Nambucca Shire Council

Lower Nambucca Local Environmental Study

Main Report

July 2004

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1. Introduction

1.1 Overview

GHD Pty Ltd (GHD) has been commissioned by Nambucca Shire Council (NSC) to prepare a Local Environmental Study (LES) with respect to four narrow parcels of land (the study area) within the Lower Nambucca.

This LES aims to provide an understanding of the environmental context of the area, the issues which impact on the natural and built environment, and to evaluate possible options for future land use and development.

In fulfilling the NSC brief, the LES has been prepared to:-

- Identify and examine the environment of the study area.
- Identify particular characteristics of the environment which are of significance to the future development of the study area and analyse the implications of these characteristics for future land use options.
- Identify alternative land use options for the study area.
- Assess the environmental opportunities, constraints of the land use options considered having special regard to the following:
  - The ecological sustainability of development and environmental performance goals;
  - The identity of the Lower Nambucca area and surrounding rural character;
  - The social and economic impacts relating to the development of the area;
  - The likely environmental impacts of development and appropriate environmental management strategies to reduce identified impacts;
  - The infrastructure and service requirements of the land use options.

The LES is intended to provide both NSC and the Department of Infrastructure, Planning and Natural Resources (DIPNR) with a sound basis for decision-making concerning the future land uses within the Lower Nambucca and the necessary documentation to allow a draft LEP to be prepared and ultimately exhibited.

This LES has been prepared in accordance with the Environmental Planning and Assessment Act 1979 (as amended) and associated Regulations. In preparing this LES, GHD has consulted with relevant government departments and other authorities.

GHD has reviewed an extensive range of existing studies and investigations undertaken for the study area, made available by both NSC and the land owners of the study area. GHD has also overseen and utilised several specialist investigations prepared for this LES.

1.2 Background

In July 2002, NSC received an application to rezone land at Lot 3, DP 842158, Lots 4, 9 and 10, DP 749152 and Lots 2, 6, 8, 9 and 10, DP 749153 (Site 1) from 1(a1) Rural Residential to 4(b) Industrial (Business) for the purposes of an industrial subdivision.

In May 2003, NSC resolved to support in principle the proposed rezoning of Lot 3, DP 749152 (Site 2) from Part 1(a2) Rural (Prime Agriculture/ Flooding) and Part 1(a1) Rural to 1(a1) Rural Residential to permit rural residential development. The applicant has since requested that Council investigate the possibility of rezoning the site 2(d) Residential (Tourist).

In September 2003, Council decided to issue a brief for the preparation of an LES for not only Sites 1 and 2 but also the Council owned land to the north (Site 3) and private land adjacent to Teagues Creek (Site 4). The inclusion of Sites 3 and 4 were promoted by both NSC and the private land owner for industrial and bulky goods land uses respectively.

This LES has therefore been prepared to assess the suitability of Sites 1 - 4 for the purposes outlined above.

1.3 Planning Context

The study area has been the subject of numerous studies and development proposals over the past 20 years.

In 1984 NSC commissioned an Environmental Study (Lower Nambucca Local Environmental Study, JTCW Planning et.al.) for a number of sites within the Lower Nambucca. The northern section of the study area was included in the investigation. The study found that the main development issues affecting the bulk of the area are flooding and the protection of estuarine environments (river and wetlands). The study assessed the land to be suitable for and capable of development, and recommended it be included in a Residential 2(d) Tourist zone. To date no tourist development has occurred within the study area.

In 1991 an Environmental Impact Statement (EIS) was prepared for the Roads and Traffic Authority to investigate the impacts of a potential highway deviation between Watt and Teagues Creek on the Pacific Highway (*Pacific Highway Deviation – Watt Creek to Teagues Creek*, GHD). The area covered by the EIS included much of the study area. The EIS identified a number of development constraints within the area including:

- a seasonally high water table;
- high erosion hazard of the soil;
- flora and fauna habitat including SEPP 14 Wetlands; and
- land below the 1 in 100 year flood event.

The deviation was never constructed and the land was subsequently sold by the RTA.

