pass.

The results of the TEC study have been incorporated in Lismore Draft DCP No. 25, and Council's Draft Section 94 Contributions Plan (May 1994). A contribution of \$2,444 per lot is required to defray the costs of providing the Urban Arterial Road System.

As indicated in Section 7.6.2 - Standard of the Existing Roads, Dunoon Road and Nimbin Road are currently in need of upgrading to meet standards recommended by Austroads and Lismore City Council.

7.6.9 Intersection Treatment

Dunoon Road and Nimbin Road currently have an average traffic load of 2300 to 2400vpd. Estimates of maximum future traffic volumes and intersection design requirements at Dunoon Road and Nimbin Road to the site have been derived on the following assumptions:

- future traffic generation of 12,600 vehicle movements per day (9 x 1,400 lots);
- likely distribution of vehicle entry/exit to site via the three access roads (ie: McLeay Road extension, Sextons Road extension and the Quarry access road) as follows:
 - 50% of traffic using the Sextons Road access (ie: $12,600 \times 50\% = 6,300$ vpd);
 - 30% of traffic using the McLeay Road access (ie: $12,600 \times 30\% = 3,780$ vpd); and
 - 20% of traffic using the Quarry access to Nimbin Road (ie: $2,600 \times 20\% = 2,520$ vpd).
- 85% of vehicle trips will involve exiting the site (ie: 15% of vehicle movements contained within the site having regard for provision of neighbourhood retail, commercial and community facilities);
- design peak hour flows could be 15% of average daily figures with equal right and left turn; and
- the "traffic volume" on existing Dunoon and Nimbin Roads will increase by some 25%, reflecting growth in the rural catchment areas north of the site (ie: increase in traffic flows on these roads to 3,000vpd, resulting in 225vph per lane).

From these assumptions, the minimum intersection required is a type "c" which has a shielded turning storage lane and would also require a concrete "sea gull". The options for the intersection treatment will be the subject of further study particularly in relation to staging. Our preliminary assessment shows that the intersections warrant major intersection construction in either a roundabout or a type "c" raised median and shielded intersection.

However, it is considered that the construction of roundabouts at each intersection with the existing road system is the preferred option. The reason for this is the relative balance of vehicle movements at each intersection. Channelised intersections are not as safe if the volumes on the leg of the "T" are large or greater than the through traffic. The right hand turns into and out of the area are required to turn against or across the flow of traffic and thus increasing the danger at the intersection. There is also the matter of through vehicle speed and the roundabout assists in controlling speed as well. Lismore has also constructed a number of roundabouts in the City area. The intersections associated with this study area are comparable with those that have been constructed as roundabouts.

7.6.10 Access Road Costs

To meet Council's standard for rural road design Dunoon Road and Nimbin Road would require to be upgraded to meet the current traffic volumes. Increased traffic loads from the development of the site

fit within the 7,000vpd upper limit set by Council (see Section 7.6.2 - Standard of the Existing Roads). Road upgrading requirements and any necessary adjustment to Council's Draft DCP No. 25 - Urban Arterial Roads, and Section 94 Contributions Plan would need to be investigated in more detail prior to commencement of development.

A major constraint affecting development of this site is the necessity for the initial developers to expend large capital outlays on road construction to achieve access to the first residential subdivision.

These costs are further examined in Section 8.0 - Development Costs.

7.7 Site Suitability

7.7.1 Preamble

The purpose of this section of the report is to make a preliminary evaluation of the stability of the site, the potential for mass movement of soil in the study area and the effects of soil erosion. Comments will then be made concerning site stability constraints on landuse and development options, and management measures required.

7.7.2 Soil Movement in Mass

From site visits there is no evidence of mass movement of soils on the site. However, steep areas were observed with slopes greater than 20% which we would advise as being areas with potential for mass movement of soil, particularly if disturbed. These slopes are also areas where soil erosion can occur readily. Erosion problems were not generally in evidence because of the substantial vegetation cover on the steep areas.

Generally areas with a slope exceeding 20% should not be developed for urban subdivision and should be retained as private or public open space.

There was some sign of erosion on the old tractor tracks on the eastern escarpment. This dictates that any road constructed up to the plateau will need special erosion control measures and should be designed following detailed geotechnical analysis involving core sampling and structural analysis.

Some areas have rock outcropping at the surface foreshadowing future difficulties and higher costs in reticulation of services underground.

7.8 Quarry

The purpose of this section of the report is to examine the impact on rezoning of the existing quarry to the southern end of the study area. The extent of a quarriable resource is also considered along with the final use for the quarry area.

7.8.1 Extent of Quarry

The quarry dominates the southern third of the study area, as can be seen in the Exhibit No. 21. The quarry has been operated for many decades by Lismore City Council as a hard rock quarry. Over the years there has been a significant amount of material, in the order of 750,000m³, has been extracted and removed from the site. The material would have been predominantly a basalt rock but there appears to be some small areas of Jurassic type which actually contain small amounts of coal.

The basalt rock in a band 15m thick has been used by the Council for road making purposes and the rock can be seen throughout the City area.

The actual quarry covers an area of approximately 7ha. There is a wooden crusher located part way down the access track which probably served as the loading point for the trucks. Although some loading would also have occurred at the quarry site.

The remains of an old workshop, a explosives bunker and some other small building show that the quarry was at one time a large operation for this region.

7.8.2 Current Usage of Quarry

The quarry is nominated by the Lismore City Council as producing 1,000m³ of material per year for commercial purposes. The material derived from the columnar jointed would mostly be large irregular shaped basalt rocks used for landscaping or riprap on drainage works.

7.8.3 Geological Assessment of the Quarry Area

A preliminary assessment of the quarry resources was undertaken for Council by geologists from the Centre for Coastal Management (Southern Cross University). Council's Quarry Manager has confirmed that these preliminary investigations have indicated sufficient accessible reserves exist on the eastern and southeastern side of the quarry for economic extraction, working towards the east and southeast of the existing quarry face towards the smaller quarry southeast of the study area. There is also sandstone base material below the basalt flows of less potential for extraction.

7.8.4 Future Usage of Quarry

There is potentially 250,000m³ of basalt rock available in the western face of the quarry. This material seems to be of equal quality to the other basalt quarries in the area (subject to further investigation).

The extraction method would involve blasting then loading and depending on the final usage crushing. The material could well be suitable for the rock facing to the flood levees being proposed for Lismore. This would seem to be a most suitable use where the carting distance is short and the variation in rock size would not be a concern. Rock facing or riprap will be required on the levee where the water flow is greater than about 1m/sec. The rock treatment will then reduce the potential for scouring of the levee. It is understood that some 35,000 cubic metres is required for levee construction.

The resource could again be used as a road base material similar to the usage being made of the basalt from the Blakebrook quarry.

The floor of the existing quarry appears to be a sandstone based material, a sedimentary rock. This material may be suitable for road base material and or fill for other applications.

The area to the south of the existing quarry and down to the small quarry on the road side near the cemetery could contain an economically viable basalt quarry resource. It does appear from the visual inspection carried out as part of this study that the basalt in this area is overlain on the Jurassic rock and would only be relatively thin and could also be variable in its direction.

7.8.5 Constraint to Development

It is most important to ensure that the continuing viable extraction of identified quarry resources not be sterilised by premature encroachment of housing close to the quarry resource.

The Council's Development Control Plan No. 29 for Extractive Industries nominates a buffer for quarries which depends on the size and extraction rate of the quarry. If the resource were to be used as indicated above with in excess of 10,000m³ per annum extraction, then the primary buffer zone would need to be 500m and the secondary buffer 800m.

The DCP No. 29 nominates that "urban/village-residential and rural residential development is excluded from both the primary and secondary buffer areas.". It further nominates that "farm houses on agricultural holdings may be permitted in the secondary buffer area (but generally not the primary buffer area)", and "Buffer area may be reduced where topographic, climate, site conditions or production techniques are favourable to reducing distance separation." (See Section 5.0 DCP No. 29).

In the case of the extraction of the resource from the quarry in the study area the following points may mitigate against such an extensive buffer:

- all the required blasting could be done as a first stage of the extraction of the resource, then the remaining operation would be loading and carting, or the blasting techniques could be varied to accommodate a reduced buffer to the north of the quarry;
- the spur at the northern end of the quarry on the Council land does not seem to have the same quality or quantity of basalt rock. This end of the site may then be still worked but not extensively;
- extraction could commence from the north and work towards the south. In this way the buffer line would move south also at the same rate as the resource is removed;
- use of an acoustic buffer on the north side of any quarry operation and quarry machinery could assist in noise reduction and reduce the buffer. The area to the south would be protected by the existing topography and the noise transportation would have to be over and down the existing hill; and
- the haul road from the quarry would still be the existing road and this will not impact on the northern part of the study area.

Section 10.6 of this report further discusses the quarry buffer issue.

7.8.6 Rehabilitation of the Quarry

The final use of the quarry could be residential. The sedimentary base of the quarry which supports the basalt cap is suitable for house construction. While soil would have to be imported for gardens etc. the area could be ripped with a dozer and seeded successfully.

We would suggest that the southern end of the quarry could be left with minimal restoration and used as a nature park with opportunities for organised rock climbing, and creation of a future public reserve south of the quarry as the open space component of future residential development.

8.0 DEVELOPMENT COSTS

8.1 Preamble

The purpose of this section of the report is to make an assessment of the potential costs in broad terms of the development of the study area for urban residential purposes. This will provide an indication as to the viability of the land for urban subdivision to meet some of the residential land supply requirements for Lismore City.

The critical parts of the cost of development will be the offsite works or "headworks". These are principally water, sewer and road access. It is likely that onsite subdivision development costs will be similar to those normally associated with the subdivision of land in the Lismore City area, unless particular problems such as shallow ground rock are encountered.

Cost estimates have been prepared for the headworks as detailed in the following paragraphs. All estimates are subject to final design and survey and should not be relied upon. They are supplied here as an indication only.

It is clear that during the preparation of the development applications more detailed design will be carried out and the staging and cost shown in this section of the report will vary. Council as the consent authority will have to deal with the technical issues of the provision of headworks as they are submitted in each application. An alternative may be for the Council to prepare a detailed development control plan incorporating the means by which the headworks can be provided to the subject site.

Council's Water and Sewer Manager has instructed that no change be made to the staging proposed in the Section 7.2 and 7.3 of the report which deal with water and sewerage. These sections of the report were prepared by Wayne Franklin of Lismore City Council.

This section of the report is provided here purely for the benefit of the Council to achieve an appreciation of the likelihood of subdivision proceeding if the rezoning is approved.

8.2 Estimated Sewerage Headworks Costs

The following table is taken directly from Section 7.3.3 prepared by Lismore City Council but arranged in the two stages suggested. There has been no change to the estimates prepared by W & S Manager, except in proportion the costs between the two stages. It is assumed that all the inlet works will be done as part of stage one.

Our adjustments have resulted in a new Table of Costs for the provision of the facilities as follows:

SEWERAGE COST: Staged Treatment Cost (LSC)

ITEM	ESTIMATED COST (\$k)	
STAGE	1	2
EP from stage	2000	2000
Process units	350.	350.
Power supply	50.	50.
Roads & drainage	50.	50.
Site works	20.	20.
Inlet works	100.	
Pipe works	40.	10.
Landscaping	5.	5.
Site water	10.	5.
Existing facilities	200.	200.
Sub-total	825.	690.
20% Contingency	165.	138.
Total	990.	828.
TOTAL (Say)	990.	830.

In addition, sewerage transportation to the South Lismore Wastewater Treatment Plant has been estimated by Council in Section 7.3.4 as follows:

SEWAGE COST: Staged Transport Cost

ITEM	ESTIMATED COST (\$K)	
STAGE	1	2
EP FROM STAGE	2000	2000
Major pumping stations	435.	435.
Rising mains	540.	540.
TOTAL	975.	975.

8.3 Estimated Water Supply Headworks Cost

The Council in Section 7.2 of this report has provided staging costs for the provision of water to the subject land. There are two stages proposed and separately costed.

The first is based on a lot yield of 350 lots as shown in Options 1.1 Costing table, page 43. While the Future Stages Costing is provided for 1040 lots as shown in Option B page 44. Thus equating at the Council's occupancy rate, see page 45, of 2.9 persons per lot the following summary table is possible:

WATER COST: Staged Water Supply Cost

ITEM	ESTIMATED COST (\$k)	
	1	2
STAGE		
Lots per stage	350.	1040.
EP per stage	1015	3016
Option 1.1 Tullera Res.	988.	
Option B Howards Grass		4056.
Sub-total	988.	4056.
Cumulative TOTAL		5044.

8.4 Estimated Cost of Access Roads to the Dunoon Ridge Site

These preliminary estimates are based on measurements of the length of the access roads and unit rates which are understood to be generally representative of contractors rates for the various works involved. The estimates are only based on topographic mapping available to this office, with some site inspection, and would be subject to final design, investigation and survey.

The cost estimates per lot derive from the following table are given both as the 50%/30%/20% split for the Sextons Road/McLeay Road/Quarry Road entries suggested by Council as discussed in Section 7.6 of this report, and also assuming an equal three-way split for usage of each access road. The cost breakdown is based on a total of 1,520 lots.

Lismore City Council standards have been used to determine the seal and formation widths for access roads.

The preliminary estimates of principle access road costs, are as follows:

SEXTON ROAD EXTENSION (1400m long; Formation 8.5m and seal 6.5m)

Description	Calculations and Unit Rate \$/	Estimated Cost \$
Earthworks	200 x 12 x 2 x \$15	72,000
Formation	1400 x 8.5 x \$25	300000
Hot-mix wearing course (25mm)	1400 x 6.5 x \$10	100000
Drainage	Allowance	50000
Intersection Dunoon Road	Allowance	125000
Survey, investigation and design	15%	97000
Contingencies	15%	110000
TOTAL		854,000
No. of lots served	50% split of 1520 = 760	\$1125/lot
No. of lots served	506 on Equal Three way split (1520/3 = 506)	\$1690/lot

MCLEAY ROAD EXTENSION (700m to the top from south end and 500m upgrading of McLeay Road formation 8.5m and seal width 6.5m)

Description	Calculation of Unit Rates \$/	Estimated Cost \$
Earthworks	12 x 150 x 1 x \$15	30,000
Formation	1200 x 8.5 x \$25	255,000
Hot-mix wearing course (25mm)	1200 x 6.5 x \$10	78,000
Drainage	Allowance	20,000
Intersection with new estate road	Allowance	125,000
Land Acquisition	Allowance	50,000
Intersection with old Dunoon Road south end only	Allowance	30,000
Survey, investigation and design	15%	80,000
Contingencies	15%	93,000
TOTAL		761,000
No. of lots served	30% split of 1520 = 456	\$1670/lot
No. of lots served	506 on a three way split	\$1500/lot

QUARRY ROAD UPGRADING (750m long and 8.5m formation with a 6.5m seal width)

Description	Calculation of Unit Rates \$/	Estimated Cost \$
Earthworks	200x 12 x 1 \$15	40,000
Formation	750 x 8.5 x \$25	160,000
Not-mix wearing course (25mm)	750 x 6.5 x \$10	50,000
Drainage	Allowance	30,000
Intersection with Nimbin Road	Allowance	100,000
Survey, investigation and design	15%	57,000
Contingencies	15%	66,000
TOTAL		503,000
No. of lots served	20% split of 1520 = 304	\$1655/lot
No. of lots served	Three way split = 506	\$995/lot

8.5 Summary of Headworks and Access Road Estimated Costs

To match the allotment yield from the subject site to the Council's project demand figures it is unrealistic to consider anything more than 200 lots per year.

Although the staging of the water and sewerage headworks is prepared on two stages basis and the road access on three stages, we have assumed for this exercise that the properties may develop over an eight year period. It was also considered appropriate that the access to the site should be brought in from the Sexton Road and McLeay Road and finish with access from the quarry road. This strategy suits the desire of the Council to complete the extraction of the quarry basalt from the old quarry to the south of the site. This will also effect the Sexton land and our Summary Table shows an initial release for Sexton (Lot 6) followed by a later release in Year 5. We have shown this staging in an Exhibit No. 9, which is based on Exhibit No. 4 titled, Cadastral Map, of the final report.

Combining the three headworks estimates as per the above we have prepared the following summary table. To convert lot to persons (EP) use the Council figure of 2.9 persons per lot.

Again on a preliminary basis only, and as one option in a development scenario, a Proposed Staging Plan has been prepared as Exhibit 26, superimposed on the cadastral and land ownership map. This exhibit shows the groups of landholdings (areas) and the development stages, as depicted in the table hereunder. This table indicates the potential yield for each area or group of landholdings, by stage. These stages could approximate 2 years, but this would depend on a variety of factors.

SUMMARY TABLE: Approximate Lot Yield (ET) & Headworks Estimated Costs (\$m)

Area	Yield	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6	Stage 7	Stage 8
A	360 lots	140 lots				130	90		
B	310		110	100	100				
C	300	60	90	100	50				
D	310				50	70	70	100	20
E	240						40	100	100
TOTAL	1520	200	200	200	200	200	200	200	120
Access Roads	\$2.06m cost	0.85	0	0.76	0	0	0	0	0
Water	\$5.044m	0.988	0	4.056	0	0	0	0	0
Sewer	\$3.77m	1.965	0	0	0	1.805	0	0	0
TOTAL	\$10.874	3.803	0	4.816	0	1.805	0	0	0

8.6 Cash Flow For Dunoon Ridge Headworks - Privately Funded Option

The necessary funds to commence the project could be derived by private sector funding of headworks. Since the private sector already funds onsite works such as water and sewer reticulation, road construction etc, it is necessary to include an allowance for the onsite costs in the formula and summary table. On the income side of the budget must be added from sales. This enables some very broad indication of private sector funding feasibility.

To express this option in simple terms we have used a bank overdraft method, with expenses estimated against income and where there is a shortfall it is shown as a negative or overdraft. Development costs in this scenario have been assumed to include normal Section 94 Contributions allowing for land dedication, the cost of water and sewer reticulation, site works, site preparation and internal road construction, various fees and charges and we have allowed for \$22,000 per ET or per lot. We have also allowed for a land purchase component assumed to be \$10,000 per lot or ET. The headworks costs are the same as those included in the previous "Public authority funded" Table of Development Costs.

Income from the sale of lots has been assumed at \$75,000 average per lot, with no allowance for difference in values for different sections of the site. We have not used any assumed percentage interest rates as profits would be distributed rather than retained in the separate fund.

CASH FLOW TABLE: Privately Funded (\$ thousand)

YEAR	1	2	3	4	5	6	7	8	9
LOTS	200	200	200	200	200	200	200	120	0
EXPENSES									
Headworks costs	3803.	0.	4816.	0.	1805.	0.	50.	0.	0.
Land purchase	2000.	2000.	2000.	2000.	2000.	2000.	2000.	1200.	0.
Site costs	4400.	4400.	4400.	4400.	4400.	4400.	4400.	2640.	0.
Expense pa.	10203.	6400.	11216.	6400.	8205.	6400.	6450.	3840.	0.
<i>Cumulative total</i>	<i>10203.</i>	<i>16603.</i>	<i>27819.</i>	<i>34219.</i>	<i>42424.</i>	<i>48824.</i>	<i>55274.</i>	<i>59114.</i>	<i>0.</i>
INCOME									
Sales	0	15000	15000	15000	15000	15000	15000	15000	9000
<i>Cumulative total income</i>	<i>0</i>	<i>15000</i>	<i>30000</i>	<i>45000</i>	<i>60000</i>	<i>75000</i>	<i>90000</i>	<i>105000</i>	<i>114000</i>
BALANCE	(10203)	(1603)	2181	10781	17576	26176	34726	45886	54886

8.7 Cash Flow for Dunoon Road Headworks - Council Funded Option

For the purpose of the development costs exercise, the per lot (equivalent tenement or ET) rates derived from the previous sections as advised by Council (Water and Sewer) and as estimated by us (road access costs) have been used to calculate a preliminary cash flow. These headworks contributions are summarised as follows:

Water - \$ 3,900/ET
 Sewer - \$ 2,730/ET
 Road access - \$1,700/ET
Total \$ 8,330/ET

To this figure must be added the loan repayments required to provide the upfront or headworks facilities. In the following table we have used a formula to calculate the amount of loan repayment required. The table hereunder assumes that Lismore City Council would operate the fund and raise the necessary loan seeking repayment by increased contributions. The figure which best suited the cashflow was a contribution of \$9,354/ET. There would be flexibility for Council to adjust contribution figures as the need arose.

It has been assumed that interest on investments would be 5% for the purposes of this table, whilst interest on loans is 10%. These figures are indicative only for the purposes of this assessment, there is no doubt that interest rates would vary with adjustments to rates to suit.

CASH FLOW TABLE: Public Authority Fund (\$ thousands)

STAGE	1	2	3	4	5	6	7	8	9
LOTS	200	200	200	200	200	200	200	120	0
EXPENSES									
Headworks costs	3803	0	4816	0	1805	0	50	0	0
Loan repayments	0	713	713	1365	1365	1686	1686	1686	1686
Total	3803	713	5529	1365	3170	1686	1736	1686	1686
INCOME									
Borrowing	3803	0	2470	0	800	0	0	0	0
Contribution	0	1871	1871	1871	1871	1871	1871	1879	1122
Interest - investments	0	0	58	1	27	3	13	20	30
Total	3803	1871	44399	11872	2698	1874	1883	1891	1153
CUMULATIVE BALANCE	2	1160	29	537	65	252	399	603	69

Note: 5%pa interest on investments.

10%pa interest on loans.

Contributions \$9.354/ET.

Amounts are in thousands of dollars.

(...) indicates a deficit amount.

From the above table our preliminary conclusion is at that the project could be feasible provided of course that borrowings could be achieved at the levels nominated within Council's overall financial structure and priorities. As indicated in Section 7.2 and 7.3, such Council funded capital works on infrastructure would require a significant reallocation of budgetary priorities. The maximum would be in the first two stages (2-4 years) where a total figure of approximately \$4M would be required.

8.8 Conclusion on Development Costs for Urban Residential Option

From the preceding tables it would appear that development costs for staged urban development of the ridge would not be excessively high and appear to be within the range of viability to enable development to proceed either with Council support or privately funded. The maximum loan required under the privately funded option would be \$10.203 million in the first year. A difficulty would be the necessity in the privately funded scheme for the various property owners to act together in terms of financial commitment and fund raising for major infrastructure, particularly in the early stages.

In the Council funded option, the water and sewer headworks contributions (assuming Council has loan capital works program) are some 16% or \$800 higher than the current headworks contributions applying to new lots at Goonellabah, being the present major development area for residential lots in Lismore. The additional access road contributions (\$1,670 per lot maximum - stage 1) are not considered excessive.

9.0 CONSULTATION WITH GOVERNMENT AUTHORITIES

The following public authorities, government departments and agencies have responded to the invitation to give comments concerning the proposal by the time of completion of the study. These responses are summarised hereunder, with copies of the letters from the various departments attached.

Telecom Australia

Telecom advised ability to provide the required services subject to certain criteria being met, the criteria area as follows:

1. A contribution from the developer will be required to allow a fibre extension of the Telecom network.
2. Telecom will require a number of small parcels of land 5m X 5m for distribution points, these sites need to be negotiated in conjunction with layout to ensure adequate coverage can be obtained.
3. If the developer can arrange to provide a shared trench then the site will be cabled free of charge otherwise the trench will be installed by Telecom and the developer charged for the costs.
4. Telecom needs to be advised of the time table for the site development so as to be able to allocate sufficient funds for the project.

Department of Conservation and Land Management (CALM) Soil Conservation Service Division

The Protected Lands Maps and the Rural land Capability Map of the area have certain limitations in reliable interpretation for urban investigation.

In assessing the area for capability purposes the service considered it necessary to undertake measures of slope, terrain units and geology while keeping in mind the importance of soil type limitations/constraints. The service included two documents to assist in the evaluation of the property, a manual entitled "Rural Land Capability Mapping" and another entitled "Soil Conservation and Urban land Use Planning" both of which are to be used in the study.

Department of Conservation and Land Management (Crown land Service)

The service in correspondence dated 1 March 1993 noted that a number of Crown roads dissect the area and that no development, construction or removal of material can occur either on or across the crown road without the permission of the Crown Land Service.

Any development which incorporated crown roads would need to seek permission from the Crown Lands Service to have the roads closed. If the developer is to seek to have roads constructed on Crown roads reserve then arrangements would need to be made under the *Roads Act, 1993*, to have the road transferred to council control. However the implications of the *Commonwealths Native Title Act, 1993*, (discussed below) the department is not in any position to proceed with dealings at this stage.

However, The *Commonwealth Native Titles Act, 1993*, which commences on January 1st 1994 and expected complementary State legislation, when enacted, is expected to have far reaching implications for crown land administration. If native title ever existed over this land it cannot be said that native title would have been validly extinguished by a past act. There has been no determination of native title in relation to the Native Title Tribunal or other forum recognised for this purpose under the NTA.

In regard to the subject sections of crown road, investigations would need to be made to determine if native title has been extinguished or does not exist before the Crown Lands Service can invite applications to deal with the land.

Environment Protection Authority

Correspondence from the Environmental Protection Authority (EPA) dated 27 February 1994 suggested that matters to be considered in the assessment include:

- a) the potential for the contamination of land from past industrial or intensive agricultural landuses;
- b) the Land and Information Section of the EPA indicates that there are no statutory notices issued by the EPA under Section 35 of the *Environmental Hazardous and Chemicals Act* or Section 5 of the *Unhealthy Building Lands Act, 1990* for the land in the specified area; and
- c) a dip site called "Boorie" is near the boundary of the specified area. Its location was indicated in an attachment.

In regard to the quarries the EPA refers to Council's Draft Development Control Plan No. 29 (Extractive Industries).

Department of Minerals and Energy

Correspondence was received from the Department of Minerals and Energy 4/3/94. After outlining the geology of the area the Department confirmed that the site is not affected by any current mining titles or applications.

The Department did however express concern about possible extractive mineral resources remaining in the abandoned quarry located in the southern part of the site. The quarry has produced blue metal in the past and its current resource potential is unknown. Due to the unknown extent of the resource the Department recommends undertaking a resource assessment of the site. The assessment needs to establish the quantity of material remaining before any rezoning takes place which may jeopardise the reopening of the quarry.

The Department also recommends that a buffer zone be established around the quarry to allow for its future development and, to prevent the encroachment of residential development close to a dangerous area.

While the coal seams in the Walloon Coal Measures beneath the study site appear to be unsuitable for underground mining, both the Walloon and Ipswich Coal Measures have potential for producing coal seam methane. This resource is best developed on flat or low sloping ground, close to consumers. With these requirements in mind and given the steeply sloping nature of the basalt ridge, the Department considers it unlikely that the development of energy minerals would be likely to occur in this locality.

The northern half of the subject area does not contain any other known mineral deposits and the Department has no objection to it being rezoned for residential or rural residential use.

Department of School Education

The Department noted that the potential population of the site at 4000 persons is marginally lower than the 5 000 persons required to justify a new primary school. However, as the development was to be released in stages the existing schools could cope with the increase in student numbers.

Before final approval of each stage the Regional Demographic Planner has requested to know of the proposed lots in each stage so as to be able to enhance yearly student number projections.

Public Works Department

The study for proposed residential development of the study area should include a water management plan which provides controls and measures to minimise the impacts of sediments, nutrients and pollutants infed into Leycester Creek.

Roads and Traffic Authority

The Roads and Traffic Authority (RTA) has no objections to the proposal but does offer a number of suggestions to assist in the preparation of the Planning Study and the subsequent Local Environmental Plans.

Preliminary studies and Draft Local Environmental Plans should incorporate the Authority's "Guidelines for the Preparation of Local Environmental Plans". They should include a planned hierarchy of roads as described in the guidelines, designed to meet these objectives and in particular include a traffic study and assess the proposed road connections to the existing arterial road network.

These access points should be located to provide safe intersection site distance and designed in accordance with current AUSTROADS standards.

Current AUSTROADS standards should also be adopted when designing major roads within the proposed developments and any necessary upgrading of the surrounding road infrastructure. Council should seek Section 94 Contributions towards development of this infrastructure.

Subsequent Development Control Plans should take into account significant areas and not just be restricted to individual development proposals.

Appropriate Buffer zones will need to be retained surrounding the two quarries at the southern end of the site.

Department of Water Resources

The focus of the Department of Water Resources is to assist the community and Local Government to better manage activities that impact on the water environment.

The Department considers that there is a need to develop a "water sensitive design" approach to be developed for the study site. To maintain the health of the water environment there is a need to:

- protect the catchment frame; and
- to ensure that the activities associated with developments adopt the best management practice available.

From a water perspective the study needs to identify:

Site Characteristics

- surface and groundwater features (creeks, swamps, wetlands, springs, etc);
- drainage patterns;
- groundwater depth, local usage, aquifer extent and characteristics especially where shallow groundwater systems occur; and
- extent and nature of riparian vegetation cover (% coverage along extent of creeks and other water related features).

Water Balance and Quality

Establish the natural benchmark conditions for:

- runoff and drainage characteristics of the respective catchments; and
- water quality from a total system context, assessing biologic indicators as well as the traditional physical and chemical parameters.

Provide the framework for water sensitive design for future development in relation to:

- stormwater control measures;
- lot density;
- road orientation;
- distribution of open space and other reserves; and
- waste disposal mechanisms.

To achieve drainage functions, water conservation, water quality, recreational and pathway/cycleway objectives.

Waste Effluent Disposal

Identify areas sensitive to traditional septic absorption trench methods.

In conclusion, the Department strongly recommends that a pre-development water balance and water quality standard be maintained as the development ethic.

In the conceptual layout ensure that all drainage lines and water features are appropriately buffered. Recognising that riparian and other water related vegetation is the prime protector of the waterway ecology and provides a zone of high conservation value that can be utilised for multiple functions.

Buffered, fully vegetated, drainage lines and water features together with vegetated ridge lines are an integral component in keeping intact the catchment framework.

National Parks and Wildlife Service

In a letter dated 3 February 1994, the Service noted that it had reviewed its database records but was unable to supply any information at the time.

Civil Aviation Authority

A response from the Civil Aviation Authority (CAA) dated 9 February 1994 noted that while the CAA calculates noise exposure contours, the distribution of these contours was the responsibility of the airport owner, in this instance the Lismore City Council. The CAA suggested that NREPS contact the Executive Engineer at Lismore City Council, Mr Dick Smith, correspondence was sent to the Lismore City Council (28/2/94).

Response from the Lismore City Council regarding Lismore Airport

A response was received from the Lismore City Council dated 7 March 1994. The letter noted, that with reference to Councils Development Control Plan No. 27 (Buffer Areas) (S.3.18) the site falls within the 4 000m radius from the end of the runway where no structure or installation is to be erected without the specific approval of the CAA.

The natural ground levels of the ridge also conflict with the basic requirement of the CAA, these being lands above RL 56m AHD (or 45 m above the natural ground level of the airport) (Ibid) Accordingly any development on the ridge anticipated to be of a height greater than that of the surrounding trees, such as a radio mast or similar, or high rise residential buildings would be of concern to council and not likely to receive approval.

A copy of the noise exposure forecasts for the airport based on existing traffic and anticipated aircraft traffic up to the year 2 000 was also provided. The subject development is clear of the 20 A.N.E.F (Australian Noise Exposure Forecast) contour line and is not expected to present a problem in relation to most aircraft movements. However, it was further noted that light aircraft fly over the site as part of the circuit for their approach to the Lismore Airport when the wind is predominantly from the south.

In summary, the Council did not object to residential development on the subject ridge from the aspect of possible conflict with the future development of the Lismore Aerodrome. However, further assessment of impact of future flight paths and noise mitigation measures should be foreshadowed.

Northern Rivers Electricity (NRE)

NRE noted in correspondence dated 11 March 1994 that a user-pays principle applies to the installation of electricity services to this site. Arterial 11 kV feeders exist in close proximity to the site.

NRE encourages Lismore City Council to continue its policy requiring electricity services to be installed underground. Not only does this maximise the future potential of the subdivision for tree planting, but also reduces the future community cost involved in tree growth control.

Outstanding Responses

At the time of completion of this report, responses had not been received from NSW Department of Community Services and NSW Department of Health.

10.0 SITE DEVELOPMENT CONSTRAINTS AND OPPORTUNITIES

10.1 Preamble

This section summarises the development and landuse constraints and opportunities emerging from the previous assessments of issues. The constraints include physical characteristics affecting land capability and suitability, cost and difficulty of providing services and access, ecological impact constraints, quarry resource protection, need to avoid potential for conflicting land use, and statutory/policy constraints and opportunities.

Landuse constraints can occur in the following circumstances:

- low tolerance of site to disturbance;
- hazard to life or property;
- valuable natural or cultural or scenic asset phenomena;
- high development or maintenance cost; and
- sterilisation of a valuable or scarce resource.

10.2 Habitat Conservation Issues

The Site Flora and Fauna Assessment by James Warren, Biological and Environmental Consultant, indicates that there are no areas regarded as being of high habitat conservation value. Areas of medium conservation value are restricted to the relative small areas of remnant dry rainforest/Hoop Pine/Forest Redgum communities mainly on the ridge crests and upper slopes of the escarpment. Whilst development can be carried out for purposes such as residential housing in or adjacent to such communities, development design and management should include identification of significant native trees and restriction on the removal of old growth trees particularly those with hollows. Native trees over 5 metres in height should be replaced at a ratio of 2:1. Some of the ridgecrests and upper slope forested areas should be utilised for passive recreation areas within future development, and development design and landscaping could result in a significant enhancement in the environmental amenity of the area compared to the current status, particularly avifauna. A program of Camphor Laurel and noxious weed replacement should be undertaken in conjunction with development.

James Warren identifies a corridor network for vegetation conservation and habitat enhancement for consideration in future development as indicated in Exhibit 11.

10.3 Heritage Issues

The preliminary archaeological assessment of the site (Stage 1 - February 1994, J.P. Collins) and the archaeological survey (Stage 2 - May 1994, J.P. Collins) of the study area indicated no specific Aboriginal concerns in relation to the rezoning proposal and recommended that no constraints be applied to the rezoning of grounds of Aboriginal archaeology.

In terms of European heritage, the report of J.P. Collins has recommended that the well preserved section of dry stone wall located in the northwestern part of the site, apparently dating from the late 19th Century, be protected as a potentially significant local educational resource by appropriate inclusion and protection in the design of future subdivisions for development. In addition, appropriate strategies for the protection of the Pioneer Memorial Park should be set in place in view of likely increased public visitation as a result of nearby urban development, such strategy to include erection

of historically appropriate fencing and/or frequent monitoring by Council personnel, as recommended by J.P. Collins.

10.4 Engineering Services Issues

The main constraint in relation to provision of engineering services, particularly reticulated water and sewer supply is one of cost. This is particularly the case in respect of the first few stages of development.

Section 11.2.4 of this report identifies that provisions of water and sewer services in technically feasible at an economic cost.

Provision of other services, such as electricity and Telecom, does not present major constraints, subject to appropriate arrangements with the supply authority.

10.5 Access Issues

Investigations of existing and proposed traffic access system to cater for development options of the site clearly indicate that the existing public road access via McLeay Road from Dunoon Road is quite unsatisfactory for increased development and the feasibility of upgrading the existing intersection with Dunoon Road is doubtful compared to other options. The site should be provided with at least two major public road access point to the major rural road system with a third access via the reconstructed quarry access road to Nimbin Road. The routes and design feasibility of such future access roads have been identified in very "broad-brush" terms, namely an extension of Sextons Road linking Dunoon Road with the eastern side of the central part of the site, and a new road in the northeastern part of the study area extending south from McLeay Road to link up with Dunoon Road, mainly utilising an existing unformed road reserve.

In each case, there would be a considerable length and construction cost in road, before the first residential development is reached on the plateau, making the initial development costs of providing road construction high.

However, the opportunity for some development on the lower sections of the road could be justified as a means of offsetting some of the high costs of road access to the main development site, particularly where Council is not in a position to pre-fund major road acquisition or roadworks. In this respect, the planning and development of residue lands on the eastern side of the actual study site is an important consideration.

The preferred option would seem to be the Sexton Road extension since this involves only on landowner who will benefit by the urban rezoning of the plateau. Nimbin Road and Dunoon Road would require some upgrading to cater for the anticipated levels of development. However, this upgrading could be undertaken in stages and offset by Section 94 contributions on a per-lot basis, based on the method of defining and calculating upgrading requirements in Council's Section 94 Contributions Plan - Rural Roads and Urban Arterial Road.

The proposed northern bypass and western bypass in the Urban Arterial Roads DCP are in reasonable proximity to the study site.

An early commitment from affected landowners as to the provision and feasibility of providing access is suggested as part of any rezoning.

The design and provision of internal vehicle and pedestrian is not anticipated to present a significant development issue, subject to appropriate management of access points as between properties in different ownership.

10.6 Quarry Buffer

The North Lismore Quarry owned and operated by Lismore City Council, has been identified as presenting a usable extractive industry resource which should not for the time being be sterilised by encroachment of residential landuses, pending more detailed definition of the extractive resource, and proposals/approvals for extraction of the remaining resource and its rehabilitation.

As identified in both Lismore DCP No. 27 (Buffer Areas) and DCP No. 29 (Extractive Industries), a primary and secondary buffer area is suggested between residential development and the quarry. The suggested width of such primary and secondary buffers in these DCP's ranges from 300-800 metres depending on the size of a quarry (minor, medium or large).

However, the actual buffer area can be varied depending on a refinement of topographic, climatic, production techniques and site conditions favourable to reducing the distance separation. It is anticipated that the main project for this quarry is to supply riprap for the proposed Lismore levees estimated at some 35,000 cubic metres. It is likely that this will need to be extracted within one year. Thereafter, the extraction rate would reduce to below 10,000 cubic metres per annum (ie: a medium-sized quarry).

Therefore, the quarry would be assessed as a large quarry, with a primary buffer zone of at least 800 metres being desirable because blasting would be involved. This buffer could be reduced to 400-500 metres or even less depending on blasting technique or where blasting is infrequent and/or only small staggered blasts are used.

Since the main blasting activities associated with the proposed Lismore levee works will take place before the development of any housing, it is therefore suggested that for the purposes of the rezoning, the buffer separation for a medium sized quarry (5,000-10,000 cubic metres per annum) be utilised, namely a maximum of 600 metres (secondary buffer) from the likely working area to any potential housing.

Because this secondary buffer area could exclude potential residential development from a significant part of the study area which would otherwise be suitable and logical for residential development, it is strongly recommended that the plan of extraction, including timing, staging, method of extraction, etc, be determined early to enable proper consideration to be given to:

- 1) reduction in the buffer area, if appropriate; and
- 2) appropriate staging of future development in relation to quarry extraction and rehabilitation.

The subject North Lismore Quarry is registered as a "continuing operation" in terms of the provisions of State Environmental Planning Policy No. 37 - "Continued Mines and Extractive Industries". The moratorium period for submission of development applications under the policy for quarry extensions or expansion expires in July 1994; therefore it is appropriate that the quarry expansion be resolved in terms of development application and environmental impact assessment requirements well before mid-1994.

Recent discussions with Council's Quarry Manager indicate that preliminary investigations of the extent

and quality of the remaining extractive resource material confirm that sufficient accessible reserves exist on the eastern and southeastern side of the quarry for economic extraction. It appears at this stage that the most practicable and feasible extraction plan would be the working out towards the east and southeast of the existing quarry face to produce a gradually sloping rehabilitated end landform suitable for return to rural use or future urban use. This would be subject of course to detailed assessments and preparation of the required development application and environmental assessment as necessary for the quarry extension. The basalt material could well be usable for the construction of part of the proposed levy bank works should these proceed, and it is vital that economically workable resources close to the levy site be available and not be sterilised for use.

Depending on the identified needs and extraction plan, it may be possible to extract the remaining resource within a few months or years, rehabilitate the quarry area and render the buffer area and the quarry itself suitable to alternative development including residential within a relatively short time, consistent with the urban development in stages of the plateau parts of the study area.

Provided this is foreshadowed, a residential zoning option is considered feasible over the quarry, with a suggested performance clause in the LEP to ensure identification of and extraction of the quarry resource as a prerequisite for urban development taking place within the buffer. Another alternative is to retain the Investigation 1(d) Zone over the southern part of the study area within the quarry buffer for the short term pending finalising of a plan for quarry extraction.

Upgrading of the existing access from Nimbin Road to the quarry could have a flow-on benefit by upgrading of this access closer to the standard required for future alternative access to development areas on the plateau.

10.7 Other Conflicting Land Uses

Conflicts in landuse can occur where residential development encroaches into non-residential areas and established landuse practices associated with a particular landuse or activity, the operation of which leads to real or perceived loss of amenity for residents (Lismore DCP No.27 - Buffer Areas, 1994). It is important to ensure that inappropriate or premature urban development does not sterilise viable existing landuse practices, as a result of pressure and litigation, for instance under the Noise Control Act, for the closure of existing productive landuses.

The Lismore City DCP No. 27 (Buffer Areas) nominates suggested separation distances between incompatible landuses and residential development.

In the case of the Dunoon Road study area, potential conflicts arise as follows:

- 1) **Lismore showground:** this is located about 500 metres east and southeast of the study area. Activities creating noise and nuisance include motorcycle speedway and stock car racing, the annual North Coast National Show, auctions, livestock sales, livestock exhibitions and pet shows, and circus. In addition, the Show Committee also has control of the adjacent Go-Cart track immediately north of the showground.

The speedway season involves 13-14 meetings on weekend evenings during the six month summer period, attracting a crowd of between 1,000-2,500 persons, and ceasing 10.30-11pm. The Go-Cart track is used most weekends and is operated through the Cart Club.

It is understood from discussions with representative of the Show Committee that some \$500,000

has been expended in the last 5 years on improvements to the showground, and some \$100,000 on improvements to the cart track. The speedway is the single most important source of income for the Show Committee, which is concerned that an increase in new residents will lead to an inevitable increase in complaints regarding showground activities. The Committee is also concerned that potential increased runoff from the urban development of the site will increase flood levels at the showground site. Whilst there are no significant historical floods on this particular site, and flooding does create a nuisance in operation of the activities, the relocation of the showgrounds to an alternative site would be considered. However, such an option is unlikely to be financially feasible at the present time.

From interview with some residents of the study area and adjacent land, it is evident that the existing speedway and go-cart track operations cause some concern. As with other potential conflicting landuses in the North Lismore valley, the nature of the topography has the potential to funnel noise and odours up to the plateau above, particularly in certain wind conditions. Potential residential development on the eastern racing side of the plateau would obviously be affected by future noise nuisance, to the extent that the future operation of some of the activities on the showground could be placed in jeopardy.

- 2) **North Lismore Sale Yards:** The sale yards, owned by Lismore City Council, are currently the site of stock sales on an average of once per week. Parts of the study area would be within 400 metres of the sale yards, and potential residential development on the eastern facing side of the plateau would be exposed to noise nuisance occasioning potential for complaints from new residents, particularly noise from cattle bellowing during the overnight curfewing of stock on the site prior to sale days.
- 3) **North Lismore Industrial Area:** this industrial area at Macauley's Lane has a range of industrial uses including concrete products manufacture, stone masonry, hardware, and mechanical repairs. Noise generated is that to be expected from an industrial area, and it is important that future expansion potential of this industrial area, particularly following implementation of flood levy banks is not sterilised or unduly constrained by proximity to residential areas above. However, the separation between this industrial area and its potential expansion to the west and east and potential residential areas is considered adequate, noting that potential residential development in the vicinity of the quarry would be protected from direct noise by the edge of the escarpment.
- 4) **Piggery:** two small piggeries located at the base of the escarpment on the eastern side of the study area, within 300 metres of potential residential areas have ceased operation and therefore do not present a source of conflict due to odour and noise.
- 5) **Grazing Land:** Lismore City Council's Development Control Plan No. 27 - Buffer Areas, requires a 30 metre setback between dwelling houses and adjoining grazing land with a minimum 5 metre wide planting buffer along boundaries adjoining grazing land. This buffer will need to be incorporated on certain parts of the potential development site boundaries, particularly to the north.
- 6) **Lismore Airport:** The southern part of the study area is located within 2.5 kilometres of the Lismore Airport runway. Much of the study area is located within a four kilometre radius of the runway and therefore comes within the Obstacle Limitation Surface for the airport defined by the Civil Aviation Authority which is designed to keep obstacles such as buildings and masts free of air space to enable airplane operations to be conducted safely in and around the airport. Generally buildings below the tree line such as two storey residential buildings would not be a constraint

for airport operations on this land.

Exposure to aircraft noise is also a potential source of conflict. Advice from Lismore City Council indicates that the site is clear of the 20ANEF (Australian Noise Exposure Forecasts) contour line for the airport up to the year 2000, and should not present a problem in relation to most aircraft movements. However, Council notes that light aircraft fly over the subject land as part of their circuit when wind is predominately from the south. In summary, Lismore Airport does not pose a constraint for normal residential development in the study area, (see Exhibit 20) but potential impact of flight path options should be further pursued.

In summary, having regard for the existing separation between potential conflicting landuses mainly to the south of the study area, and potential housing areas, these activities do not in our opinion form a significant constraint to housing development on the plateau, with the possible exception of the speedway, cart racing activities, saleyards and aircraft movements.

10.8 Agricultural Land Protection

Evaluation of the agricultural land capability of the site indicates that the site falls within the category Class 4 or Class 5 agricultural land. Although small areas of the plateau top having deep chocolate soils and moderate slopes displaying some of the characteristics of Class 3 land, these areas are very limited in extent, and do not overall warrant classification as Class 3 land. Existing and previous farming practices have been restricted to dairying and beef cattle production, with occasional cropping on some areas. Therefore, since there is no consolidated areas of prime grazing or crop land in the study area, protection of land for agricultural purposes does not form a constraint on any form of residential development.

There are no nearby areas of intensive horticulture giving rise to a potential for conflict between agricultural management practices such as spraying, and future residential development.

10.9 Community and Recreation Services

Progressive upgrade of existing services within Lismore City and provision of some community and recreation services on the site as development takes place, would be a matter of development management, and do not form a constraint on development.

10.10 Other Planning Issues

Council's brief noted that urban development in the vicinity of the study area would encourage development to the west of the city, This would assist in maintaining the centrality of the Central Business District, and therefore help maintain population balance in expansion leading to more rational use of the infrastructure, commercial and community services and facilities of the Lismore Central Business area.

This presents an important opportunity in the future development of Lismore, particularly in the context of a review of potential alternative expansion areas located on the eastern side of Lismore City, such as East Goonellabah, where further development will lead to significance imbalance in infrastructure provision and costs, ribbon development, greater distance from shopping and other facilities, and intrusion into prime agricultural land.

11.0 DEVELOPMENT SUITABILITY AND LANDUSE OPTIONS

11.1 Development Suitability

Arising from the above assessment of land capability and site development constraints, the following general conclusions are made:

- 1) Steep terrain and slope form long-term constraints to urban development over considerable fringe areas of the site forming the escarpment slopes.
- 2) Flooding is only a minor constraint for the construction of the road to join with Sextons Road, capable of being overcome with appropriate design.
- 3) Site instability and potential for mass movement is generally not a constraint, except for the steep slopes.
- 4) Medium flora and fauna significance attaching to some regrowth areas of dry rainforest, Forest Redgum and Hoop Pine woodland does not form an absolute constraint to development, but rather presents opportunities in the design of development for the location of passive open space, integration of landscape areas within private development and Camphor laurel replacement to form bushland corridors, to enhance the environmental and visual values of the site.
- 5) The quarry and the necessary buffers to separate potential housing areas from the quarry are a significant constraint, pending definition of the future extractive resource and extraction plan. Therefore, the quarry is a short to medium term constraint, with development of housing and recreation as a potential landuse following rehabilitation of quarry areas and the cessation of quarry activities.
- 6) The speedway and go-cart racing activities at the Lismore Showground and the saleyards are potentially significant sources of conflict and nuisance to future residents overlooking the North Lismore area. These activities are important for the showground income stream and attract significant community support. Their relocation is probably not feasible in the short term. Further investigation is necessary beyond the scope of this study.
- 7) Other landuse conflicts do not present major constraints on development, and the land is not capable of supporting particularly productive agriculture.
- 8) Provision of access is a short term constraint, pending adequate investigation as to the design feasibility, acquisition and costs feasibility of providing and staging road access to the potential development areas.
- 9) Provision of water and sewer infrastructure and other utility services is technically feasible at an overall cost which is not likely to be excessive. However, the method and management of finding options, particularly for early development stages is a critical factor.
- 10) No apparent Aboriginal archaeological heritage or significance has been identified which would affect urban development. A dry stone wall is a European heritage relic worthy of protection as a feature in site development.

- 11) Onsite wastewater disposal is generally acceptable utilising septic tanks and absorption beds or trenches only at relatively low densities (minimum lot size 8,000m²). More sophisticated systems enabling a higher density will be more costly.
- 12) Visual and landscape constraints apply to the exposed areas of visual prominence and high scenic sensitivity. Careful design of development, attention to siting, design, height, density and colour of building and roofing, and strategic use of landscaping to enhance visual impact, are required, with lower densities on the more exposed upper plateau slopes and avoidance of major disturbance to wooded areas.
- 13) Lismore Airport does not appear to be a constraint to development subject to all building development being low-scale particularly at the southern and central parts of the elevated plateau, so as not to intrude into the flight path Obstacle Limitation Surface. However, further assessment of the impact of flight path options, and noise mitigation measures, should be pursued.

Exhibit 23 "Development Constraints and Suitability" indicates the location of constrained areas.

Arising from this land capability and suitability assessment, the following sections outline preliminary "Development Options" including an "indicative landuse budget" and the main design, access, servicing, staging and environmental management considerations for each option. These are put forward as a means of focussing on the potential outcomes of a rezoning process.

11.2 Urban Residential Development Option

11.2.1 General

A primary focus of the study has been to determine the suitability of the land or parts thereof for urban residential development. Having regard for the constraints and opportunities identified, various forms of urban residential development appear the most obvious landuse on significant areas of the site. It is considered that subject to appropriate planning controls, urban residential housing development and associated landuses could occur in an environmentally acceptable manner.

The evaluation of urban housing needs indicate an anticipated shortfall in urban housing land particularly in the eastern part of Lismore, which could be recognised by supply of alternative and attractive urban housing land close to Lismore on its western side.

Those areas of the site which are considered suitable for urban housing, including the quarry site assuming rehabilitation, amount to some 140 hectares. These areas include areas, both cleared and wooded, identified as having no development constraints, a low constraint or a medium vegetation constraint only, as indicated in Exhibit No. 23 "Development Constraints and Suitability".

11.2.2 Design

It is appropriate that housing densities and housing mix be maximised in line with the recommendations of the North Coast Draft Urban Planning Strategy, and AMCORD and AMCORD URBAN guidelines. However, the need to avoid undue visual impact of development on the ridge when viewed from Lismore will require lower densities in some exposed locations. Development of a satellite suburb to accommodate up to 4,000 population is considered achievable.

The nature of the topography and landscape units gives opportunity for design of a variety of residential types to penetrate different markets, including new markets for residential neighbourhoods of potentially high amenity and innovative design, with both innovative and traditional housing forms.

A preliminary Concept Plan for the urban residential option is shown in Exhibit No. 24. This has been prepared for preliminary planning purposes only and will give guidance for future more detailed consideration of design staging, services and environmental management. In addition, the following Indicative Landuse Budget has been prepared for this option:

INDICATIVE LANDUSE BUDGET (URBAN DEVELOPMENT OPTION)

Landuse	Lot size (m ²)	No. of Lots, dwelling or other	Persons per dwelling	Pop.	% of total population	Gross area (ha)
Residential						
• low density	1,000 - 1,200	150	3.1	460	11.5%	26ha
• traditional	600 - 800	580	2.9	1680	42%	60ha
• small lots and integrated housing	350 - 500	400	2.5	1000	25%	25ha
• medium density	250-350 per dwgs.	300 dwgs.	2.2	660	17%	14ha
• dual occupancy on 15% of traditional lots	-	90 dwgs.	2.2	200	2.5%	-
TOTAL RESIDENTIAL	-	1520 dwgs.	2.63	4,000	100%	125ha
Public Open Space						
• active (on plateau)		2 sport fields + 2 tennis courts				4ha
• passive (neighbourhood parks)						4ha
• bushland regeneration						40ha
TOTAL OPEN SPACE (ON PLATEAU & FRINGES)						48ha
Community Centre		500m ²				0.5ha
Commercial/retail		4000m ² floor space				3ha
TOTAL AREA						176.5ha

Densities in this preliminary concept range from traditional and small lot housing development over considerable areas of the site, with medium density housing located closer to the neighbourhood centre and main connector road through the estate. Lower density housing is strategically positioned in the more visually exposed parts of the slopes (when viewed from Lismore), and then more distant and inaccessible parts of the site utilising steeper areas and wooded ridgelines for private open space.

In deriving the gross areas for residential landuses, a factor of 150-180% of lot size has been used to account for roads, drainage reserves, public walkways, and the like.

Approximately 38% of dwellings in this scenario are traditional allotments ranging from 600-800 square metres, with a further 26% being allocated for small lots, cluster housing and integrated

housing, 10% of all dwellings are low density, 20% of all dwellings are allocated for medium density and allowance for 6% as dual occupancy dwellings. The gross area developed for residential landuse would be 125 hectares, to comprise up to 1,520 lots, giving a population of 4,000 persons at current day average occupancy rates.