In 1992 the landowners of Lot 3 and 4 DP 749152 and Lot 2 DP 749153 (Part Site 1), submitted a proposal to NSC to rezone the land to enable the establishment of a car dealership business. The landowners also submitted a preliminary proposal to Council for the establishment of a bulky goods retail centre on the remainder of the land. A draft LEP prepared by Council for the site was not supported by the Department of Urban Affairs and Planning as the rezoning of the land for commercial and industrial purposes was not justified by a Commercial and Industrial Strategy as required by Clause 39 of the North Coast Regional Environmental Plan (NCREP).

In the mid 1990's land south of Teagues Creek was the subject of a rezoning proposal. The proposal involved a shopping centre on the western side of the highway (Site 4) and a bulky goods handling facility on the eastern side. The proposal was excluded from the LEP as a result of RTA objections regarding highway access. Consultants, RoadNet Pty Ltd, subsequently prepared a Traffic Impact Report to provide justification to obtain RTA concurrence to highway access to the subject land, however such approval was not granted.

In 1996 NSC engaged consultants, RDM Pty Ltd, to prepare a Commercial and Industrial Strategy for the Shire. At the request of NSC, the strategy considered the suitability of the study area for bulky goods retailing. The strategy concluded that:

"All land in the Lower Nambucca area zoned 1(a1), 10 and 2(d) is capable of supporting bulky goods retailing. There are, however, major constraints to development of these areas for bulky goods retailing at present. These constraints are:

1. *The land is not serviced by a sewer;*
2. *Part of the land is flood prone but could be developed subject to adequate flood control measures;*
3. *The land is located on a section of the Pacific Highway with an 80 kilometre per hour speed limit. The establishment of bulky goods retailing outlets without adequate access arrangements has the potential to adversely affect highway traffic.*
4. *The land is well away from established retail and industrial locations. Establishment of the area for bulky goods retailing has the potential to adversely affect the viability of existing and proposed commercial and industrial areas.*
5. *Bulky goods retailing needs appear to be adequately met within the existing industrial zone at Nambucca. While the existing industrial area is for the most part fully developed, the additional 4.4 hectares of land proposed for 4(a) zoning in Nambucca Local Environmental Plan 1995 should adequately meet bulky goods retailing needs in the short term.*
6. *The land is well located for the purposes of highway passing traffic but is remote for those Nambucca Head residents who could be expected to provide the majority of patronage for bulky goods retailing in this area.*

7. *The development of the area for bulky goods retailing would increase the appearance of strip development which is noticeable along the highway south of Nambucca.*
8. *Apart from the site proposed for rezoning, there is little evidence of demand for bulky goods retailing at present in the Nambucca area (based on Development Application/Building Application registers).*
9. *Environmental constraints such as bushfires would require the establishment of buffers which would severely limit the use of land. Land on the east of the highway adjoins a State Environmental Planning Policy 14 Wetland. High to extreme bushfire hazard exists on the western side of the highway where land adjoins wetlands and state forest.*
10. *The land is fragmented by way of the highway and ownership making establishment of a functional industrial area difficult. Higher servicing costs might also result.*
11. *Land at the southern end of the area west of the highway is zoned to permit Rural Residential Development. An industrial area would require an extensive buffer to avoid adverse effects on the amenity of adjoining rural- residential land.*

In summary, the land, while capable of supporting some bulky goods retail and industry, is not considered suitable for rezoning at this time. The need for bulky goods retailing in the area could be reassessed once servicing is proposed for the area and when Council is satisfied that the establishment of a flexible industrial zone in the area is both warranted and not likely to adversely affect the viability of other existing and proposed industrial and commercial areas within the Shire. (NSC 1996: p28-29)"

In response to the draft Commercial and Industrial Strategy, the landowner of Site 1, with the concurrence of Council, engaged consultants, ERM Pty Ltd to specifically assess the feasibility of the proposal for a motor showroom and bulky goods retail development. The *Nambucca Commercial/ Industrial Strategy Review* 1996 was produced, and addressed each of the constraints set out in the NSC Commercial and Industrial Strategy. Following consideration of that report and representations made by the consultant, NSC adopted the following resolutions:

1. *That Council resolve pursuant to Section 54 of the Environmental Planning and Assessment Act to prepare a Draft LEP to rezone Lot 3, DP 842158 and Lot 9 DP 749152 Pacific Highway, Lower Nambucca for the purpose of a motor showroom.*
2. *That Council defer consideration of Bulky Goods Development on Lot 2 DP 749153 and Lot 4 DP 749152 Pacific Highway, Lower Nambucca pending submission of a development and rezoning application addressing all relevant environmental impacts.*

Nambucca LEP 1995 was subsequently amended (Amendment No. 24 to LEP 1995 – 26 June 1998) and development approval was granted for the motor showroom. The motor showroom was subsequently constructed.