Rezoning to a Residential 2(a) Zone of the residential area would give sufficient flexibility for all housing types with related uses such as professional consulting rooms, childcare establishments, clubs, schools, restaurants, corner stores etc within the new housing area. The Residential 2(a) zoning would be restricted to the plateau area. Obviously, more specific site planning and management guidelines for the development of the area would need to be established through a development control plan following rezoning.

The concept also suggests provision of about 15 hectares of Rural Residential and some public open space on the footslopes adjacent to Sextons Road extension, forming a buffer between rural land to the south and east and urban development above. Such rural residential development may assist in off-setting the cost of the Sexton Road extension.

11.2.3 Access

The preferred initial access point to service the proposal would be the Sexton Road extension to the central eastern part of the plateau, followed by the implementation of the McLeay Road deviation to Dunoon Road, and finally the reconstruction and use of the quarry access road connecting to the Nimbin Road, as indicated in Section 7.6 - Traffic and Access, of this study. The cost of major access road construction, when distributed over total yeild in stages, is considered reasonable in relation to total costs.

The Concept Plan for this option (Exhibit No. 24) shows a preliminary internal road network.

11.2.4 Utility Services and Community Facilities

The preliminary assessment of water and sewerage provision options and costs for urban residential development of the ridge by Council's Engineering Services Division, as discussed in Section 7.2 and 7.3 and our evaluation of overall staging in Section 8.0, has established that the staged housing development of the plateau is not likely to be excessively costly as to make development within the short to medium term unfeasible.

However, the provision of services must rely either:

- (1) private funding of headworks and offsite infrastructure through amalgamation of sites and financial cooperation between owners; or
- (2) a Council loan commitment to fund the headworks through levies under the Water Supply Authorities Act 1987.

The necessity to fund costly headworks components and access before the release of the first residential development, is a major constraint.

Overall however, the cost per lot of water and sewer headworks averaged over the development at present day \$ values is only some \$800 or 16% higher than current headworks contributions for Council water and sewer at Goonellabah (assuming Council financial capacity to raise loans).

The overall cost of major access roads on a per lot basis (\$1,700 per lot - see Section 8.4) does not appear to be excessive, once again provided that the staging and management of development financing allows advance provision of access roads prior to development.

Electricity and Telecom services can be economically provided to the site.

A satellite suburban community of 4,000 persons would justify the provision of certain neighbourhood community facilities, such as pre-school, play groups, small community centre, possibly in conjunction with recreational facilities such as tennis courts and relate private facilities such as doctor's and dentist's surgeries. Other facilities and services would be provided by way of augmentation of existing Lismore City services located within three kilometres of the study area. A number of community facilities and services are provided by other government and non-government organisations, such as the Department of School Education and the Department of Community Services. At this stage, the Department of School Education advises that at least for the first few stages of the possible future development, the population of the area would be served by existing North Lismore Public School and Richmond River High School. The population of the area would be just below the normal threshold for the provision of a new public school.

11.2.5 Staging

The above section has dealt with staging issues in relation to the financing of access and water and sewerage headworks. Another major factor affecting staging is the existence of the North Lismore Quarry, and the need for Council to define as soon as possible the future, the extent of the quarriable resource, and the timing and method of operation and therefore the impacts of any quarry operation. This would in turn determine the extent of the buffer to any residential development particularly on the north side of the quarry. The quarry rehabilitation could be carried out to facilitate a residential development end use.

11.2.6 Open Space and Environmental Management

A population of 4,000 would generate a need for approximately 8 hectares of active open space (ie: sports, fields, tennis courts and the like), two (2) hectares of district level parks and two (2) hectares of small or neighbourhood parks and playgrounds. In addition, having regard for the significant opportunities to create habitat and visual buffers through urban bushland.

The site presents significant opportunities for use, enhancement and dedication of urban bushland tract along the steeper upper ridge slopes around the site (50-100m wide) and the vegetated ridge-crests. These bushland areas would provide habitat enhancement fringing the housing areas and visual buffers, and provide a corridor system of bushland regeneration and passive open space/neighbourhood parks, in part reflecting the recommendation for rehabilitation zones shown in Exhibit 11.

Whilst significant active open space is available within two kilometres of the study area at North Lismore, it is appropriate that the satellite community cater for its active open space requirements onsite by means of four (4) hectares allocated adjacent to the proposed Sexton Road extension within the drainage basin and footslope area, and the balance of the four hectares active open space being provided on the plateau. Total active and passive open space provision is 12 hectares, with 40 hectares of urban bushland.

The visual and landscape values of the site should be recognised in the design of the subdivision, preferably with areas of private open space for large lots or for integrated housing development including bushland regeneration areas, with Camphor laurel replacement programs required as

conditions of consent. Appropriate water management and erosion controls will need to be implemented.

Only the upper slopes of the escarpment should be included within the boundaries of urban development allotments, with the balance of the escarpment slopes included within urban bushland areas or residue rural allotments particularly to the west.

11.2.7 Commercial Facilities

Based on standards applied in the Canaiba Lands Report, it is appropriate that over three (3) hectares be available for future commercial/retail development to support a satellite residential community. This assumes a provision of one square metre per head of population in retail/commercial floor space, and could involve initially the development of small-scale retail facilities such as a general store, video outlet, takeaway food store, etc. The appropriate location for provision of a small district shopping and commercial centre would be at the northeastern end of the study area where McLeay Road meets the Dunoon Road deviation. It is unlikely that any retail or commercial would be viable until a significant level of housing development had taken place.

The site could also be the logical location of a future Neighbourhood Multi-purpose Community Centre.

11.2.8 Development Costs

As discussed in Section 8.0 of this report overall development costs including headworks, site works and access do not appear to be excessive subject to appropriate financial arrangement to fund major headworks and recoup the monies.

11.2.9 Positives and Negatives of an Urban Residential Development Option for the Study Area

Positive aspects include the following:

- economical and logical use of the land compared to other uses;
- proposal would assist in maintaining the centrality of the Central Business District by encouraging west of the city centre;
- attractive land of high amenity with opportunities for superb views and creative use of bushland regeneration areas, access to breezes and good microclimate;
- ready accessibility to the Lismore Central Business District and existing local and regional facilities (within 3kms); and
- minimal impact on agricultural landuses and other conflicting landuses.

Negative aspects include the following:

- relatively high costs of providing initial road and service infrastructure;
- multiple land owners and therefore more complex development management;
- existence of quarry having major effect on staging; and
- potential conflicts arising from speedway, go-cart racing and saleyard activities in the valley below.

11.3 Rural Residential Development

Whilst the land has not been identified as prime agricultural land for either cropping or grazing, there are significant constraints making rural residential development on a significant scale an inappropriate use of the site, as described hereunder:

- a) The onsite waste disposal tests have indicated that the site is relatively poor overall from the point of view of acceptable onsite waste water disposal, although with specific attention to design and management, appropriate systems could be designed for development down to 8,000 square metre or even higher densities rural dwelling lots. Recent concerns and guidelines, particularly issued through the Department of Health, indicate increasing concern for cumulative potential impacts of pollution from septic disposal systems;
- b) Provision of access and infrastructure to service a significant rural residential component would appear to be uneconomic in relation to the anticipated yield; and
- c) the development of this site so close to Lismore City Centre and having other identified attributes for urban housing development, would be an obvious inefficient use of rural land, if developed as low density rural residential.

INDICATIVE LANDUSE BUDGET (RURAL RESIDENTIAL OPTION)

Landuse	Lot Size (m ²)	No. of Dwellings	Population	Gross Area (ha)
Rural Residential	8,000 to 10,000m ²	130	390	160ha
Public Open Space * (neighbourhood park)	-	-	-	0.5ha
Community Centre	-	-	-	-
Commercial/retail	-	-	-	-
TOTAL	-	130	390	160.5*

* this includes 20 hectares of the upper slopes of the escarpment - incorporated with rural residential lots

11.4 Mixed Urban/Rural Residential

One option which has some merit is a predominately urban housing development, but with some rural residential development on the fringes where reticulated sewerage can be replaced by onsite wastewater disposal systems.

11.5 Other Uses

A number of uses would be compatible with or ancillary to urban housing development of the land, including **recreation uses, community, education and small scale commercial/retail uses**. Development for the site to a maximum of say 4,000 persons would generate a need for about 8 hectares of active open space (sports fields etc), two (2) hectares for larger scale district level parks, and two (2) hectares for neighbourhood parks and playgrounds. In the case of development of this particular plateau area with opportunities for Camphor Laurel replacement and development of dry rainforest remnants, opportunities exist for a higher proportion of passive open space in the form of

urban bushland, for instance, along the forested slopes. It is envisaged that a sports oval or field be provided below the site adjacent to the proposed access road through the Sexton land, and a second sports field be provided at a suitable relatively flat area near the northern part of the site.

A population of up to 4,000 people isolated from the nearest shopping centre by 2-3 kilometres will generate the need for a neighbourhood shopping centre of say 4,000m² floor space consisting of individual or small clusters of shops providing basic and essential items and could be related to other facilities such as post office, medical centre, childcare facilities, service station, etc. Shops would typically include a small supermarket grocery store, milk bar, video outlet, takeaway food, newsagent or sub-newsagency, etc. The potential viability of such a neighbourhood shopping centre would be increased if it were located close Dunoon Road, to capture passing trade between Lismore and Modanville-Dunoon. This is particularly feasible if the access option to the site involving relocation of a section of Dunoon Road via McLeays Road takes place. The Indicative Landuse Budget for the Urban Residential Development option, recognises this need with a suggested allocation of three (3) hectares to accommodate a neighbourhood shopping/commercial centre.

Other landuses considered include the following:

Tourist development: not considered particularly attractive or feasible for this site.

Large scale commercial development: this site does not appear locationally suitable since it would be relatively isolated from major transport routes. However some commercial uses which are compatible with residential development such as technology parks, might be a potential use.

Amphitheatre cultural venue: this suggested landuse has been the subject of some consideration by Council, and involves potential use of the quarry "amphitheatre" as a cultural, music, performance venue. The use is not feasible pending determination and use of the extractive resource. Assess to the site for such purposes is considered unsatisfactory, and would require significant upgrading.

Industry: the site is not locationally suitable for manufacturing or service industries, as adequate scope for expansion of industrial area to serve the west Lismore area is available at North Lismore and South Lismore, particularly following additional flood mitigation.

Agricultural/Rural Uses: if development does not take place, the site would in all likelihood remain as low intensity grazing land, with little potential for cropping or intensive agriculture.

11.6 Consistency with Statutory Planning Guidelines

As indicated in Chapter 2 a number of clauses and requirements of the North Coast Regional Environmental Plan required to be addressed in any rezoning proposal. In general, the rezoning of the site to allow urban housing is consistent with the requirements of the REP as summarised hereunder:

Clause 7 - Prime Crop or Pasture Land: No land identified as prime crop or pasture land is located on the site, and future residential development is not likely to result in land use conflicts with existing or potential agricultural uses.

Clause 17 - Extractive Materials: The North Lismore Quarry has been identified as having a potential for continued extraction of a quarriable resource, and any residential development should be located a sufficient distance to avoid potential landuse conflicts resulting from the quarry operation, pending the final extraction of the quarriable resource and rehabilitation of the site.

Clause 20 - Rural Land Release Strategy: the area is not one of the identified rural village expansion areas, and rural residential development would require a review of Council's rural land release strategy.

Clause 29 - Natural Areas and Water Catchments: Areas identified as having medium conservation significance are proposed to be incorporated and enhanced within the design and development by appropriate Camphor laurel replacement program, etc.

Clause 35 - Heritage Items: Stage 2 of the archaeological assessment is awaited.

Clause 38 - Urban Land Release Strategy: Although the 1991 Urban and Village Residential Development Strategy Review undertaken by Council identified a need for release of further urban land in the short-term, a formal review of this strategy to include the subject land will be necessary. The land appears to meet the basic requirements for land release.

Clause 39 - Retail, Commercial or Business Activities: Rezoning to urban residential should involve provision for a future convenience and neighbourhood centre to serve the immediate needs of the satellite suburban community, and as such should not be considered a significant retail or business development requiring a review of Council's commercial/retail expansion strategy.

Clause 40 - Principles for Urban Zones: A simple and flexible zoning is intended, with detailed guidelines preferably identified in subsequent development control plans and Section 94 Contributions Plans. A wide range of housing types is practicable.

Clause 45 - Environmental Hazards: Constraints relating to flooding, bushfire risk, aircraft noise, site instability, disposal of septic effluent have been taken into account in this study.

Clause 45A - Flood Liable Land: No part of the study area is directly subject to flooding, except for a small part of the potential access from Sextons Road.

Clause 56 - Land Near Aerodromes: The land is outside the relevant noise exposure forecast contour, and low-scale residential development will not intrude into the obstacle limitation surface.

Clause 56A - Bus Services: The design of the future road system can take this into account.

Clause 58 - Servicing Urban Areas: Subject to advice from Council's engineers.

Clauses 60-65 - Health, Education, Community and Welfare Services: Adequate provision can be made for upgrading of these facilities, and provision of a small multiple-purpose community centre onsite to cater for the maximum population.

Clause 78 - Public Recreation: Proposed open space has been identified in the report and can be provided as development takes place.

The proposal is consistent with those Section 117 direction of the Minister which are relevant to the site's potential future development as follows:

Direction G22 - Form and Content of LEP: Consistent if proposal done as simple amendment to Lismore LEP 1992.

Direction G25 - Flood Liable Land: The proposal is consistent.

Direction G26 - Residential Lot Sizes: The proposal is consistent.

Direction G27 - Bus Services: The proposal is consistent

Direction S27 - Development Near Licensed Aerodromes: The comments of the CAA and Council have been taken into account.

12.0 SUMMARY AND RECOMMENDATIONS

This Planning Study has been carried out in accordance with the brief from Lismore City Council, and evaluates the environmental, physical, economic, and servicing constraints and opportunities which will influence and direct future landuses. This process has been assisted by the comments of the relevant Government Departments and Agencies.

The Planning Study provides the basis for the preparation of a formal Environmental Study if Council decides to proceed with that course of action.

Specifically, the Planning Study concludes that the urban residential development of the plateau is the most appropriate future development of the site, and discounts rural residential development as a viable and appropriate landuse. Future urban residential development of the plateau area could envisage accommodating up to 4,000 people in a satellite suburban community. However the following significant issues require further investigation and negotiation with landowners and others:

- 1) identification of the remaining quarry resource on the site, and an extraction and rehabilitation plan to determine extent of buffer to housing and effect on staging of development;
- 2) provision and funding of major infrastructure headworks and an access road to the site to enable the first stage of any urban residential development to take place; and
- 3) measures to minimise potential conflict between future residents and speedway/go-cart racing, aircraft movement and saleyard activities.

Effective criteria and management plans to minimise the following environmental impacts are identified:

- visual impacts and landscape enhancement opportunities;
- drainage, erosion and water quality control for run-off; and
- protection and enhancement of woodland vegetation on the site, and effective management of the residue escarpment slopes.

The appropriate rezoning to facilitate the creation of the preferred option (subject to the three (3) significant issues above being resolved satisfactorily), would be as follows:

- rezoning of the plateau including ridgetops and the quarry to Residential 2(a). This would include areas for services, easements, the smaller bushland regeneration corridors, and smaller public open space areas within the 2(a) Zone;
- larger public open space and urban bushland regeneration areas to be zoned 6(a) Recreation Zone;
- a small area of 3(b) Neighbourhood Business to be located in the northeast corner of the site;
- a small area of 1(c) Rural Residential at the head of the North Lismore valley west of Sextons Road;

- a Scenic Protection Zoning or alternatively a Rural 1(a) Zone or Private Recreation 6(b) Zone accompanied by a management plan for vegetation enhancement and erosion control on the escarpment; and
- a specific performance clause or special provision within the LEP, providing that urban development or housing should not take place until:
 - 1) in relation to any area within the buffer to the North Lismore Quarry, Council is satisfied that an adequate investigation to define the extent of the quarry resource has taken place, and a plan of extraction has been approved for the winning of the quarriable resource, and rehabilitation of the site;
 - 2) adequate arrangements have been made for the financing and provision of a new sealed road access to the site from Dunoon Road, and key water and sewer service installations, pump stations, treatment system augmentation, mains and reservoirs; and
 - 3) adequate measures and arrangements are in place to minimise potential noise and nuisance impact of speedway and vehicle racing activities at the Lismore Showground, activities at the saleyards and airport/aircraft movements, to ensure that the long-term viability of the showground, airport and saleyards is not comprised by urban development and future noise complaints from residents.

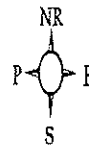
The above arrangements could be the subject of an appropriate "development agreement" with the landowners prior to any decision in regard to rezoning being effected.

It will also be necessary for Council to formally amend the urban and/or rural land release strategy prior to or in conjunction with the preparation of any amending LEP, and also prepare appropriate development control plans (DCP's) and Section 94 Contributions Plans for the site's development and management.

EXHIBIT NO. 1

Sub-Regional Location

DUNOON ROAD PLANNING STUDY



Northern Rivers Engineers
Planners & Scientists
Level 1, Suite 1
14 Jonson Street
BYRON BAY NSW 2481
TEL: (066) 855 717 FAX: (066) 855 677

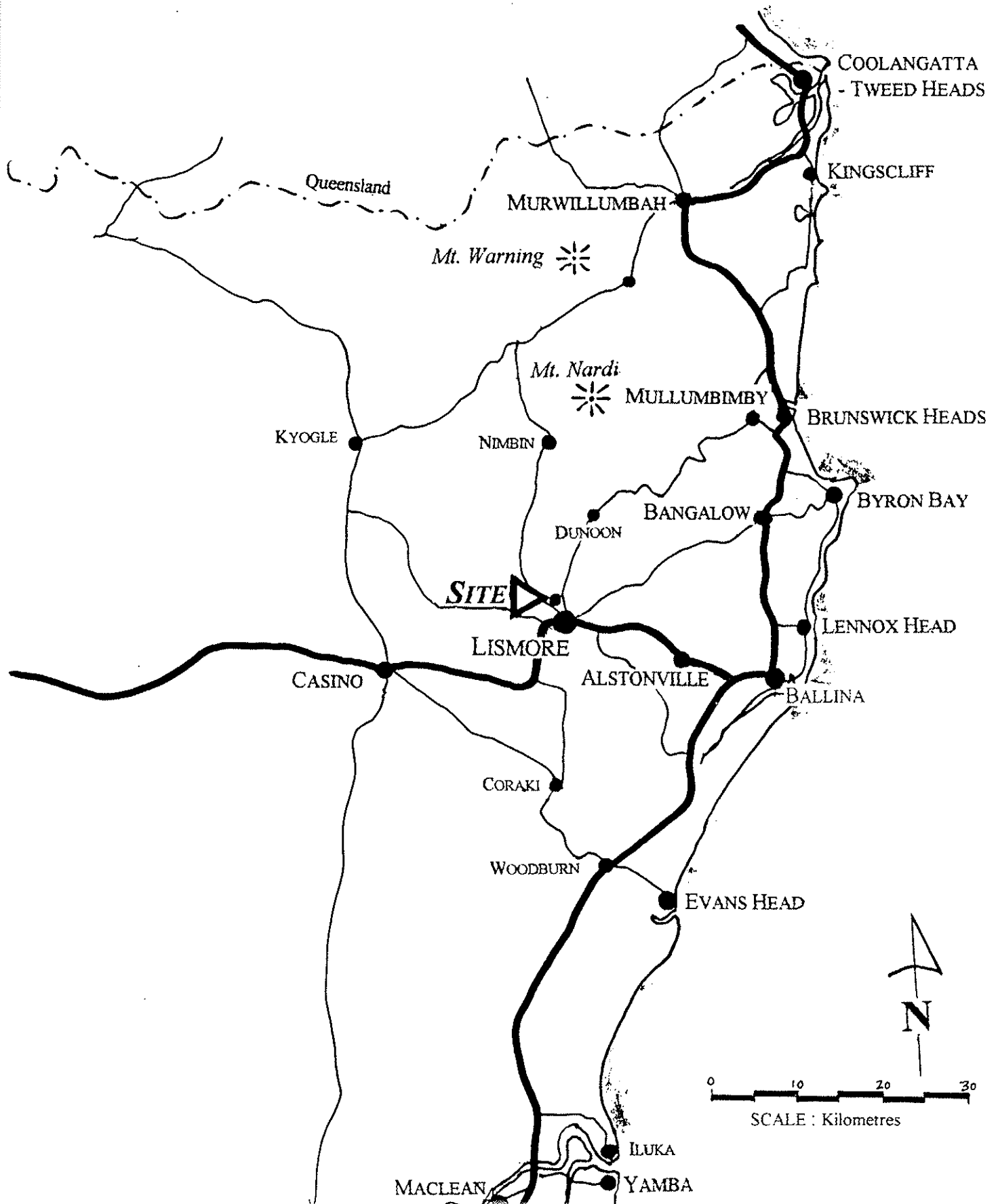


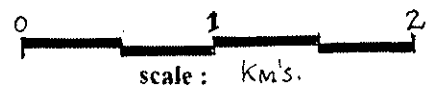
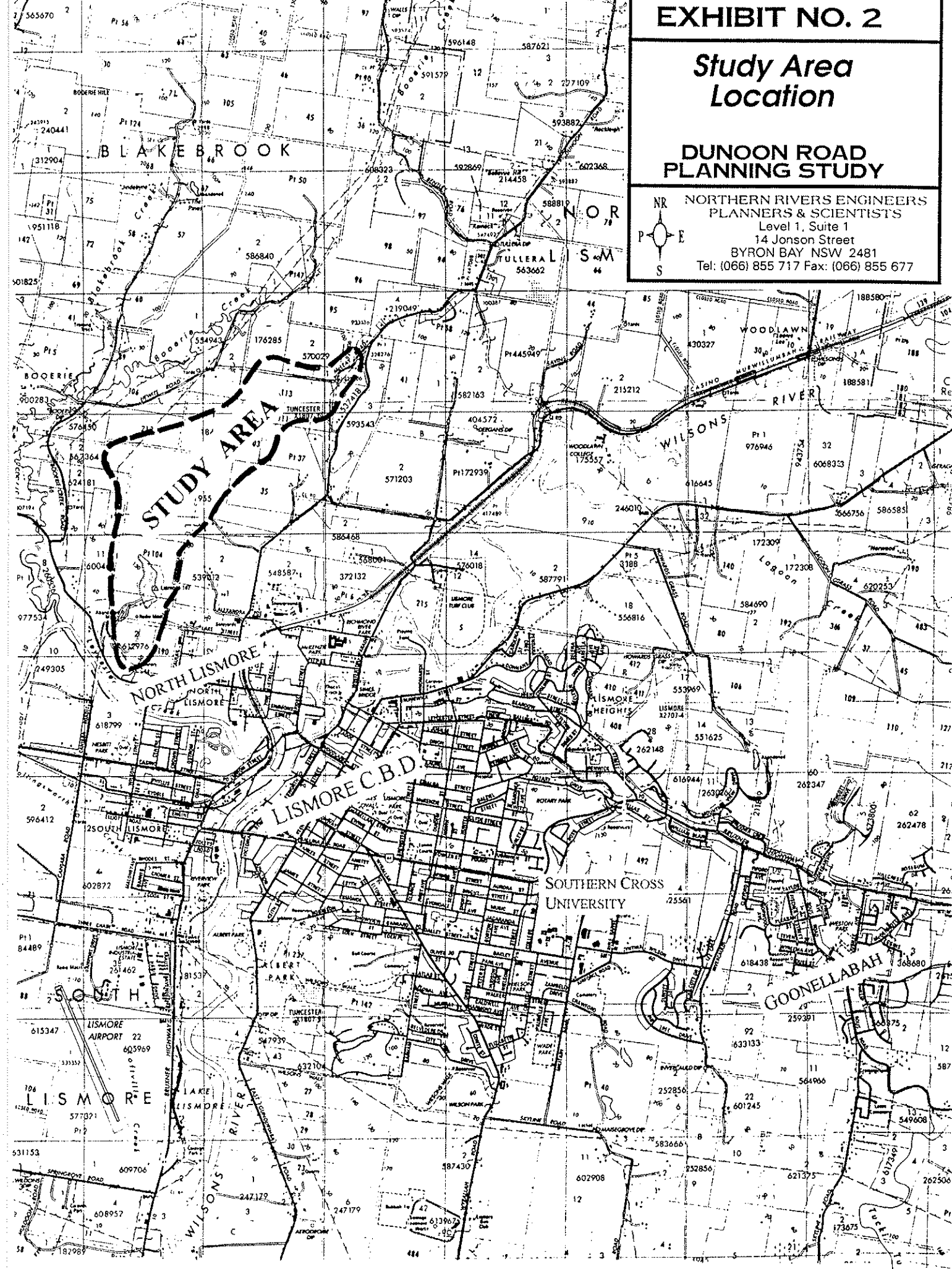
EXHIBIT NO. 2

Study Area Location

DUNOON ROAD PLANNING STUDY



NORTHERN RIVERS ENGINEERS
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scale : km's.