In response to pressure from local developers for additional industrial land, NSC in 2001 commissioned consultants, DeGroot and Benson Pty Ltd to prepare the *Nambucca Industrial Land Release Strategy*. The strategy identified three location options for industrial land within the Shire, one of which was the Lower Nambucca area.

The Strategy describes the following constraints to future industrial development in the Lower Nambucca area:

- *"Land is located adjacent to other land holdings with significant flora and fauna values;*
- *Land is located adjacent to SEPP 14 Wetland No. 370;*
- *Significant drainage and hydrological studies would be required to address water quality and hydrological issues;*
- *The most expensive of the three options considered in the 2001 Strategy;*
- *May not yield sufficient industrial land for the Shire's future strategic needs.*

The advantages to future industrial development of the Lower Nambucca area are also set out, as follows:

- *Accessibility to the Pacific Highway;*
- *Accessibility to both Macksville and Nambucca Heads;*
- *Landowner keen to develop;*
- *Land is close to Council-owned land to the north, which is earmarked for rezoning to industrial purposes".*

The Strategy recommends that the first priority in the short term be given to the Lower Nambucca area and concludes that:

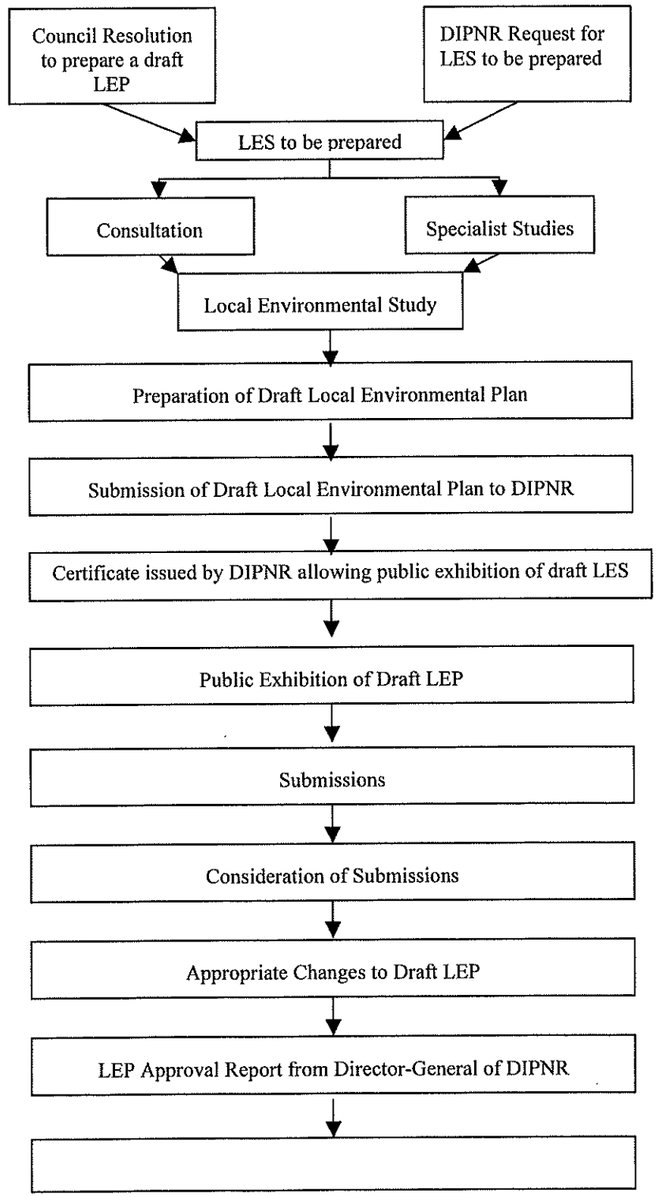
> *"The proposed site has been identified as approximately 13 ha in size, which although not large enough to provide for the Shire's long term industrial land requirements, could make a timely, short term addition to the Shire's stock of industrial land."*

Given the recommendations made by previous planning investigations regarding the ability of the study area to support industrial development, this LES is armed with determining the environmental opportunities, constraints of the study area taking into account:-

- The ecological sustainability of development and environmental performance goals;
- The identity of the Lower Nambucca area and surrounding rural character;
- The social and economic impacts relating to the development of the area;
- The likely environmental impacts of development and appropriate environmental management strategies to reduce identified impacts; and
- The infrastructure and service requirements of the land use options.

1.4 LES / LEP Process

The process involved in the preparation of the LES and draft LEP is illustrated below:



1.5 Terms of Reference

The terms of reference for the preparation of this LES derive from NSC and consultations with relevant government authorities including DIPNR. Following the NSC resolution to prepare a draft LEP for the study area, the Director General of DIPNR indicated to Council that an LES would be required pursuant to Sections 57 and 61 of the NSW Environmental Planning and Assessment Act 1979 (EP&A Act) and that the issues to be addressed in the LES should include:-

- The NSW Coastal Policy and Clause 8 of SEPP 71 – Coastal Protection;
- The provisions of the North Coast Regional Environmental Plan (Clause 47);
- Features of environmental, cultural or visual importance with a view to maintaining their special qualities and protecting them from undesirable development;
- Ground and surface water resources. Identify planning controls to protect these areas from contamination, particularly from stormwater, urban drainage and disposal of wastewater, particularly SEPP 14 Wetland Area No. 370;
- Availability of all physical services to ensure there is capacity to cater for the proposed development.
- Hazards to development of the land such as flooding, bushfire, land slip and acid sulfate soils;
- Issues relating to road traffic and access to the site.
- Potential impacts on Crown land;
- Potential impacts on native vegetation;
- Potential impacts on quality, quantity and supply of groundwater and surface water;
- Stormwater and wastewater management and disposal including reuse options;
- Land capability assessment including identification of constraints;
- Erosion and sediment controls;
- The need for a license under the Water Act 1912 if structures will intercept groundwater;
- Opportunities for environmental repair and enhancement;

To provide consistency to the planning process, the preparation of this LES generally relates to the Section 54 resolution of NSC and responds to the requirements of DIPNR. In this regard, the draft LEP will only relate to that area covered by this LES. In addition to the requirements of DIPNR, a range of other specific issues are addressed in this LES based on consultations with relevant government departments.

1.6 Format of this Report

This LES has been prepared in the following format:

Section 1 - Introduction (including background, aims and objectives and terms of reference);

Section 2 - Study Area (including general description of the study area, previous land uses, current land uses and surrounding land uses);

Section 3 - Consultation (Government Authorities);

Section 4 - Statutory Planning Framework;

Section 5 - Baseline Environmental Analysis (including climate, geology and soils, topography and landform, hydrology and flooding, stormwater and water quality, flora and fauna, bushfire hazard, agricultural resources, land contamination, potential conflicts with adjoining land uses, landscape and visual amenity, traffic and transport, utilities and infrastructure, community facilities and open space);

Section 6 - Development Demand and Land Use Options;

Section 7 - Evaluation of Land Use Options;

Section 8 - Development Constraints and Opportunities;

Section 9 - Strategy Formulation and Environmental Management; and

Section 10 - Conclusions and Recommendations.

2. Description of Study Area

2.1 Local Government Area Context

The study area is located within the Nambucca Shire on the mid north coast of NSW, 510km north of Sydney and 490km south of Brisbane. The Shire covers an area of approximately 1,400km^2. The southern and western boundaries of the Shire are defined by the Nambucca River catchment. The eastern boundary is defined by the Pacific Ocean while the northern boundary is approximately 10km north of Valla Beach and runs almost directly west. The Nambucca River drains a valley approximately 47km long, with a width of 23km at its widest point. A large proportion of the Shire is steep terrain intersected by small streams.