EXHIBIT NO. 3

Site Contour Plan

prepared by
ROGER DWYER & ASSOCIATES
(Mapping & Aerial Photography (066) 514 443)
* derived photogrammetrically from C.M.A.
air photos 1:25,000 July 1991

- * for preliminary planning purposes only
- * 2m contour interval
- * vertical datum : AHD

DUNOON ROAD PLANNING STUDY

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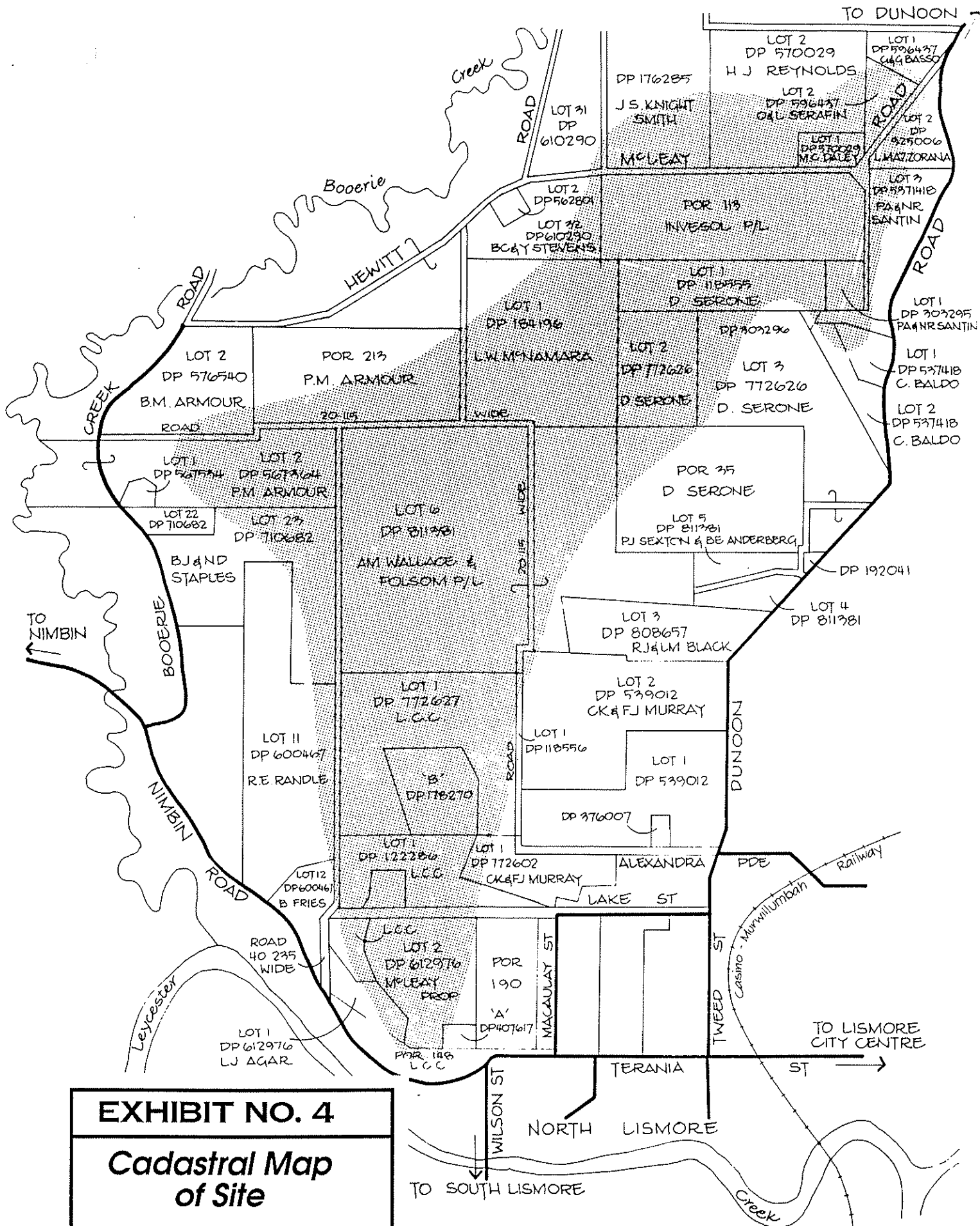


EXHIBIT NO. 5

Air Photo of Site (looking south over site)

(Photo January 1994 by Bill Mills)

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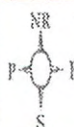


EXHIBIT NO. 6

Air Photo of Site

(Source: CMA 1991
1:25,000 contact print)

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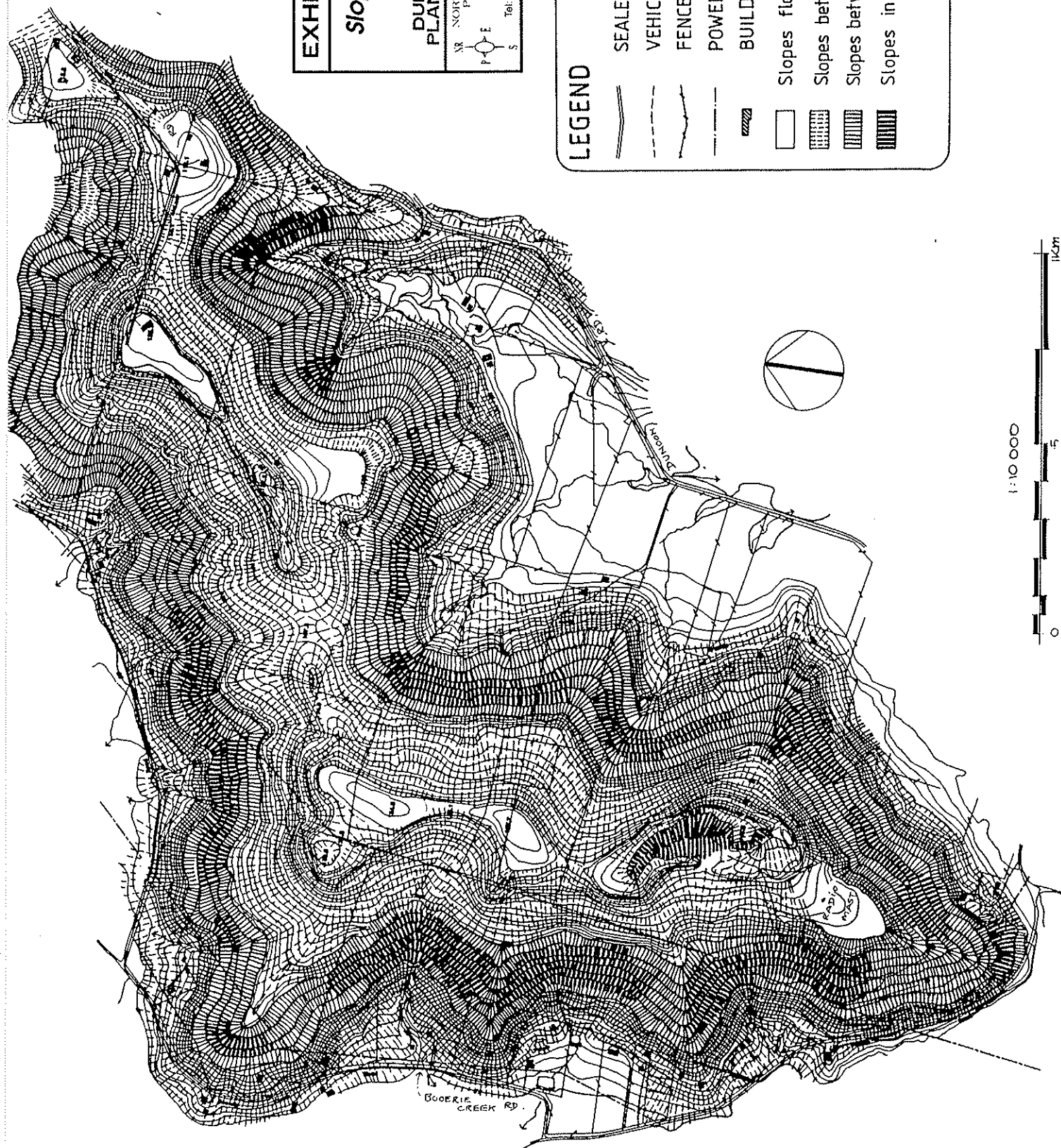


EXHIBIT NO. 7
Slope Analysis
DUNOON ROAD PLANNING STUDY NR NORTHERN RIVERS ENGINEERS PLANNERS & SCIENTISTS Level 1, Suite 1 14 Johnson Street BYRON BAY NSW 2481 Tel: (066) 855 717 Fax: (066) 855 677

LEGEND

- SEALED ROADWAY
- VEHICLE TRACKS
- FENCES
- POWERLINES
- BUILDINGS
- Slopes flatter than 1:16.66 ie <6%
- Slopes between 1:5 & 1:16.66 ie 6-20%
- Slopes between 1:3 & 1:5 ie 20-33.5%
- Slopes in excess of 1:3 ie >33.5%

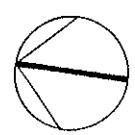


EXHIBIT NO. 8

Terrain Types

1. Drainage Plain
2. Footslopes
3. Wooded Escarpment Slopes < 33%
4. Wooded Escarpment Slopes > 33%
5. Unwooded Escarpment Slopes > 20%
6. Plateau
7. Wooded Ridge Crests
8. Unwooded Ridge Crests

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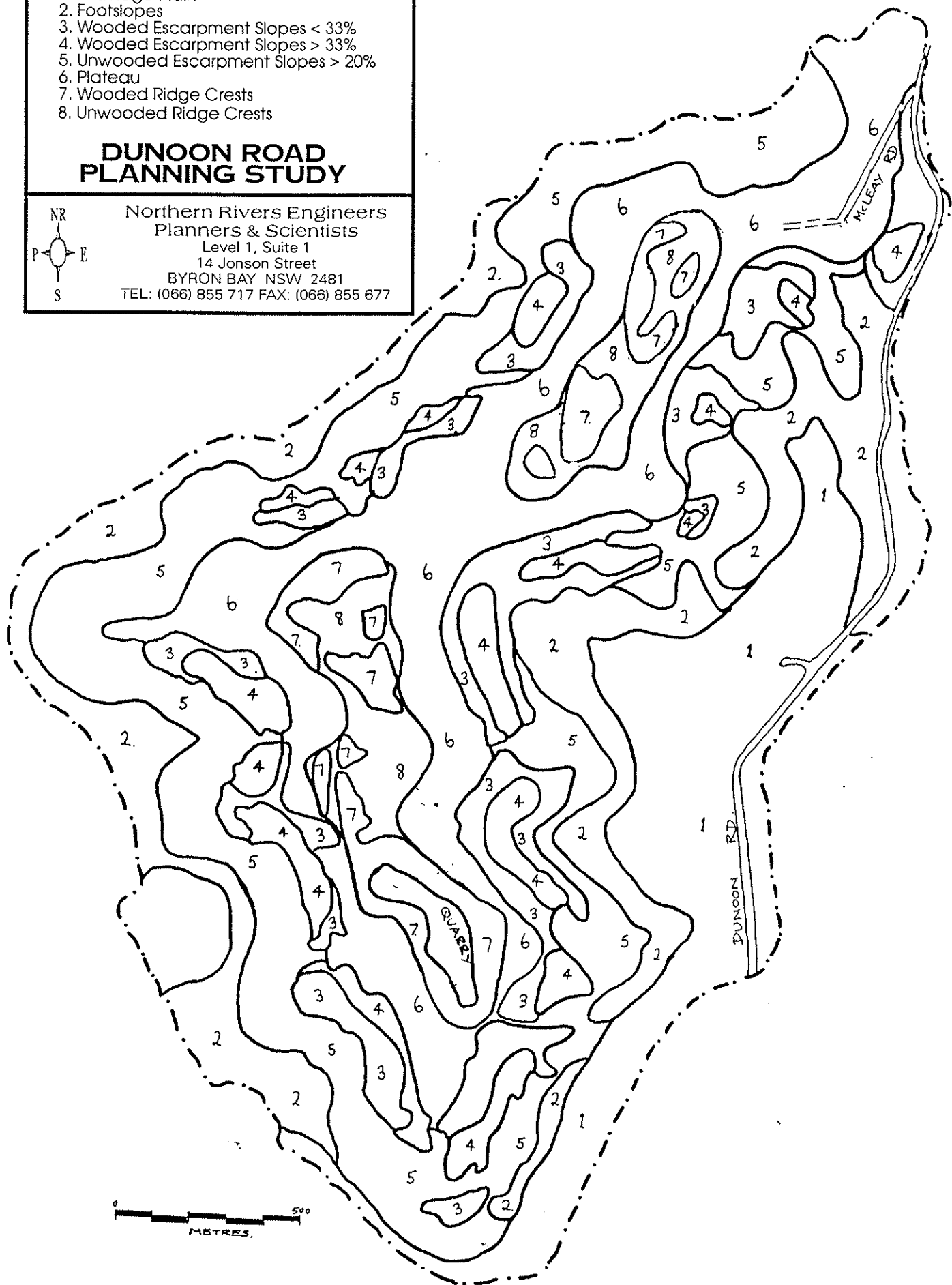
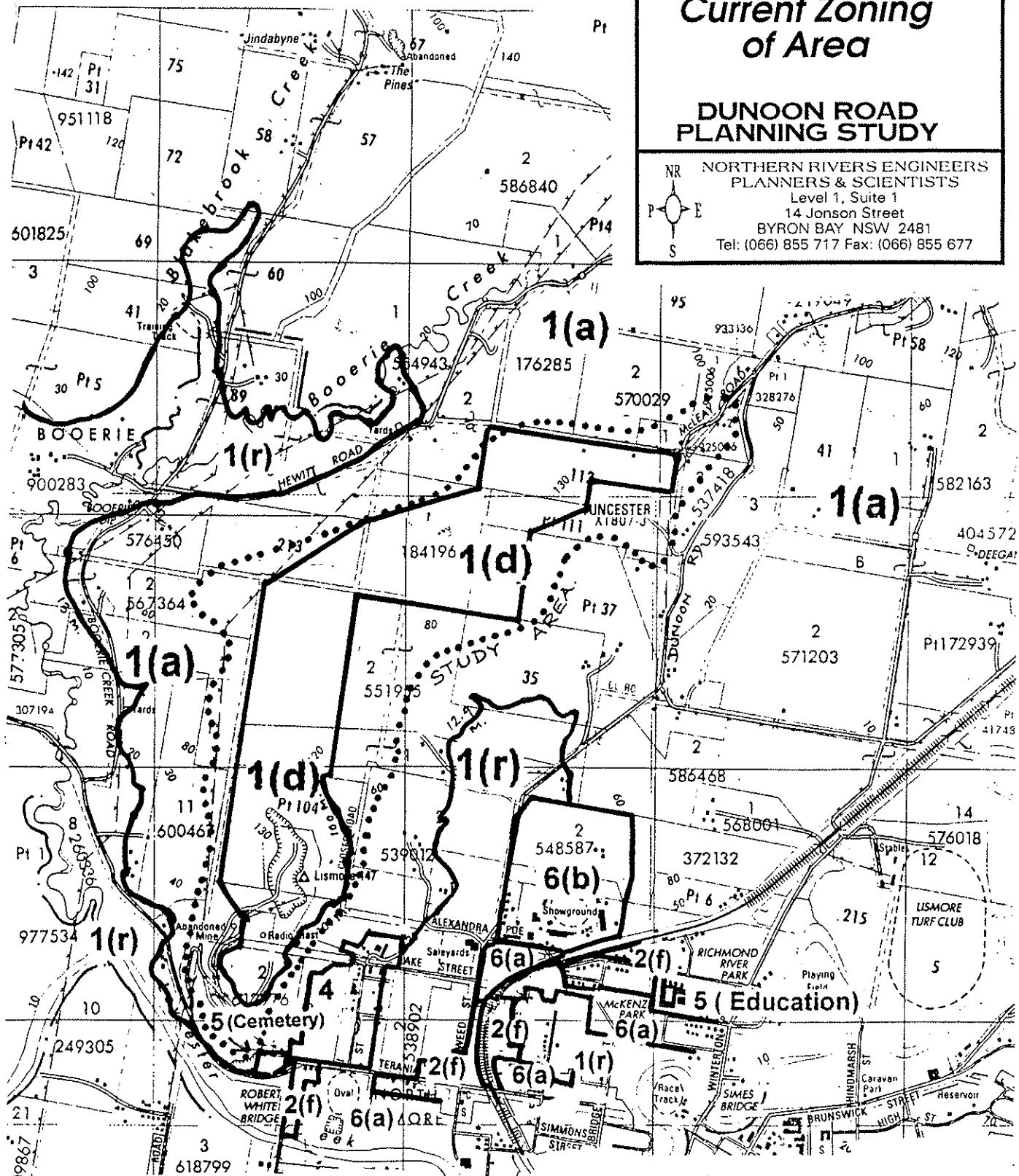
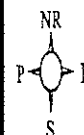


EXHIBIT NO. 9

Current Zoning of Area

DUNOON ROAD PLANNING STUDY

NR NORTHERN RIVERS ENGINEERS
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Zones

- Lismore Local Environmental Plan 1992

General Rural Zone	1(a)
Investigation Zone	1(d)
Riverlands Zone	1(r)
Residential (Flood Liable)	2(f)
Industrial Zone	4
Special Uses Zone	5
Recreation Zone	6(a)
Private Recreation Zone	6(h)

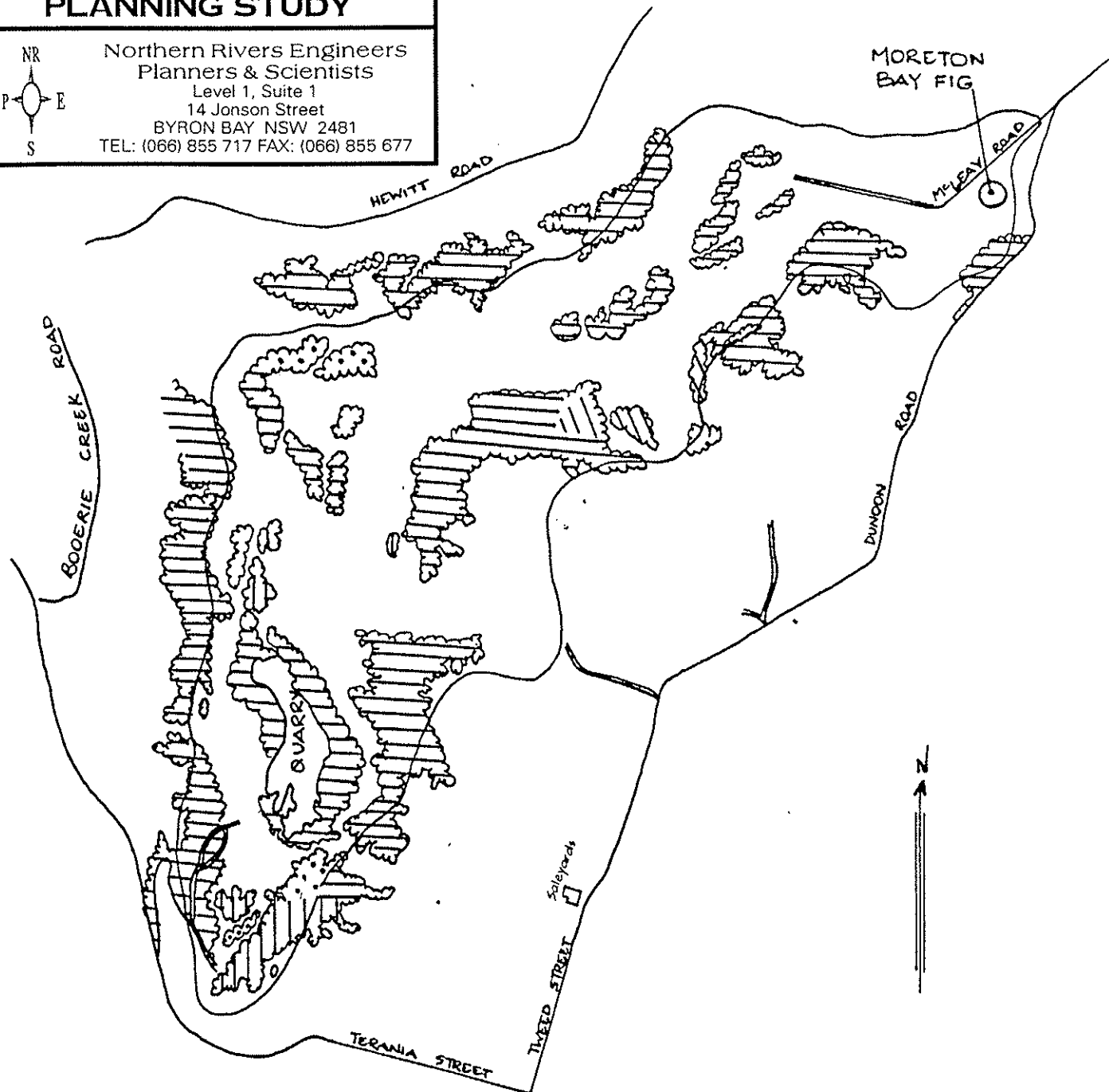
EXHIBIT NO. 10

Vegetation

DUNOON ROAD PLANNING STUDY



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-  Dry Rainforest
-  Camphor laurel / Dry Rainforest
-  Hoop pine / Camphor laurel
-  Forest red gum
-  Grassland

Vegetation

EXHIBIT NO. 11

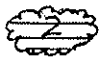
Conservation & Rehabilitation Zones

DUNOON ROAD PLANNING STUDY



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as recommended by James Warren,
Environmental & Biological Consultant



AREAS OF MEDIUM CONSERVATION VALUE



PROPOSED CONSERVATION &
REHABILITATION ZONES

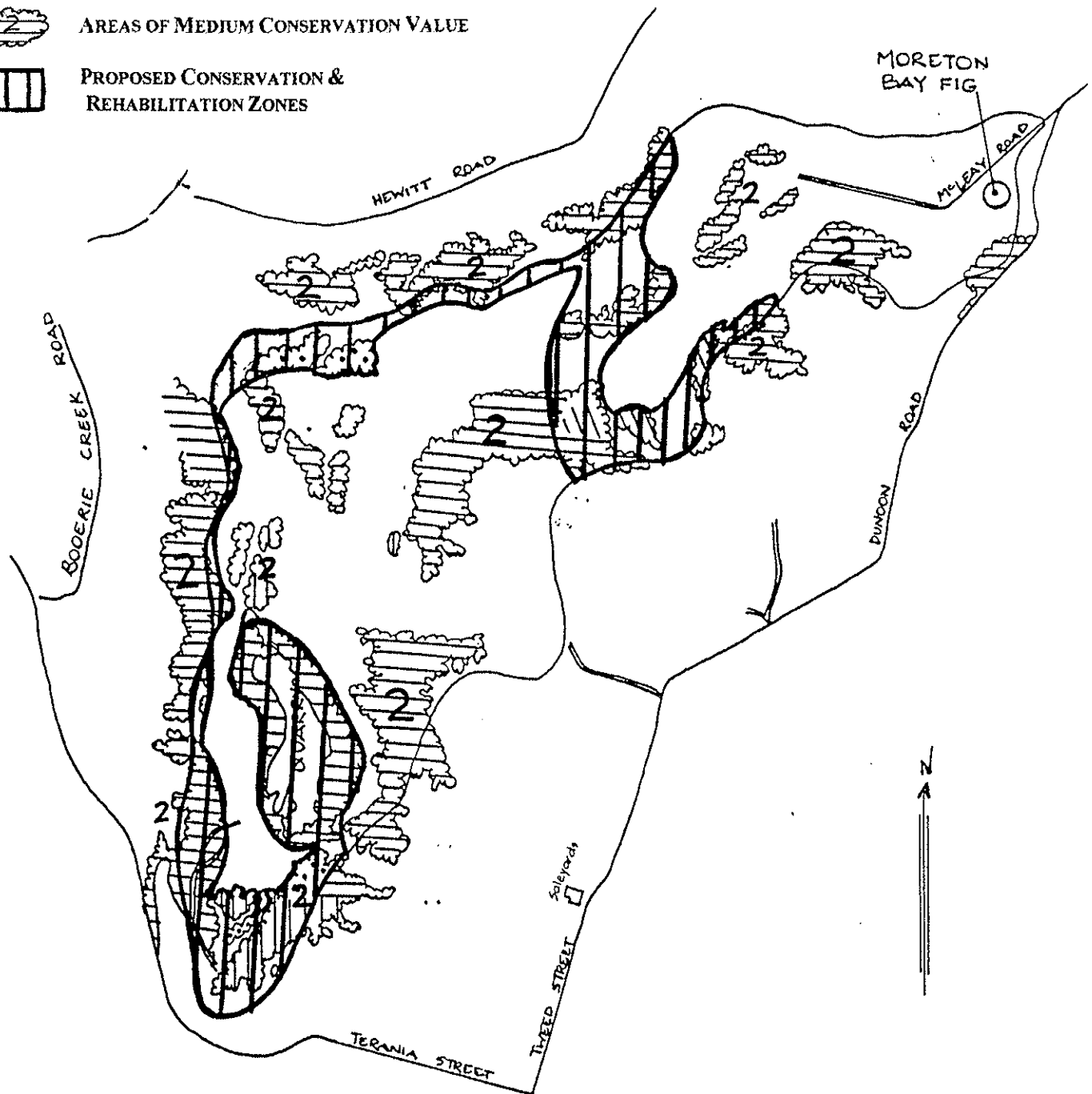


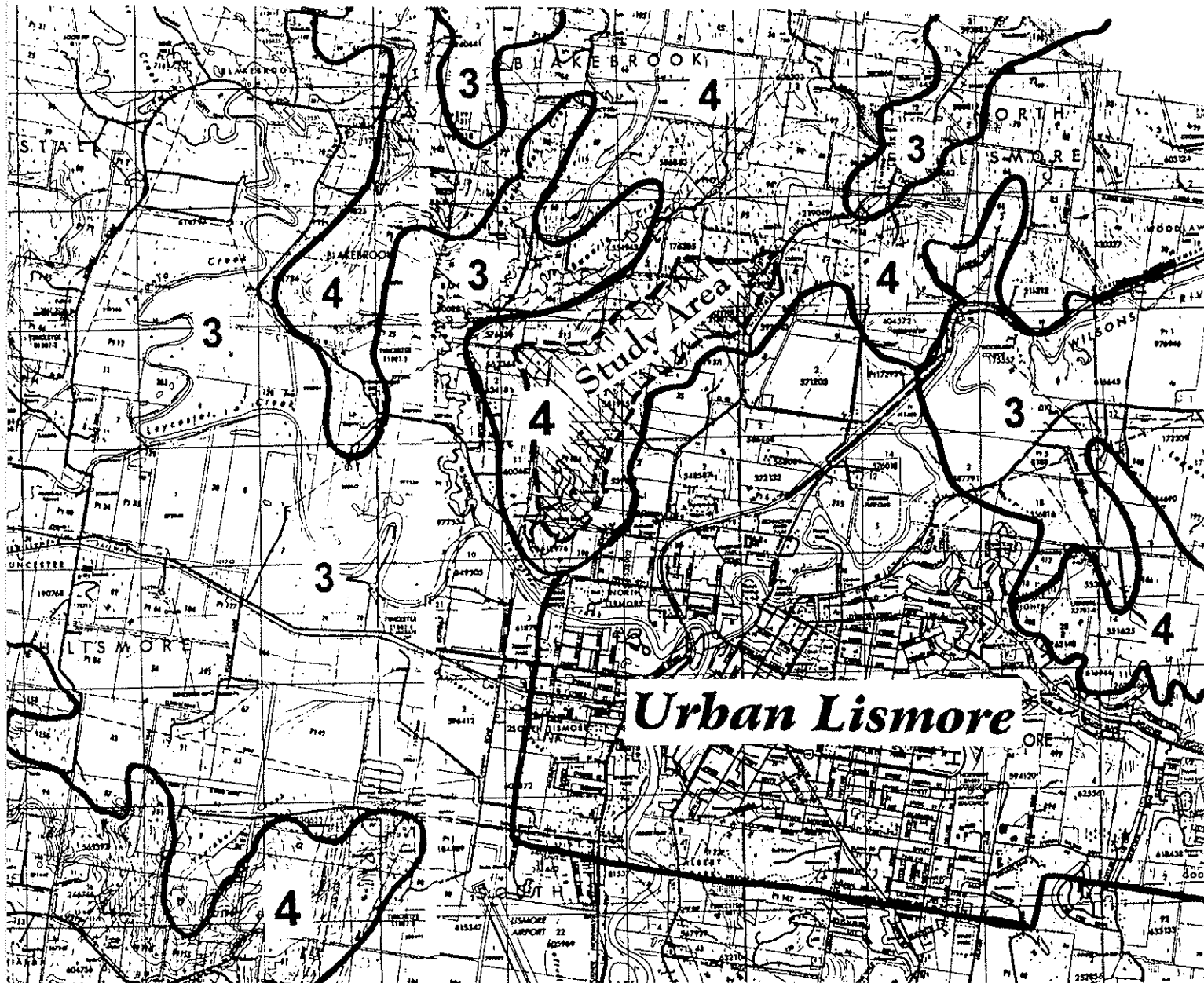
EXHIBIT NO. 12

Agricultural Land Classification

DUNOON ROAD PLANNING STUDY



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14 Jonson Street, Byron Bay NSW 2481
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source : Map - Classification of Agricultural Land -
Lismore City Council, NSW Department of Agriculture , 1983 ?

key:

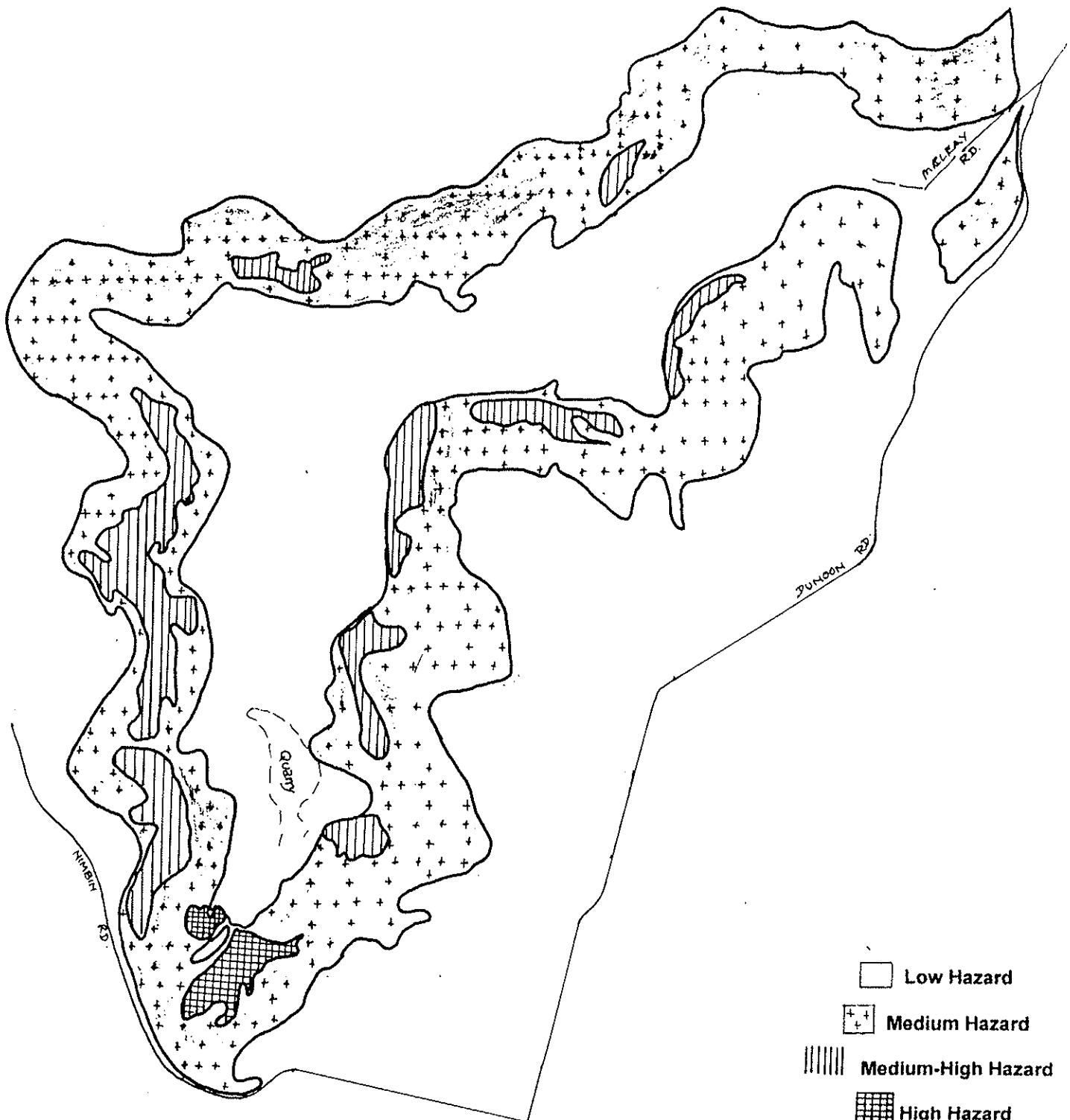
- 3 = Class 3 Land, suited to grazing, can be cultivated occasionally
- 4 = Class 4 Land, suited to grazing , not suitable for cultivation,
- 5 = Class 5 Land, suited for only rough grazing, or not suited to agriculture
(see annotations to Map)

EXHIBIT NO. 13

Bushfire Hazard Assessment

DUNOON ROAD PLANNING STUDY

NR
P
S
E
NORTHERN RIVERS ENGINEERS
PLANNERS & SCIENTISTS
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Based on Fire Hazard Scores from the "Rural Evaluation Manual"
Department of Planning:1988

0 500

EXHIBIT NO. 14

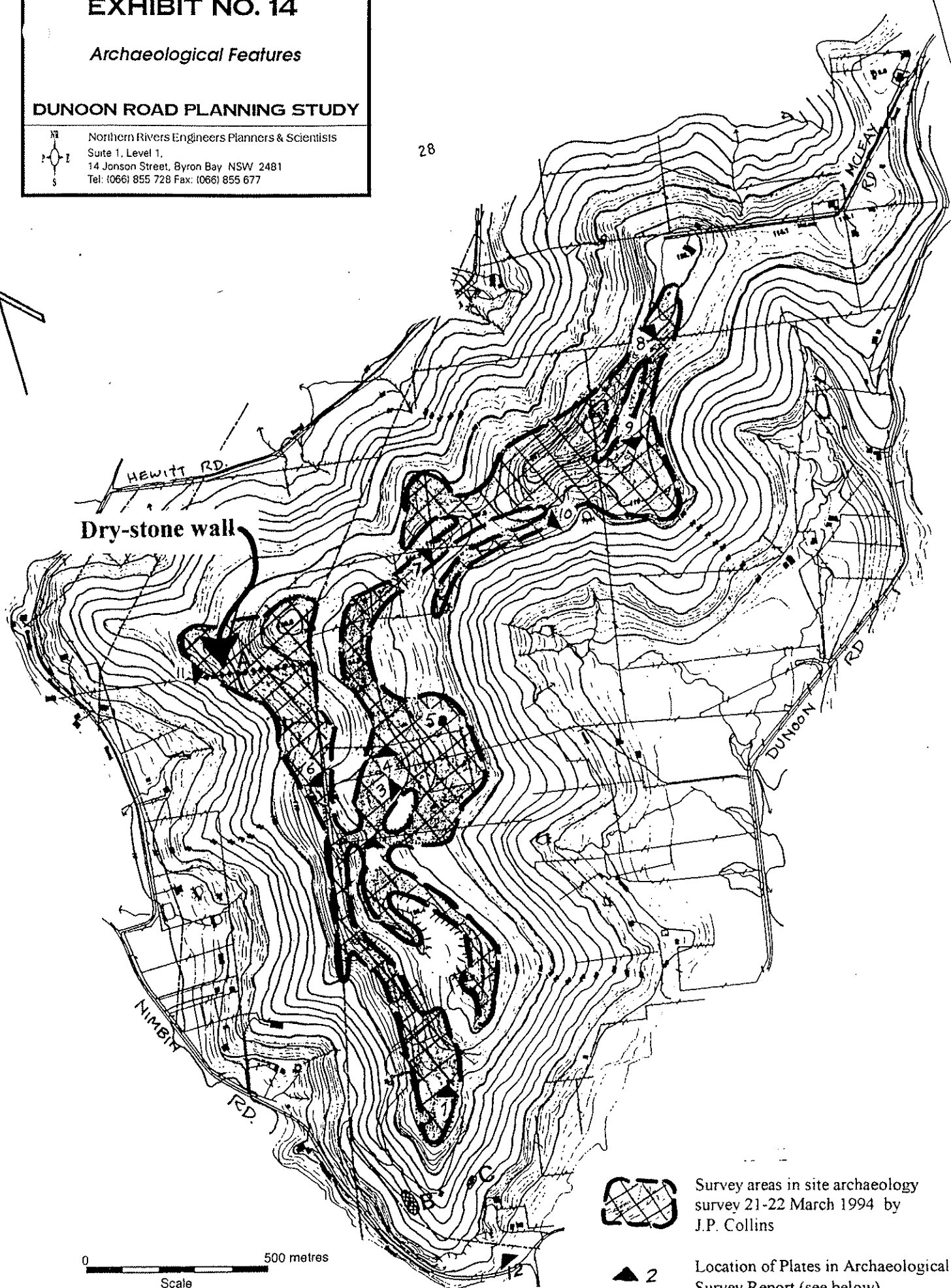
Archaeological Features

DUNOON ROAD PLANNING STUDY



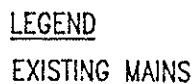
Northern Rivers Engineers Planners & Scientists
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14 Jonson Street, Byron Bay NSW 2481
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28



(From: *Archaeological Survey Report - Stage 2, for Dunoon Road Planning Study, May 1994 by J.P. Collins.*)

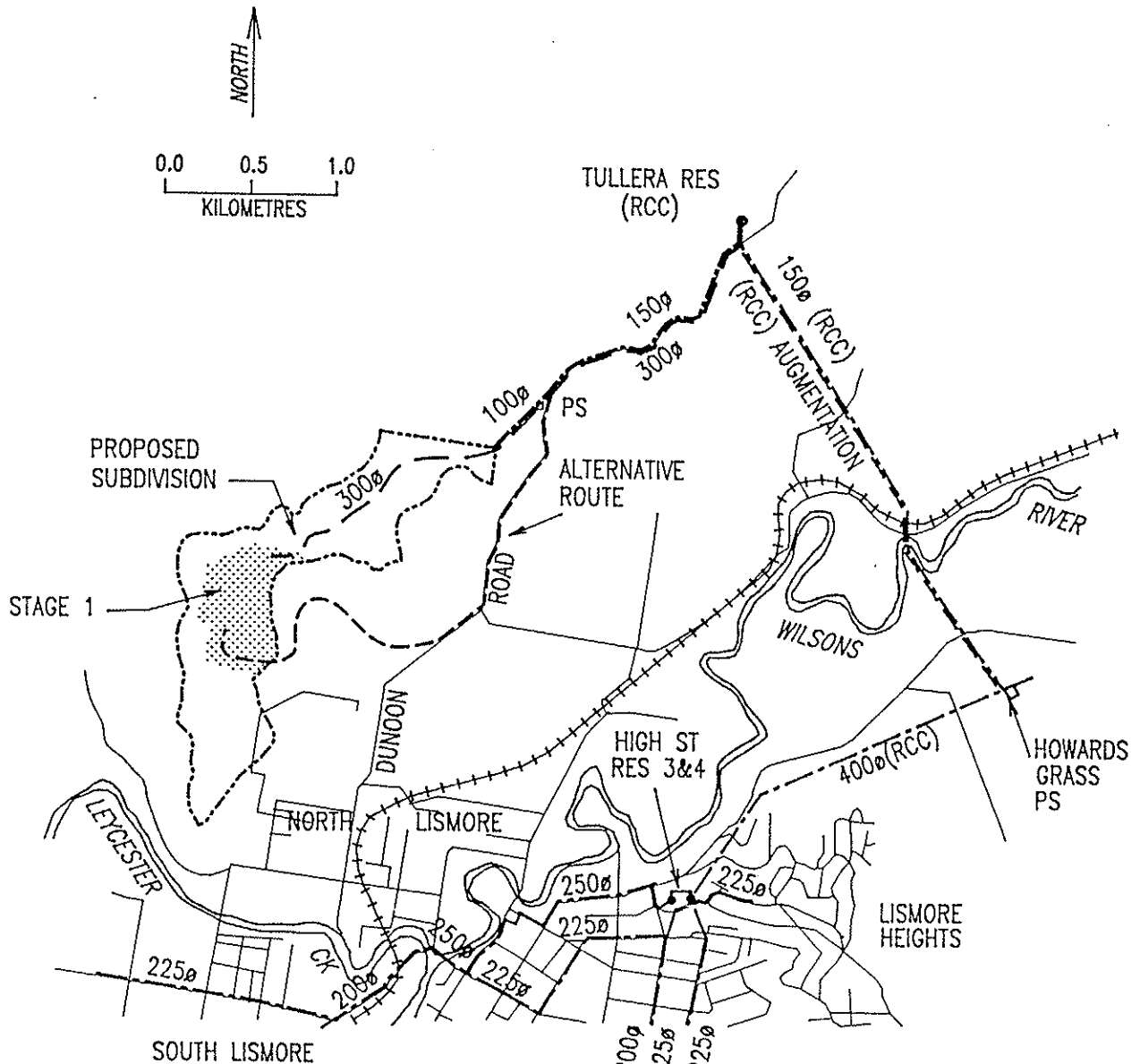
by
Engineering Services Division
Lismore City Council , May 1994



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PROPOSED SUBDIVISION DUNOON ROAD, NORTH LISMORE WATER SUPPLY INVESTIGATION

by
Engineering Services Division
Lismore City Council , May 1994



LEGEND

EXISTING MAINS ———
PROPOSED MAINS ———

EXHIBIT NO. 15B

*Water Supply Investigation
- Stage 1, Supply Option 1*

DUNOON ROAD PLANNING STUDY

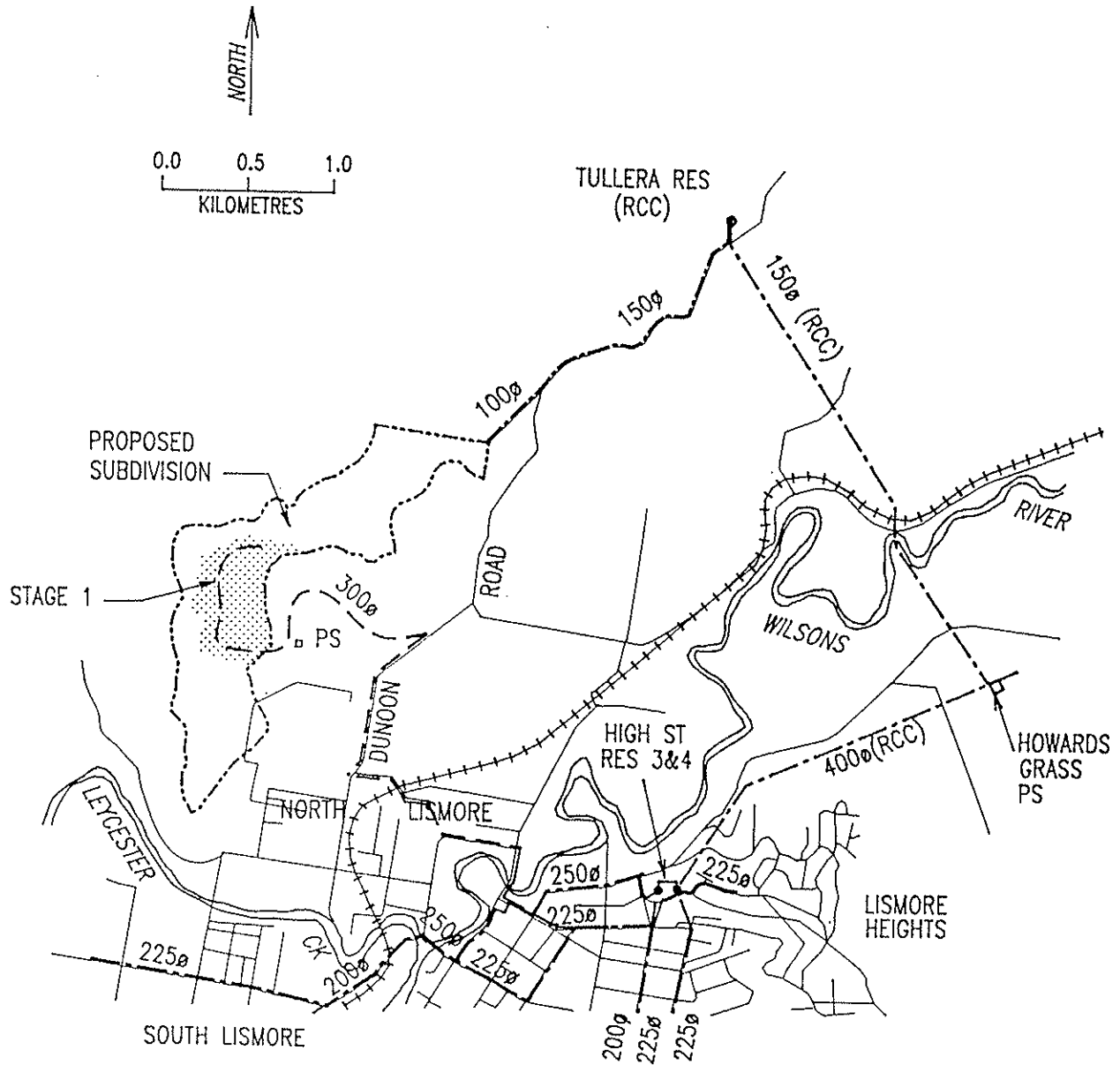


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STAGE 1 —

PROPOSED SUBDIVISION DUNOON ROAD, NORTH LISMORE WATER SUPPLY INVESTIGATION

by
Engineering Services Division
Lismore City Council , May 1994



LEGEND

EXISTING MAINS ———

PROPOSED MAINS - - - - -

STAGE 1 —

EXHIBIT NO. 15C

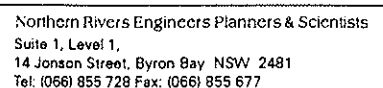
*Water Supply Investigation
- Stage 1, Supply Option 2*

DUNOON ROAD PLANNING STUDY



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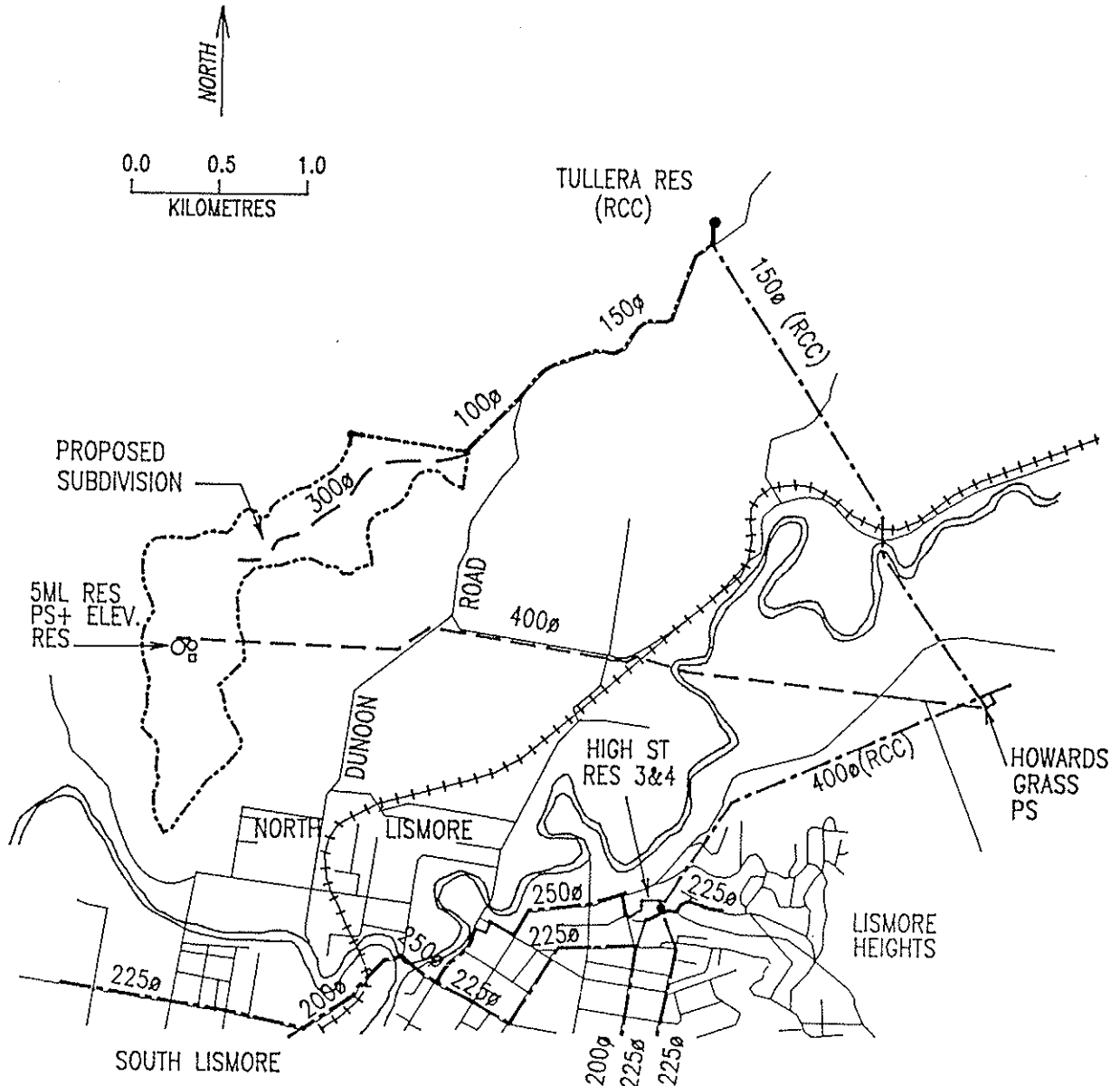
by
Engineering Services Division
Lismore City Council , May 1994



FULL DEVELOPMENT —

PROPOSED SUBDIVISION DUNOON ROAD, NORTH LISMORE WATER SUPPLY INVESTIGATION

by
Engineering Services Division
Lismore City Council , May 1994



LEGEND

EXISTING MAINS - - - -
PROPOSED MAINS - - - -

FULL DEVELOPMENT -

EXHIBIT NO. 15E

*Water Supply Investigation
- Full Development, Supply Option B*

DUNOON ROAD PLANNING STUDY



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EXHIBIT NO. 16 A***Soil Classification and
Long Term Infiltration Rates*****DUNOON ROAD
PLANNING STUDY**

Northern Rivers Engineers
Planners & Scientists
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BYRON BAY NSW 2481
TEL: (066) 855 717 FAX: (066) 855 677

SOIL CLASSIFICATION

Sample ID	Liquid Limit %	Plastic Limit %	Plasticity Index	Classification
TH1 - 180	33.5	24.5	9	ML
TH1 - 240	35	23.9	11.1	CL - ML
TH1 - 370	35.6	21.3	14.3	CL
TH1 - 500	21.2	19.9	1.3	ML
TH2 - 130	37.6	35.2	2.4	ML
TH2 - 240	41.5	25.9	15.6	ML - CL
TH2 - 360	40.3	32.7	7.6	ML
TH2 - 500	44	26.4	17.6	CL - ML

Above land based on sampling by NREPS and site inspections by geologists of the Centre for Coastal Management, Southern Cross University; laboratory tests by the Centre for Coastal Management, using Unified Soils Classification System.

ASSESSED LONG TERM INFILTRATION RATES

Hole No.	Location	Assessed Long Term Infiltration Rate (mm/hr)
1	Top of ridge northern end of Sexton property	3.5 **
2	East of the existing quarry	>200
3	Centre of plateau south end of Sexton land	>200
4	Top of ridge north of quarry on Council land	Abt. 140
5	West of quarry near radio mast	>200

** topsoil infiltration rate >200mm/hr.

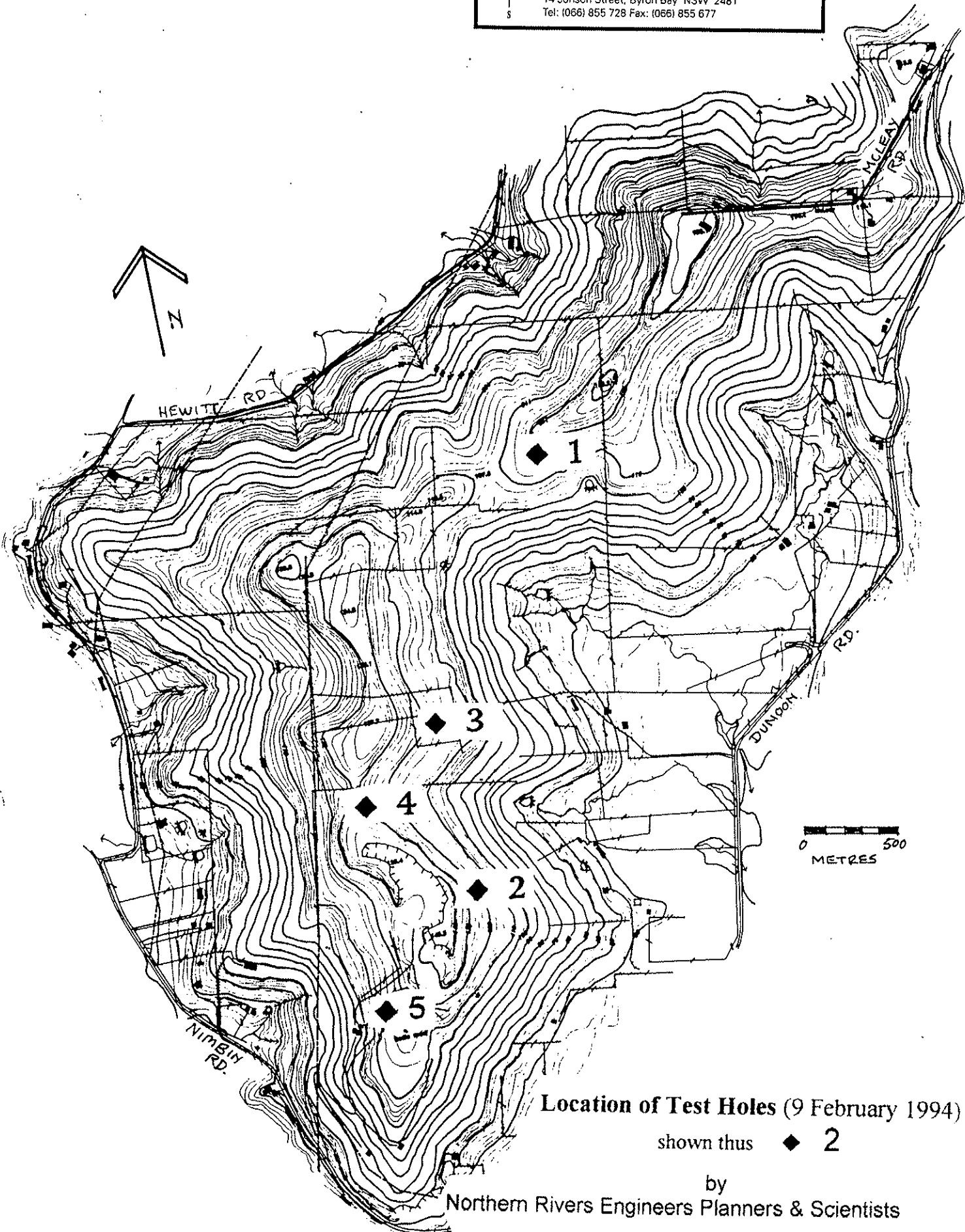
EXHIBIT NO. 16B

Test Hole Locations
- Long-term Infiltration Rates

DUNOON ROAD PLANNING STUDY



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14 Jonson Street, Byron Bay NSW 2481
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Location of Test Holes (9 February 1994)

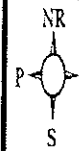
shown thus 2

by
Northern Rivers Engineers Planners & Scientists

EXHIBIT NO. 17

Traffic Movements (Existing)

DUNOON ROAD PLANNING STUDY



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Planners & Scientists
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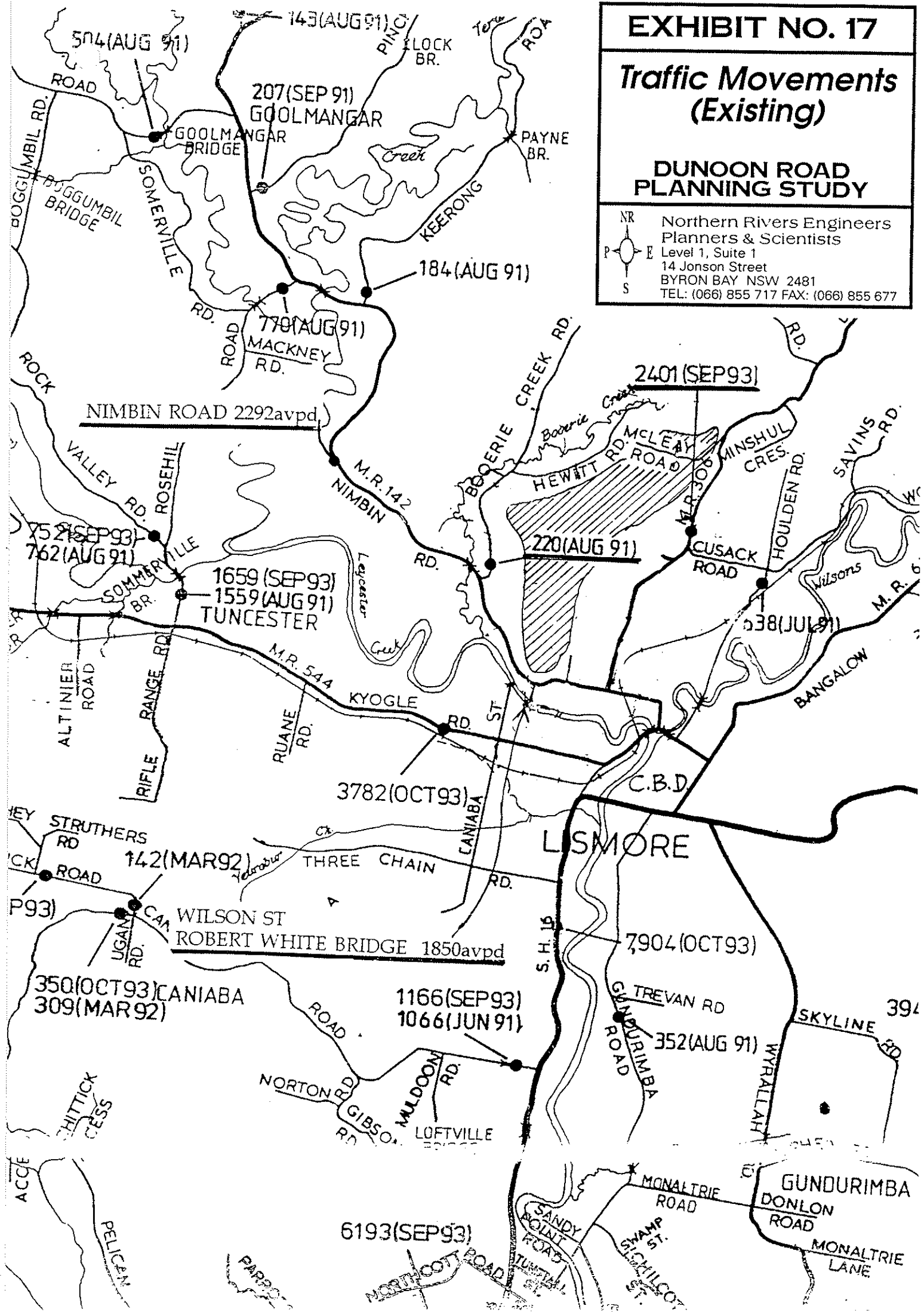


EXHIBIT NO. 18

Vehicle Access to Site

DUNOON ROAD PLANNING STUDY

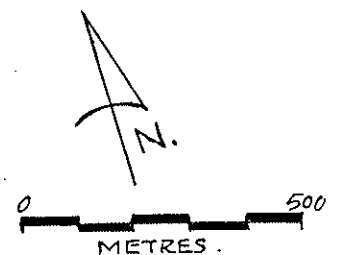


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Disused Road Reserve to be utilised to McLeay Road.
Requires purchase of about 0.4 ha.
Option to close Dunoon Road.
Maximum gradient 20%

Extend Sexton Road. Maximum gradient about 25%,
but could be adjusted during design to reduce to 20%.

Reconstruct existing access to Quarry.
Maximum gradient about 18%, with
tight bends





Sexton Road Extension, east side of site



Dunoon Road Deviation to McLeay Road, north-east part of site



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Photos of Vehicle Access

DUNOON ROAD PLANNING STUDY

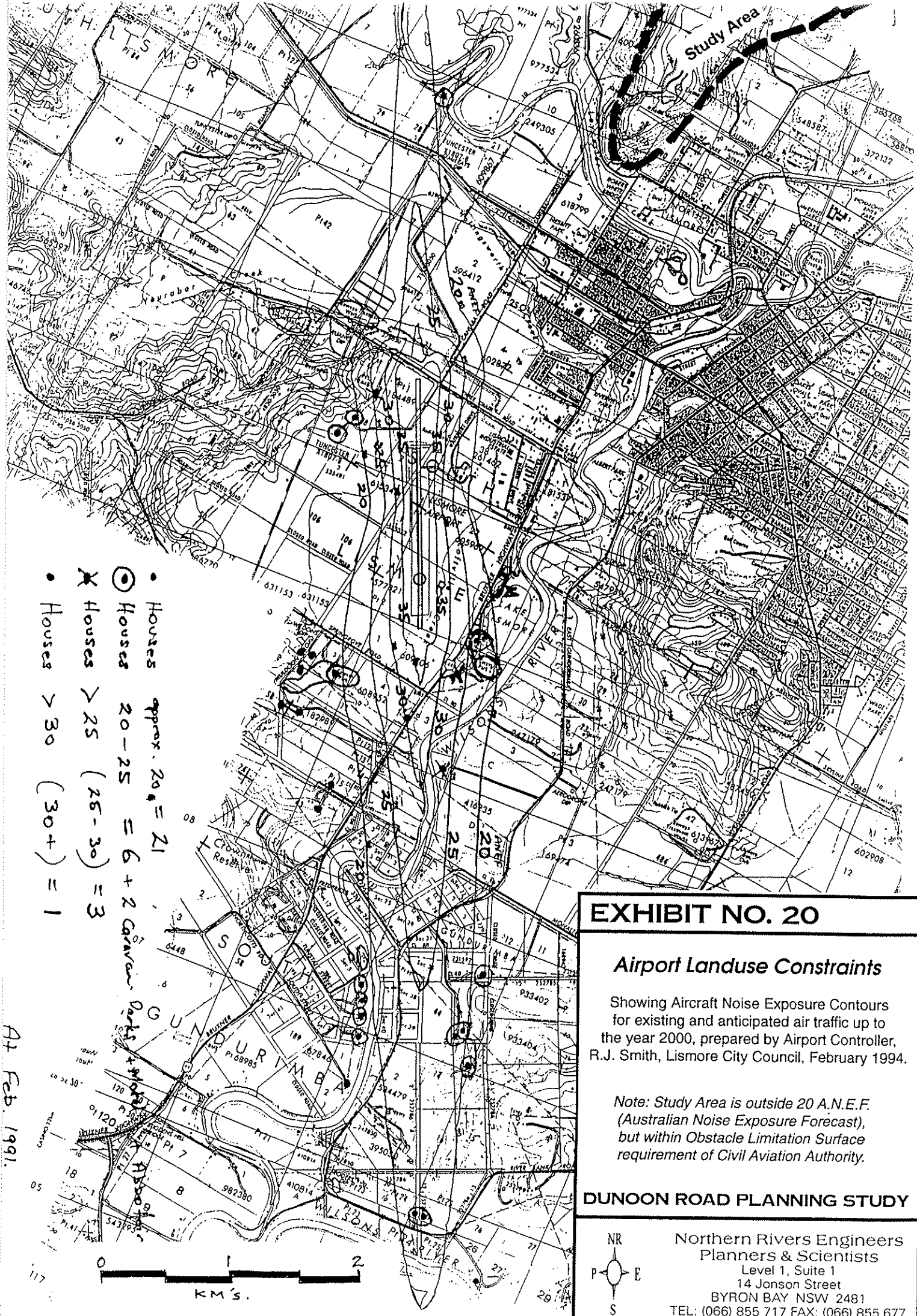


EXHIBIT NO. 20

Airport Landuse Constraints

Showing Aircraft Noise Exposure Contours for existing and anticipated air traffic up to the year 2000, prepared by Airport Controller, R.J. Smith, Lismore City Council, February 1994.

Note: Study Area is outside 20 A.N.E.F. (Australian Noise Exposure Forecast), but within Obstacle Limitation Surface requirement of Civil Aviation Authority.

DUNOON ROAD PLANNING STUDY

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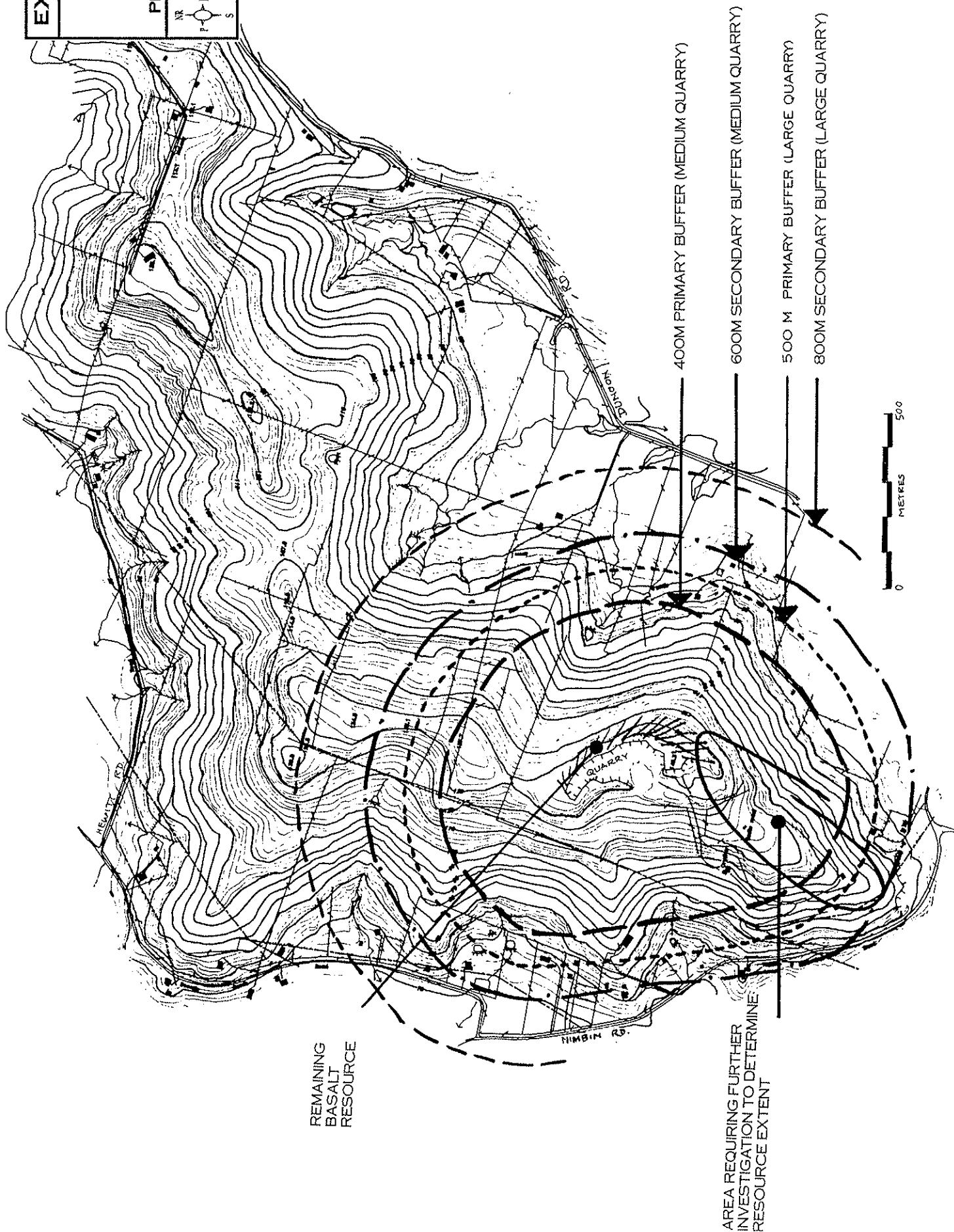
At Feb. 1991.

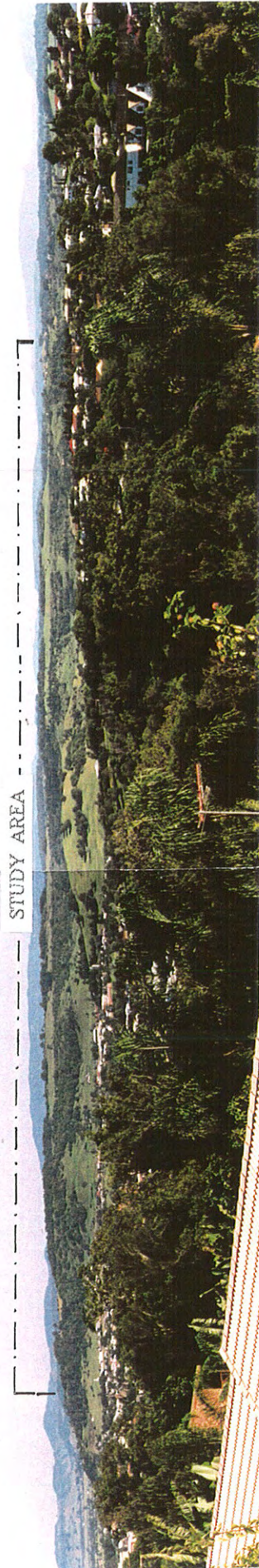
EXHIBIT NO. 1

North Lismore Quarry

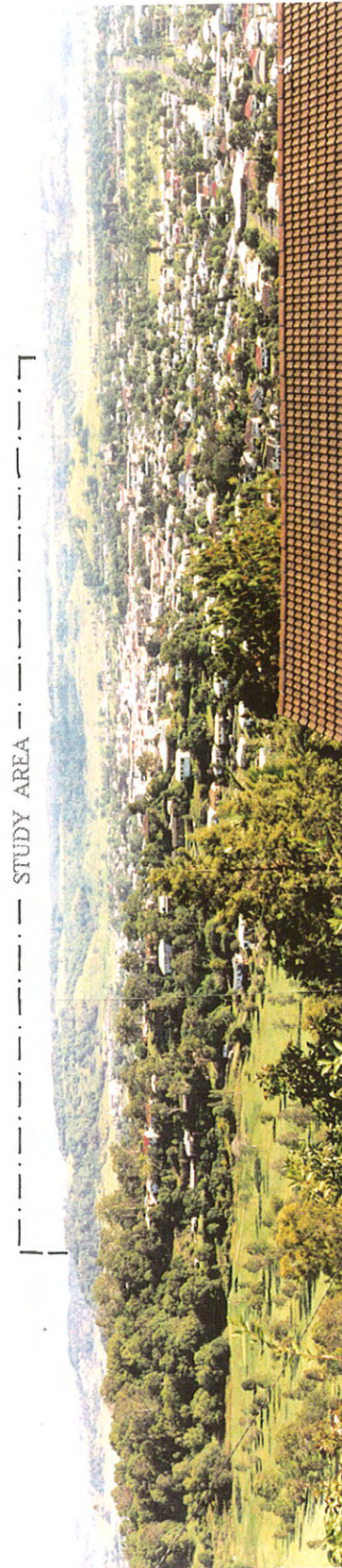
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PLANNERS & SURVEYISTS
14 JONES ST
BYRON BAY NSW 2481
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▲ View of site from Ballina Cutting, Lismore Heights, looking north-west



▲ View of site from East Lismore hill, looking north

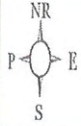
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BYRON BAY NSW 2481
Tel: (066) 855 717 Fax: (066) 855 677

EXHIBIT NO. 22(A)

Visual Appraisal

DUNOON ROAD PLANNING STUDY

EXHIBIT NO. 22(B)



NORTHERN RIVERS ENGINEERS
PLANNERS & SCIENTISTS
Level 1, Suite 1
14 Jonson Street
BYRON BAY NSW 2481
Tel: (066) 855 717 Fax: (066) 855 677

Visual Appraisal

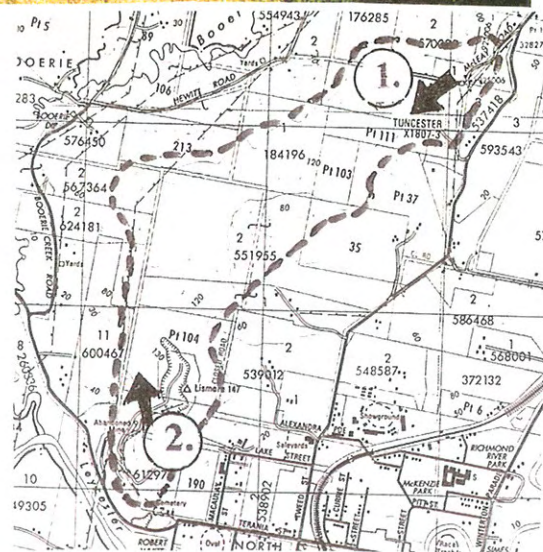
DUNOON ROAD PLANNING STUDY

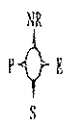


▲ 1. View of plateau and upper escarpment, north-eastern part of site, from Macleays Road looking south-west.



▲ 2. View of plateau and wooded ridge-crest, south-western part of site (west of main quarry).





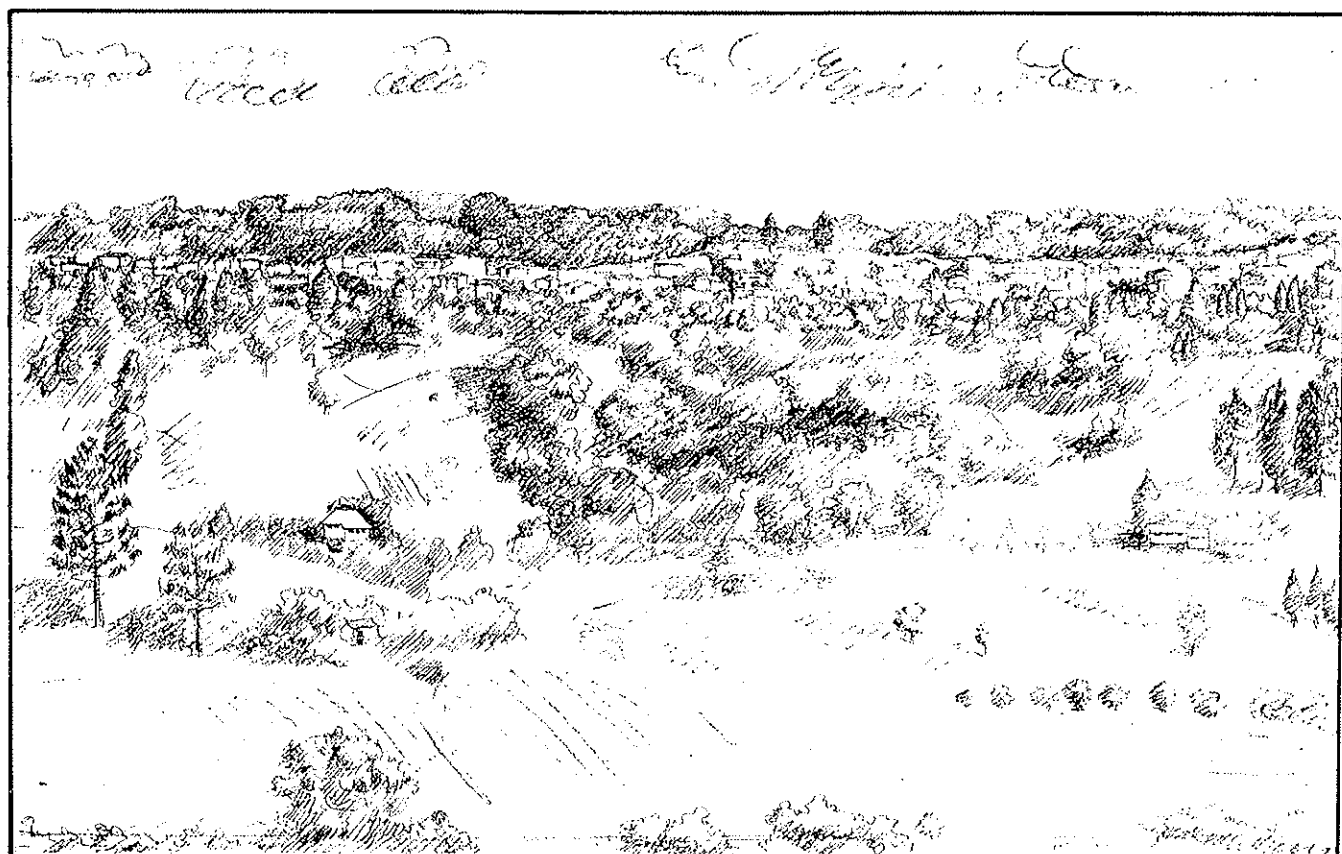
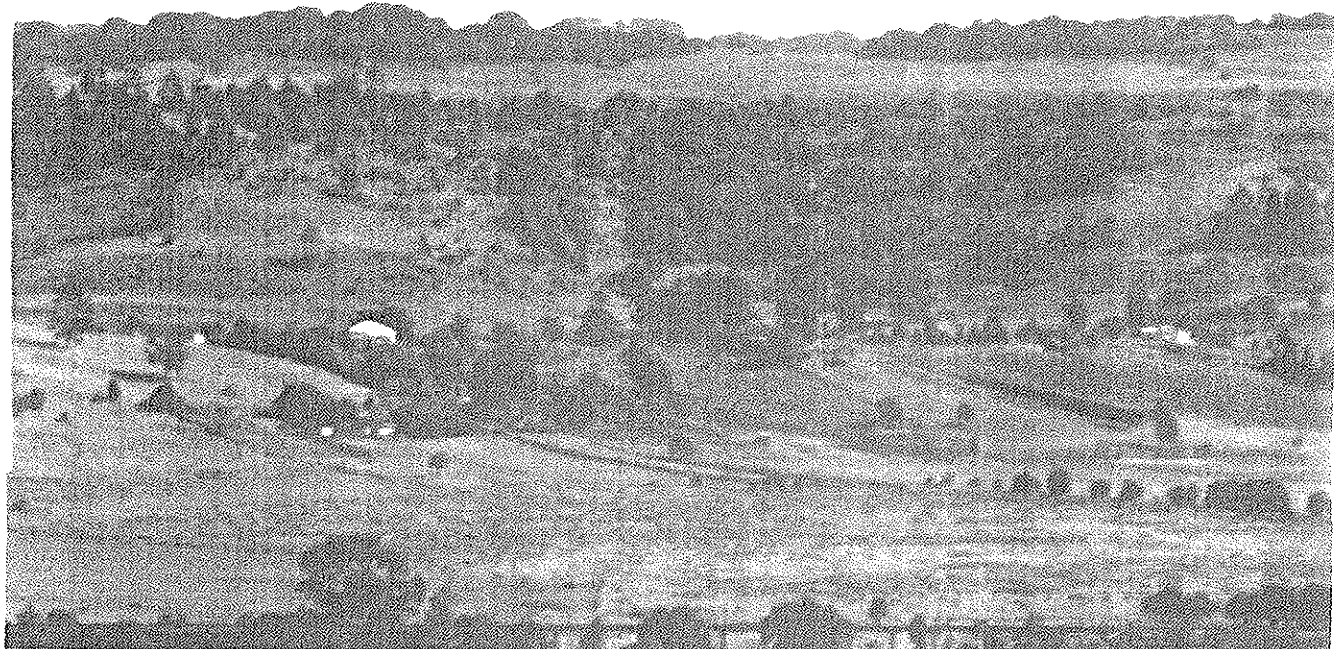
Northern Rivers Engineers Planners & Scientists

Suite 1, Level 1,
14 Jonson Street, Byron Bay NSW 2481
Tel: (066) 855 728 Fax: (066) 855 677

EXHIBIT NO. 22(C)

Visual Appraisal

DUNOON ROAD PLANNING STUDY



View from Lismore Heights looking WNW to SE slopes of NE part of Study Area,
with perspective of potential housing development on part of Inversol P/L and Serone land.

EXHIBIT NO. 23

Development Constraints & Suitability

DUNOON ROAD PLANNING STUDY



NORTHERN RIVERS ENGINEERS
PLANNERS & SCIENTISTS
Level 1, Suite 1
14 Jonson Street
BYRON BAY NSW 2481
Tel: (066) 855 717 Fax: (066) 855 677

- No Development Constraints
- Ridgecrest - Low Constraint
- Vegetation - Medium Constraint
- Land subject to flooding
- Medium Constraint
- Slope - Medium Constraint
- Three or more Constraints

0 METRES 500

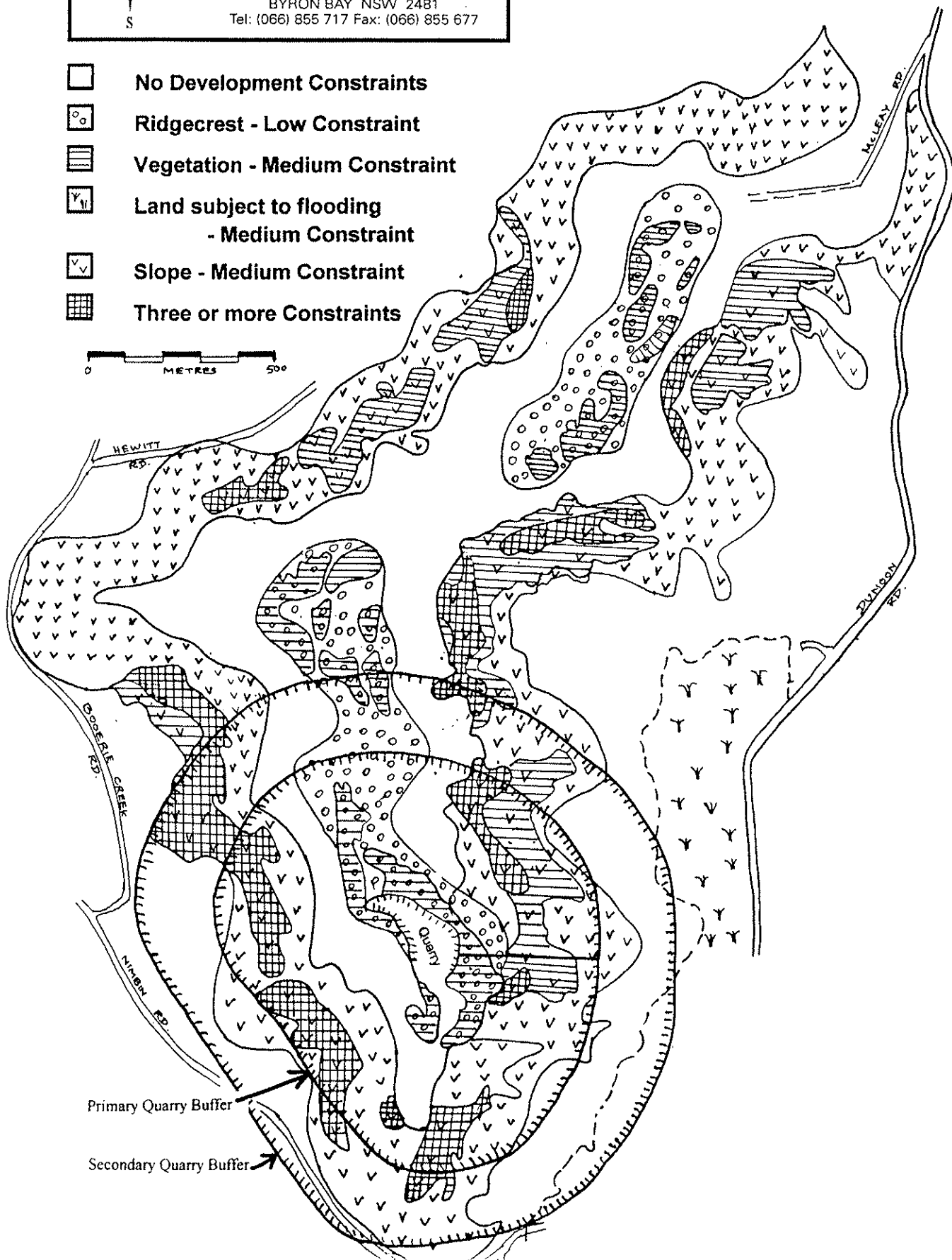


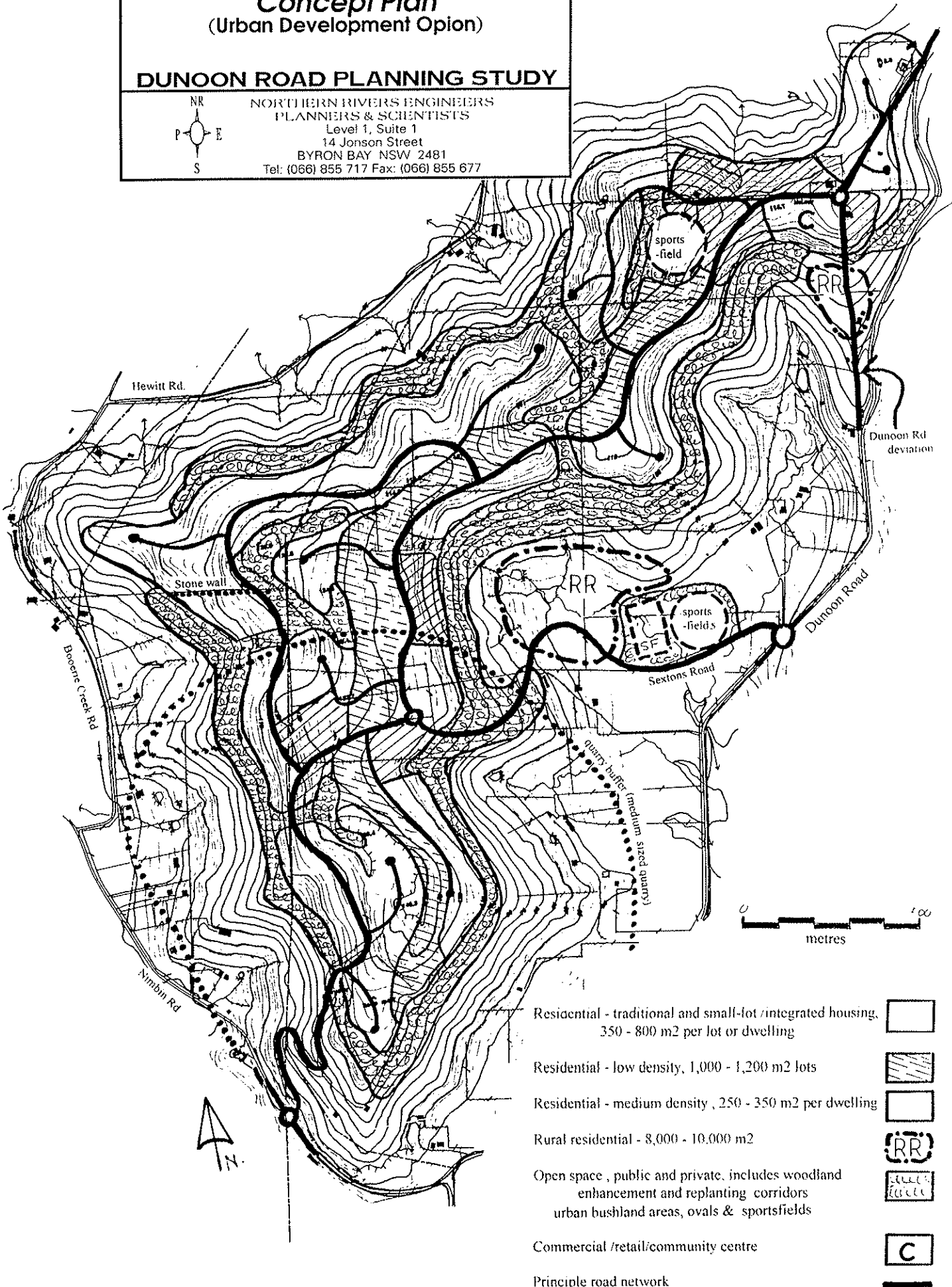
EXHIBIT NO. 24

Concept Plan (Urban Development Option)

DUNOON ROAD PLANNING STUDY



NORTHERN RIVERS ENGINEERS
PLANNERS & SCIENTISTS
Level 1, Suite 1
14 Jonson Street
BYRON BAY NSW 2481
Tel: (066) 955 717 Fax: (066) 855 677



Residential - traditional and small-lot /integrated housing,
350 - 800 m2 per lot or dwelling

Residential - low density, 1,000 - 1,200 m2 lots

Residential - medium density, 250 - 350 m2 per dwelling

Rural residential - 8,000 - 10,000 m2

Open space, public and private, includes woodland
enhancement and replanting corridors
urban bushland areas, ovals & sportsfields

Commercial /retail/community centre

Principle road network

(Note : Indicative lay-out only)



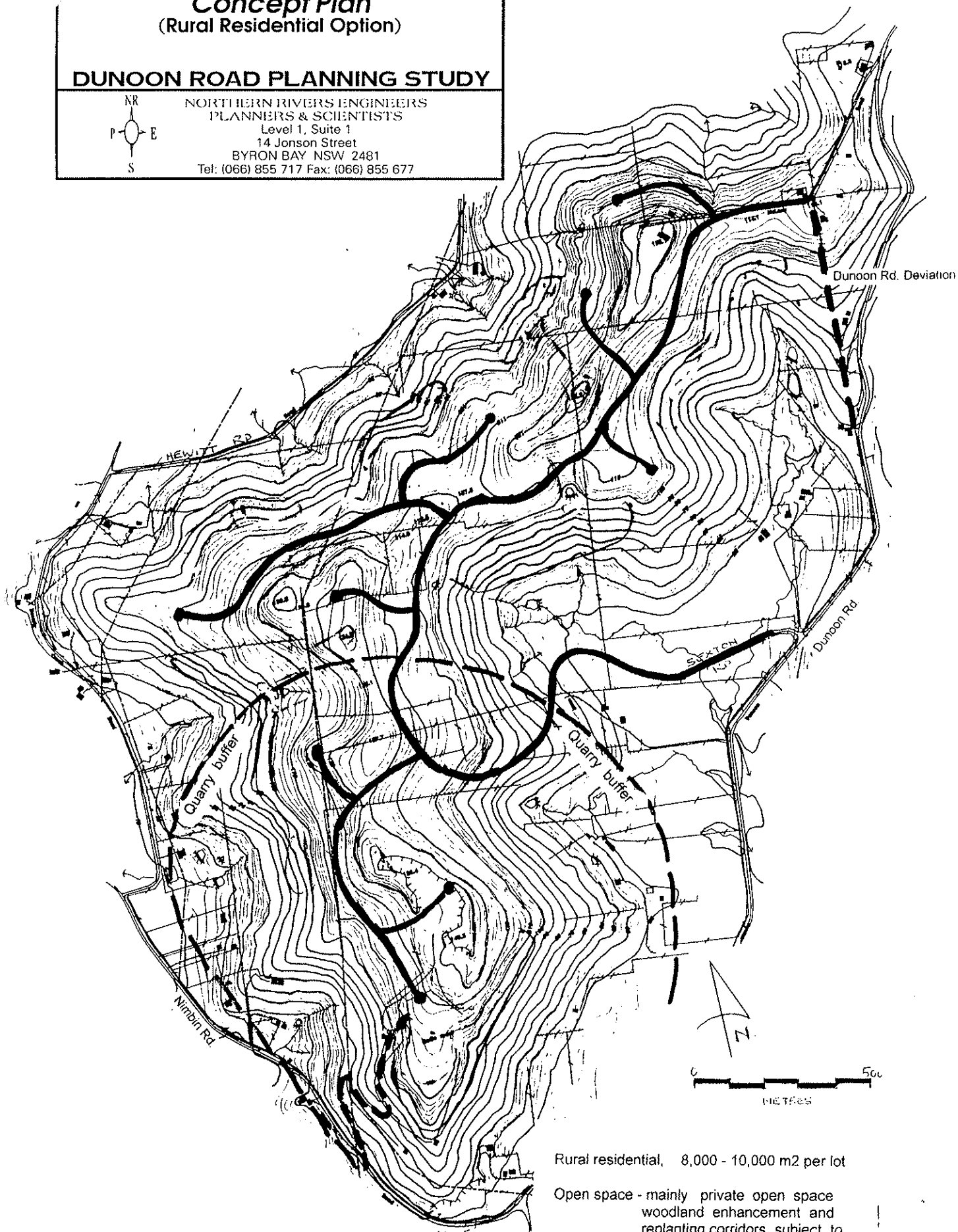
EXHIBIT NO. 25

Concept Plan (Rural Residential Option)

DUNOON ROAD PLANNING STUDY



NORTHERN RIVERS ENGINEERS
PLANNERS & SCIENTISTS
Level 1, Suite 1
14 Jonson Street
BYRON BAY NSW 2481
Tel: (066) 855 717 Fax: (066) 855 677



Rural residential, 8,000 - 10,000 m2 per lot

Open space - mainly private open space
woodland enhancement and
replanting corridors, subject to
creativity of developer / landholder

Principle road network

Note: indicative lay-out only



3rd February, 1994.

Manager,
NREPS,
14 Jonson St,
BYRON BAY. 2481.

NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

Our reference: F/0305
Your reference:

Dear Sir,

RE: PLANNING STUDY OF LAND WEST OF DUNOON ROAD,
NORTH OF LISMORE ON BEHALF OF LISMORE CITY COUNCIL

Reference is made to your letter of 28.01.94 regarding
the above study.

The National Parks and Wildlife Service has reviewed its
database records, held at Lismore District Office, and is
unable to supply any relevant information at this stage.

Yours faithfully,

Colin Browne
Colin Browne
for
DIRECTOR-GENERAL.

Lismore District
Suite 9
Colonial Arcade
75 Main Street
Alstonville
PO Box 91
Alstonville 2477
Tel: (066) 28 1177
Fax: (066) 28 3937

Head Office
43 Bridge Street
Hurstville NSW
Australia
PO Box 1967
Hurstville 2220
Tel: (02) 585 6444
Fax: (02) 585 6555

Department of School Education

NORTH COAST REGION

The Study Team
Northern Rivers Engineers, Planners & Scientists
Suite 1, Level 1
14 Jonson Street
BYRON BAY NSW 2481

101 Molesworth Street
Lismore NSW
Box 422, P.O. Lismore
NSW 2480

Our reference

Your reference

Attention: Ian Pickles

Telephone: Lismore 21 1701 388
Fax: Lismore 22 2872 388

Alison Taylor, 066/211 702
Fax No. 066/222 617

14 February 1994

Dear Sir

PLANNING STUDY OF LAND WEST OF DUNOON ROAD, NORTH OF LISMORE

I refer to your recent correspondence seeking comments from the Department of School Education on impacts of development of the abovementioned land.

Assuming the land is found to be suitable for residential or urban residential purposes, a potential population of some 4,000 persons has been identified. This estimate is just lower than the point at which a new primary school would be required, that is 5,000 persons. If, however, as stated in your letter, development occurs in staged releases, the existing schools could take the small number of extra students.

Before final approvals are given by Council, I would appreciate if the proposed number of lots in each stage could be forwarded to me so that I might determine potential numbers of additional students, in order to enhance my yearly projections.

Thank you for the opportunity of providing comments on this proposal and I look forward to being advised of the outcome of the study.

Yours sincerely



Alison Taylor
Regional Demographic Planner

DEPARTMENT OF MINERAL RESOURCES

MINERALS AND ENERGY HOUSE
12-17 CHRISTIE STREET
CORRESPONDENCE PO BOX 536
ST LEONARDS NSW 2065
TEL 3324 ST LEONARDS
TELEPHONE (02) 901 8888
FACSIMILE (02) 901 8777

Mr I Pickles
Northern Rivers Engineers
Planners and Scientists
Suite 1, Level 1
14 Jonson Street
BYRON BAY NSW 2481

Our ref : L94-0021
Your ref :
For further information
contact : Dennis Hayes
Tele : (02) 901 8238

PLANNING STUDY, DUNOON ROAD, LISMORE

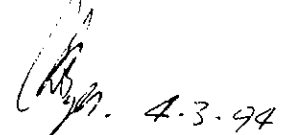
I refer to your letter dated 28 January 1994 requesting comment on the potential development and uses of the land shown by red edging on diagram "M", attached.

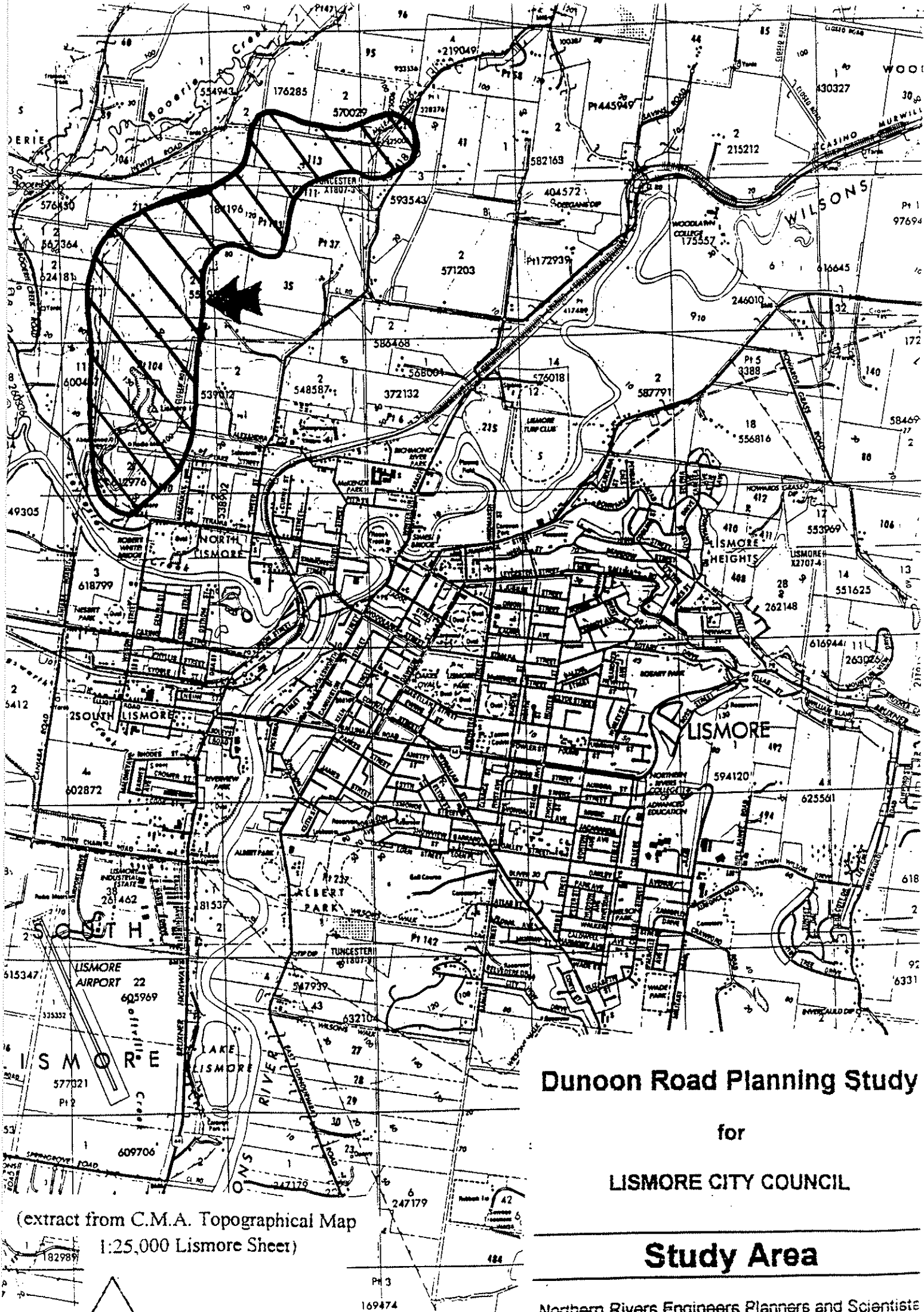
The subject area is situated upon Tertiary mafic lavas which overlay the Walloon Coal Measures at 200 metres depth and potentially the Ipswich Coal Measures at 2000 metres. It is not affected by any current mining titles or applications. The Department is concerned, however, about possible extractive mineral resources remaining in the abandoned quarry located in the southern part of the area. This quarry has produced blue metal in the past and its current resource potential is unknown.

It is recommended that a resource assessment of the site be undertaken, with a view to establishing the extent of any remaining reserves. As construction material resources are becoming increasingly in short supply along the coastal belt it is vital that such deposits are protected from sterilisation, by appropriate zoning. The abandoned quarry should be examined for its resource potential before any land rezoning takes place which would jeopardise its possible reopening. It is also recommended that a buffer zone be established around the quarry to allow for its future development and to prevent the encroachment of residential development close to a dangerous area.

The coal seams in the Walloon Coal Measures beneath the study site appear to be unsuitable for underground mining. Both the Walloon and Ipswich Coal Measures have potential for producing coal seam methane which is best developed on relatively flat or low sloping ground, close to consumers. Considering these factors and that the study area is situated along a basalt ridge, the development of energy minerals is unlikely to occur. The Department considers coal seam methane to be an important resource in the Lismore area and is concerned that any suitable sites, as described above, are maintained to allow the resource to be properly assessed.

The northern half of the subject area does not contain any other known mineral deposits and the Department has no objection to it being rezoned for residential or rural residential use.


D Hayes
for DIRECTOR GENERAL



(extract from C.M.A. Topographical Map
1:25,000 Lismore Sheet)

Dunoon Road Planning Study

for

LISMORE CITY COUNCIL

Study Area

Northern Rivers Engineers Planners and Scientists
14 Jonson Street, Byron Bay

Our reference: 257.5314 GC:CB
Mr Charleston (066) 42 0174
Your reference: -

Roads and Traffic
Authority
North Coast Zone

Northern Rivers Engineers Planners
and Scientists
Suite 1, Level 1,
14 Jonson Street
BYRON BAY NSW 2481



31 Victoria Street
Grafton
New South Wales 2460
Telephone (066) 42 3733
Facsimile (066) 42 0160
PO Box 576
Grafton NSW 2460
DX 7610

**LISMORE CITY COUNCIL. PLANNING STUDY OF LAND WEST OF DUNOON ROAD,
NORTH OF LISMORE ON BEHALF OF LISMORE CITY COUNCIL.**

Dear Sir,

I refer to your letter dated 28 January 1994 concerning the above and advise that the Authority has no objections to the proposed planning study.

The Authority's overall responsibility is to preserve the safety and efficiency of the arterial road network and the prime concern is the need to prevent "ribbon development" with direct access to these roads and minimise the number of road junctions.

However, to ensure that the Authority's concerns regarding traffic generation from the areas proposed for development, the following comments are offered to assist in the preparation of the Planning Study and subsequent Local Environmental Plans.

Preliminary studies and Draft Local Environmental Plans should incorporate the Authority's Guidelines for the Preparation of Local Environmental Plans (refer copy attached). They should include a planned hierarchy of roads as described in the Guidelines, designed to meet these objectives and in particular include a traffic study and assess the proposed road connections to the existing arterial road network.

These access points should be located to provide Safe Intersection Site Distance and designed in accordance with current AUSTROADS standards.

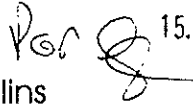
Current AUSTROADS standards should also be adopted when designing major roads within the proposed developments and any necessary upgrading of the surrounding road infrastructure. Council should seek Section 94 contributions towards the development of this infrastructure.

Subsequent Development Control Plans should take into account significant areas and not just be restricted to individual development proposals.

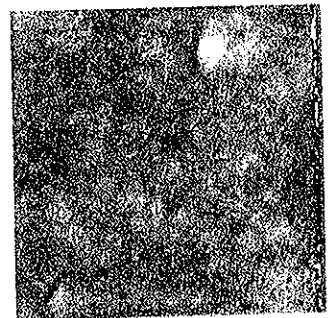
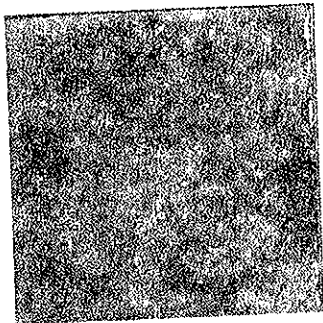
Appropriate Buffer Zones will need to be retained surrounding the two quarries at the southern end of the site referred to in your letter.

Yours faithfully,

P.J. Collins

Per  15.FEB.1994

P J Collins
Zone Manager



ROADS AND TRAFFIC AUTHORITY OF NSW

Guidelines for the Preparation of Local Environmental Plans

1. General Principles : The main policy to be observed is the reduction or elimination of traffic conflicts, both vehicular and pedestrian. To this end the major roads should be preserved for use by through traffic and the local or collector roads preserved for the use of local traffic servicing the area.
2. Road Hierarchy :
 - (a) Council's Road Hierarchy Plan should be taken into consideration when considering the location and importance of roads within the area.
 - (b) The major roads should be designed to facilitate the movement of through traffic with minimal interference due to stopping and turning movements. Traffic conflicts should be eliminated or reduced as much as possible.
 - (c) Sub-divisional or local and collector roads should be designed to discourage use by through traffic. This reduces the conflict between pedestrians and faster through traffic, and assists in maintaining the amenity of the area.
3. Access to Major Roads :
 - (a) The number of access points onto, or intersections with, major roads should be reduced to an absolute minimum.
 - (b) Business, industrial and special use zones with high trip generation or attraction potential should not have direct access to the major road system. Collector, local and service roads should be utilised for this purpose.
 - (c) There should be a denial of access clause for all land abutting major roads and this land should be serviced by internal local roads, if possible, or if not by service roads, parallel to the major road.
4. Buffer Zones : Buffer zones should be provided between freeways, parkways, highways and adjoining properties.
5. Intersections :
 - (a) Junctions of sub-divisional roads with major roads should be kept to a minimum and spacings between intersections on opposite sides of the road should be in accordance with the Roads and Traffic Authority's requirements (say 120 metres minimum). Four-way intersections should be avoided.
 - (b) Intersections should be located where maximum stopping/sight distance is available.
 - (c) Considerations should be given to roundabout or grade separation treatment at major intersections and sufficient road reservation should be available to permit this type of treatment if future needs dictate. The topography should be fully utilised where grade separation is provided, to reduce costs.

6. Road Widths : Widths of proposed roads should not be less than the standards recommended in Technical Bulletin No. 12, issued by the Department of Planning.
7. Bus Routes : The Department of Planning "Planning for Bus Services - Technical Circular No. 7" should be taken into account in planning bus routes within a subdivision.
8. School Sites : Pre-School, Primary and High Schools should be centrally located to minimise walking distances for children and to minimise use of vehicles. Sites should be on reasonably level ground to ensure adequate stopping distance/sight lines along the road frontages.

Setting down and picking up of children (including buses) should desirably occur within the School site and not on public streets. Sufficient area should be provided for on-site parking of all vehicles, including buses. Schools should be located so as to avoid, as far as practical, the need for students to cross arterial or heavily trafficked roads.
9. Grade Separation : Ideally, pedestrians proceeding to and from shopping centres, community centres, schools and other high traffic generators should not be required to cross major roads at grade. Such crossings should be achieved by means of grade separation (underpasses or bridges).

Intersections of major roads should ideally be grade separated and designed in such a way as to fully utilise the topography.
10. Cycleways : Considerations should be given to the implementation of cycleways with minimum conflict between the bicycles and both pedestrians and vehicles. The Authority's publication "Planning for the Bicycle" would be useful as a guide when considering cycleways.
11. Developments at Major Junctions : It is of particular importance that zones which permit significant traffic generating uses should not be permitted at the junction of major roads. The treatments referred to in (3) should be stringently applied if Council does not permit such development.
12. Professional Consulting Rooms or Similar : Activities of this type should be confined to neighbourhood shopping areas where appropriate off-street car parking facilities are provided and should not be allowed within residential dwellings. Further, such a development could interfere with the amenity of the area by encouraging additional traffic into it.
13. Work on Existing Classified Roads Due to the Development : Any work on a classified road, e.g. upgrading of intersections, additional lanes, that is necessary due to the development, should be undertaken to the requirements of and at no cost to the Roads and Traffic Authority. Contributions of partial costs require special consideration by the Roads and Traffic Authority.



NREPS
Suite 1 Level 1
14 Jonson Street
Byron Bay NSW 2481

Telex: 166966
Facsimile: (066) 43 1161
Telephone: (066) 42 7799
Ext:
Contact Name:
Our Reference: John Schmidt

6024611

Attention: Ian Pickles

Dear Sir

Re: Planning Study Of Land West Of Dunoon Road, North Of Lismore

As the 'States' water manager, The Departments main focus on the North Coast is to assist the community and local government to better manage activities that impact on the water environment.

Study Objective

Such a study is an excellent opportunity to identify specific site characteristics to enable a '**water sensitive design**' approach to be developed for the area in question. To maintain the health of the water environment there is a need to;

- protect the *catchment frame* and
- to ensure that the *activities* associated with developments adopt the best management practice available.

From a water perspective the study should identify;

Site Characteristics

- Surface and groundwater features (creeks, swamps, wetlands, springs, etc)
- Drainage patterns
- Groundwater depth, local useage, aquifer extent and characteristics especially where shallow groundwater systems occur.
- Extent and nature of riparian vegetation cover (% coverage along extent of creeks and other water related features)

Water Balance & Water quality

Establish the natural benchmark conditions of

- runoff and drainage characteristics of respective catchments
- water quality from a total system context, assessing biologic indicators as well as the traditional chemical and physical parameters.

to provide the framework for water sensitive design for future development in relation to;

- stormwater control measures
- lot density
- road orientation
- distribution of open space and other reserves
- waste disposal mechanisms

to achieve drainage functions, water conservation, water quality, recreational and pathway / cycleway objectives.

Waste effluent Disposal

Identify areas sensitive to traditional septic absorption trench methods.

Conclusion

The Department strongly recommends that a pre-development water balance and water quality standard be maintained as the development ethic

In the conceptual layout ensure that all drainage lines and water features are appropriately buffered. Recognising that riparian and other water related vegetation is the prime protector of our waterway ecology and provides a zone of high conservation value that can be utilised for multiple functions.

Buffered, fully vegetated, drainage lines and water features together with vegetated ridge lines will go a long way towards improving the health of our waterways.

These simple measures can help keep intact the catchment framework.

For any further discussion please contact John Schmidt on 066 427799

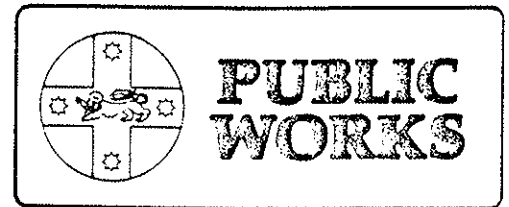
Yours faithfully



John Schmidt
Regional Environmental Officer
North Coast Region
17/2/94

OUR REF:
YOUR REF:

RH:CS (WLE2342)
CR 302



NEW SOUTH WALES
NORTH COAST REGION

Mr Ian Pickles
Northern Rivers Engineers Planners
and Scientists
Suite 1, Level 1
14 Jonson Street
BYRON BAY 2481

Contact: R. Hagley
Phone: (066)201 639

[11 FEB 1994

Dear Sir

**Planning Study of Land West of Dunoon Road,
North of Lismore on Behalf of Lismore City Council**

I refer to your letter of 28 January, 1994 concerning the preparation of a Planning Study for land to the northwest of Lismore City.

Public Works considers that the study for proposed urban residential development of the study area should propose a surface water management plan which provides controls and measures to minimise the impacts of sediments, nutrients and pollutants infed into Leycester Creek.

Yours faithfully


C. M K Harrap
Client Manager
Local Government
North Coast Region

4 February 1994

Our Ref: 870

Mr. Ian Pickles
Ian Pickles Town Planning
P O Box 442
MULLUMBIMBY NSW 2484



Cnr Walker and
Canterbury Sts
PO Box 376
Casino NSW 2470
Phone (066) 62 4477
Fax (066) 62 1954

Dear Sir,

Re: Urban/Rural Residential Study - Dunoon Road, Lismore

I have received a copy of your letter sent to Crown Lands Service, Grafton, in regard to the above proposed study. I wish to comment on a few matters.

1. Protected Lands

The copies of Protected Lands maps (obtained from Paul O'Keefe) of the proposed study area are not recommended in determining erosion hazard.

The scale of these maps is 1:126,000 and their purpose is for the administration of Protected Lands regulations in the destruction/injury of trees on such lands.

2. Our Department's Rural Land Capability Map of the area obtained from our office also has certain limitations in reliable interpretation especially if used for urban investigations. (See attached document). I generally consider these maps more suitable for use in developing Regional or Local Environmental Plans.

3. In assessing an area for capability purposes, many factors considered in determining land capability are easily identified and measured in the field or office, e.g. slope, terrain units and geology. However, one of the major limitations/constraints to urban development is soil type occurring on a particular parcel of land.

To adequately assess soils physical/chemical features of any development, it is recommended to carry out both on-site soil investigation, soil sampling and appropriate soil laboratory tests.

Please find attached the current methodology applied by our Department in soil consideration and urban land use planning.

→ not attached

Yours faithfully,

Mark Stanton-Cook

M. Stanton-Cook
District Soil Conservationist
CASINO



The Department of Conservation and Land Management incorporates: the Soil Conservation Service, Crown Lands Service, Land Information Centre, Valuer-General's Office, Land Titles Office and Forestry Policy Unit.

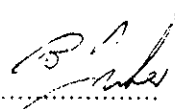
Northern Rivers Engineers Planners & Scientist
Suite 1 Level 1
14 Jonson street,
BYRON BAY 2481

Re: Planning study for Dunoon Rd and North Lismore area.

Telecom would be able to provide services to the area under study, however there would be certain criteria that would need to be addressed as listed below.

- 1..As this is a remote or satellite development from the main infrastructure there would need to be a contribution from the developers towards a fibre extension of our network.
2. Within the development Telecom will require small parcels of land of approx 5m X 5m for distribution points, these sites to be negotiated in conjunction with layout to ensure adequate coverage can be attained.
3. The current policy is that provided the developer provides a shared trench then the development will be cabled free of charge. However if no shared trench is provided then it will be installed by Telecom and charged to the developer.
4. In addition to the above points it is imperative that Telecom is advised of the time table so funds and resources can be allocated for this project. Failure of the developer to provide sufficient lead time may result in the developer bearing all costs.

Trusting these will assist with your study.



Barry Fisher
Northern Sector CAN Planner
NSW Country and ACT Region
26 Bounty Street,
PO Box 1000
LISMORE NSW 2480
Ph (066) 230321
Fax (066) 230310
23/2/94



NORTHERN RIVERS ELECTRICITY

OFFICE: 21 Carrington Street, LISMORE. 2480

MAIL TO: P.O. Box 110, LISMORE. 2480

PHONE: (066) 21 2781

FAX: (066) 21 8246

Your Ref:

Our Ref:

JN

11 March 1994

Ian Pickles
Northern Rivers Engineers
Planners and Scientists
Suite 1, Level 1
14 Jonson Street
BYRON BAY NSW 2481

Dear Sir

Planning Study of Land west of Dunoon Road,
North of Lismore on behalf of Lismore City Council

Reference is drawn to your letter received on 3 February 1994, concerning the above.

Electricity services to the area of your study can be made available under the same arrangements as existing elsewhere in the Lismore City Council area. That is, a user pays principle applies. Arterial 11 kV feeders exist near the area in question.

As with all new residential or urban subdivisions, NRE would encourage Lismore City Council to continue its policy requiring electricity services to be installed underground. This not only maximises the future potential of the subdivision for tree planting, but also reduces the future community cost involved in tree growth control.

Should you require any further information on the above, please contact me on telephone 21 2781.

Yours faithfully

V J KELLY
DISTRICT ENGINEER-NORTH



Environment
Protection
Authority
New South Wales

NSW Government Offices
49 Victoria Street
PO Box 498
Grafton
NSW 2460

Telephone .066. 42 0535
Facsimile .066. 42 0606

Mr I M Pickles
Suite 1 Level 1
14 Jonson Street
BYRON BAY NSW 2481

Our Reference: GR155
 GLS:SG
Your Reference:

Contact: Geoff Shuttlewood

Dear Ian

PLANNING STUDY OF LAND WEST OF DUNOON ROAD, NORTH LISMORE

Thank you for your letter dated 28 January 1994 concerning the proposed planning study on behalf of Lismore City Council.

We suggest that the following matters be considered in your assessment:

- a) The potential for contamination of land from past industrial or intensive agricultural landuses.
- b) Our Land and Information Section indicate that there are no statutory notices issued by the EPA under Section 35 of the Environmental Hazardous and Chemicals Act or Section 5 of the Unhealthy Building Lands Act, 1990 for the land in the specified area.
- c) A dip site called "Boorie" is near the boundary of the specified area. Its location is indicated in the attached map.

We note that you propose to investigate the need for and feasibility of the two quarries in the area. We recently reviewed Council's Draft Development Control Plan (No. 29) for extractive industries, and suggest you obtain a copy to assist you with your investigations.

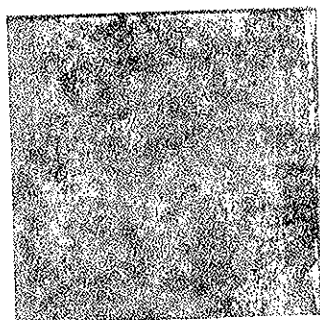
If you require any further assistance or additional information please contact Geoff Shuttlewood.

Yours faithfully



GRAEME BUDD
Regional Manager
North Coast
for Director-General

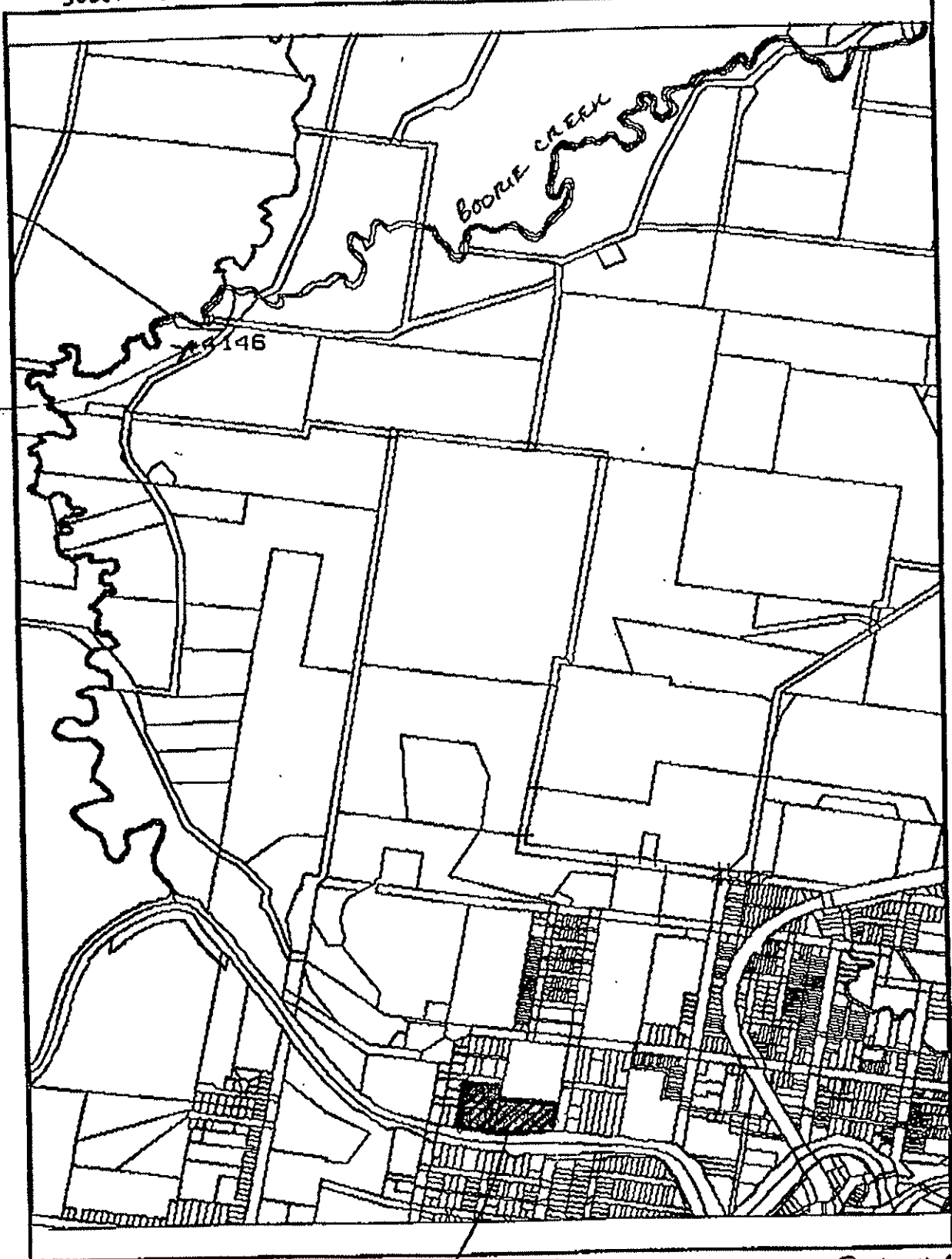
27/2/9x



Shire: LISMORE

Parish: Nth LISMORE

County: Rous



ite
Boorie'

LISMORE CITY.

Unhealthy Building land area.
Council tip - outside area
of interest

Your Ref: I. Pickles
Our Ref: GF81 H463
Contact: David Thompson
Phone: (066) 420 618
Date: 1st March, 1994



49-51 Victoria St
PO Box 11
Grafton NSW 2460
Phone (066) 42 0546
Fax (066) 42 0556

Mr I. Pickles
Northern Rivers Engineers,
Planners and Scientists
Suite 1, Level 1
14 Jonson St
BYRON BAY NSW 2481

Dear Sir,

RE: PLANNING STUDY OF LAND WEST OF DUNOON ROAD, NORTH OF LISMORE ON BEHALF OF LISMORE CITY COUNCIL.

I refer to your letter of the 28th January, 1994, concerning the planning study of land west of Dunoon road, and north of Lismore. request

The designated areas shows a number of Crown roads dissect the area. No development, construction or removal of material can occur either on or across the Crown road without the permission of the Crown Lands Service arm of the Department of Conservation and Land Management

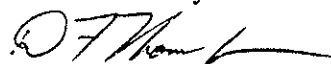
Any development which incorporated the Crown roads would need to have permission from the Crown Lands Service to have roads closed. In the event that the developer wanted to construct roads on the Crown road reserve then arrangements would need to be made under the Roads Act, 1993, to have the road transferred to Council's control. Unfortunately due to the implications of the Commonwealth Native Titles Bill, 1993 this Department is not in a position to proceed with any dealings at this stage.

The Commonwealth Native Title Act, 1993 (NTA), commenced on 1st January, 1994, which together with complimentary State legislation will when enacted, have far reaching implications on Crown land administration. If native title ever existed over this Crown land it cannot be said that the native title would have been validly extinguished by a past act. There has been no determination of native title in relation to the land by the Native Title Tribunal or other forum recognised for this purpose under the NTA.

In regard to the subject sections of Crown road, investigations would need to be made to determine if native title has been extinguished or does not exist before this office can invite application to deal with this land.

For information on soil conservation matters refer to letter from Mark Stanton-Cook, District Soil Conservationist, Casino.

Yours sincerely



D.F. Thompson
for District Manager
CROWN LANDS SERVICE



The Department of Conservation and Land Management incorporates: the Crown Lands Service, Soil Conservation Service, Land Information Centre, Valuer-General's Office, Land Titles Office, and Forestry Policy Unit.

Our reference: RJS:je
Your reference:



Wollongbar
Agricultural
Institute

NSW Agriculture

Northern Rivers Engineers
Planners and Scientists
Suite 1, Level 1
14 Jonson Street
BYRON BAY NSW 2481

Attn: Ian Pickles

Wollongbar
Agricultural Institute
Bruxner Highway
WOLLONGBAR NSW 2477

Telephone (066) 24 0200
Facsimile (066) 28 1744
Telex AA 66344 NCAI

3 February 1994

Dear Sirs

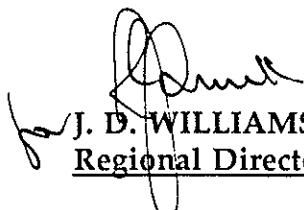
**RE: PLANNING STUDY OF LAND WEST OF DUNOON ROAD, NORTH OF
LISMORE ON BEHALF OF LISMORE CITY COUNCIL**

Thank you for your letter of 28 January, seeking comment on the above study.

I enclose for your information 'Guidelines for Subdivision and Development in Agricultural Areas' which raises the main agricultural issues which I believe should be addressed in your study.

Should you wish to discuss any of these matters, please contact Mr Bob Smith, Agricultural Environment Officer.

Yours faithfully,


J. D. WILLIAMS
Regional Director of Agriculture
(Encl)

The Council of the City of Lismore

*Council Chambers
43 Oliver Avenue, Goonellabah, N.S.W.*

TELEPHONE (066) 25 0500
FACSIMILE (066) 25 0400

P.O. BOX 23A,
LISMORE, 2480
DX 7761

ALL COMMUNICATIONS TO
GENERAL MANAGER



CONTACT

Mr. R. Smith

IN REPLY PLEASE QUOTE
RJS:VLC:94-849:S/529,
(P/21996)

March 7, 1994.

Mr. I. Pickles,
On Behalf of Study Team,
Northern Rivers Engineers, Planners and Scientists,
Suite 1, Level 1, 14 Johnson Street,
BYRON BAY, N.S.W. 2481

Dear Sir,

**RE: PLANNING STUDY OF LAND WEST OF DUNOON ROAD,
NORTH OF LISMORE, ON BEHALF OF LISMORE CITY COUNCIL.**

I reply to your letter of January 28, 1994, and your enquiry concerning the effect the Lismore Aerodrome development may have on the subject land development.

I note that you have considered Council's proposed Development Control Plan No. 27 (Buffer Areas) which reveals that the 4,000m radius from the runway end does extend into the land development area and it should also be noted that the natural ground levels of that ridge do conflict with the basic requirement of the Civil Aviation Authority. Therefore, any development on that ridge anticipated to be at a height greater than the surrounding trees would be of concern to Council and would most likely not receive approval. An example could be a radio mast or similar. It should also be recognised that high rise residential buildings would be treated in a similar manner.

As requested, I enclose a copy of the Noise Exposure Contours for the Airport and it is based on the existing traffic and anticipated aircraft traffic up to the year, 2000. It should be noted that the subject development is clear of the 20 A.N.E.F. (Australian Noise Exposure Forecast) contour line and should not present a problem in relation to most aircraft movements. However, it might also be noted that light aircraft fly over the subject land as part of the circuit for their approach to Lismore Airport when the wind is predominantly from the south.

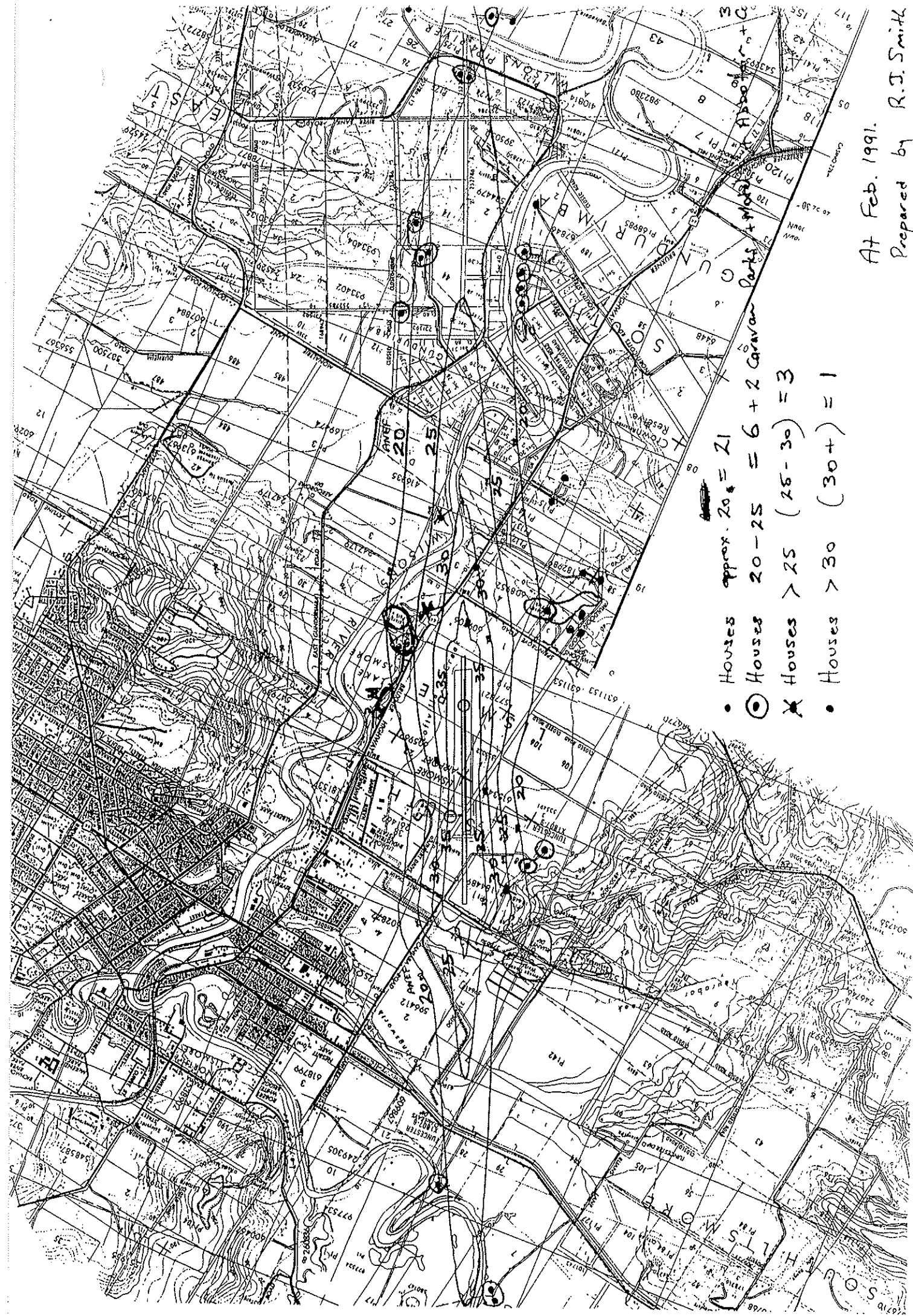
In summary, Council would not object to residential development of that ridge from the aspect of possible conflict with the future development of the Lismore Aerodrome.

Yours faithfully,

A handwritten signature in cursive script, appearing to read 'W.J. Moorhouse'.

W.J. Moorhouse,
DIVISIONAL MANAGER
- ENGINEERING SERVICES.

Encl.





CAA CANBERRA OUTWARD FAX
R&D and ICAO Division

FAX #: (066) 655 677

DATE : 9 February 1994

TO : NORTHERN RIVERS ENGINEERS, PLANNERS AND SCIENTISTS

Attn : Ian Pickles

FROM : Leigh Kenna.
Environment Monitoring Section.
Tel: (06) 2684530.
Fax: (06) 2684201.

Number of pages including this page: 1

Dear Mr Pickles,

I refer to your letter of 28 January 1994 in which you requested details of current and predicted noise exposure contours for the Lismore Airport.

Although the CAA calculates noise exposure contours, the distribution of those contours is the responsibility of the airport owner, in this case the Lismore City Council.

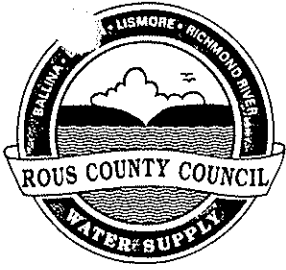
Our records show that a set of contours was prepared by the CAA for Lismore City Council in 1991. The contour set was an ANEC (Australian Noise Exposure Concept), which has no formal status for land use planning purposes. We have not as yet been approached by the City Council in regard to conversion of the ANEC to an ANEF (Australian Noise Exposure Forecast), which is the form of contour set intended for land use planning.

Our contact at the Lismore City Council was Mr Dick Smith, Executive Engineer, and I suggest that in the first instance, you discuss your requirement with him.

Yours sincerely,

(L C KENNA)
Manager, Environment Monitoring

*copy sent to
Mr. Dick Smith.
Lismore City Council
Airport Controller.
10.2.94.*



ROUS COUNTY COUNCIL

REGIONAL WATER SUPPLY

COUNCIL CHAMBERS, 56 CARRINGTON STREET, LISMORE, P.O. BOX 230, 2480, PHONE (066) 21 8055

YOUR REFERENCE:

OUR REFERENCE:

CONTACT:

DUNSTUDY.03

PGO'S/EW 255/94 (36521/13196)

FAX (066) 22 1181

DX 7652 LISMORE

18th May 1994

The Director,
Northern Rivers Engineers Planners and Scientists,
Suite 1 Level 1,
14 Jonson Street,
BYRON BAY NSW 2481

Dear Sir,

Rezoning off Dunoon Road

I write to formally acknowledge your letter of the 17th February, although I understand that there have been Council discussions with you regarding its content.

I am advised that the questions asked depend on certain investigations being initiated by Lismore City Council and that this Council intends to undertake a detailed analysis of the water supply issues in conjunction in the very near future.

Accordingly, this letter is to confirm these arrangements which I trust are made with your endorsement.

Yours faithfully,

Paul G. O'Sullivan
General Manager