2.2 Study Area Context

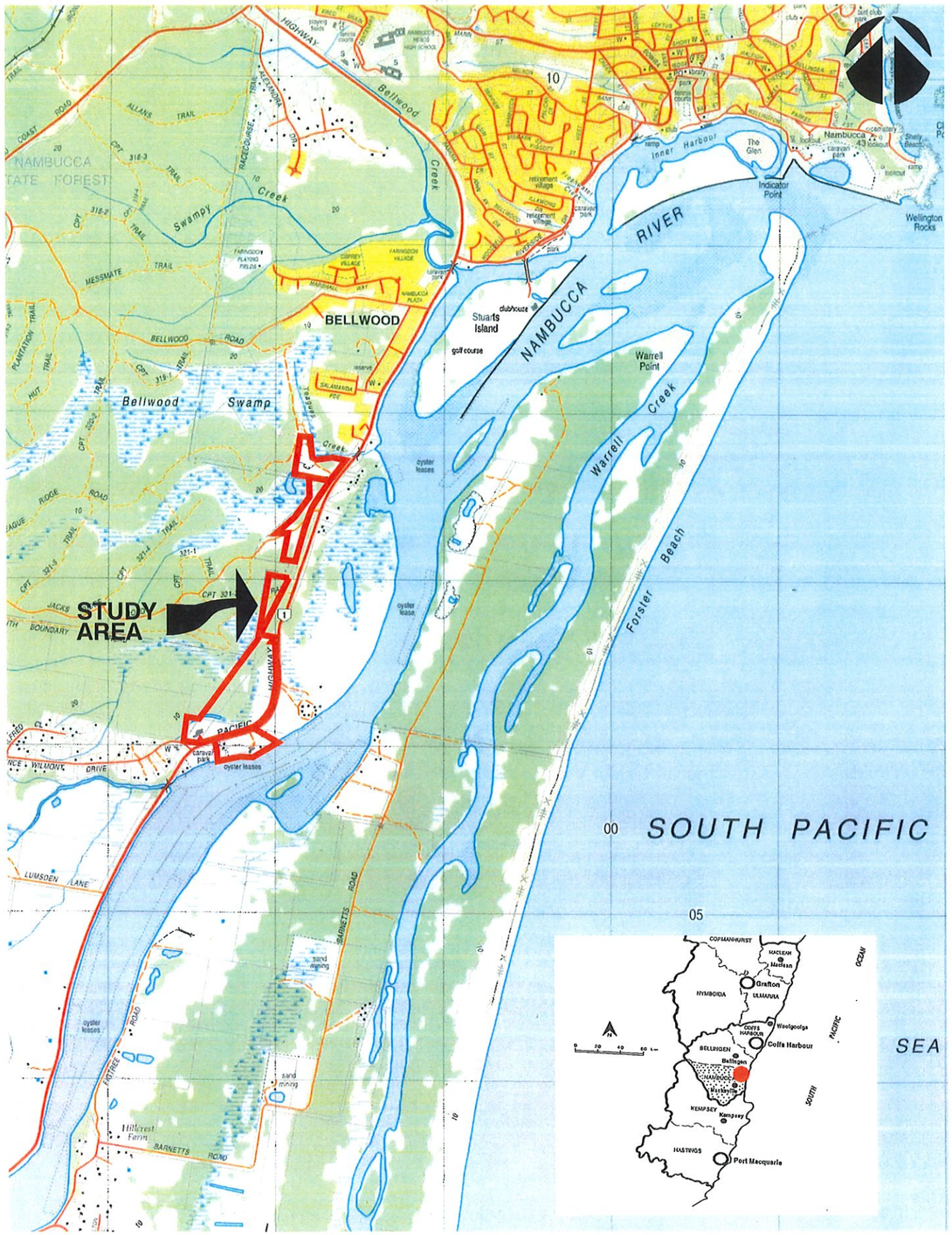
The study area is located within the eastern portion of the Shire, approximately 6km north of Macksville and 2km south of Nambucca Heads. The study area comprises four land parcels totalling 31.943ha in area, and stretching approximately 2km from Teagues Creek in the north to Florence Wilmont Drive in the south, adjacent to the Pacific Highway.

Development within the vicinity of the study area occurs along a narrow band, constricted by riverine, wetland and forest environments. Whilst the study area is immediately south of the urban development at Bellwood, it is separated by Teagues Creek and is located within a separate landscape unit by topography and vegetation.

Rural land use plays a significant part in forming the landscape character of the area, resulting in large, cleared areas interspersed with pockets of indigenous vegetation, including protected wetland environments and State Forest. The Nambucca River itself is visually important and is the focus for views from much of the surrounding countryside.

The surrounding landscape within the vicinity of the study area has suffered disturbance and change from its natural condition owing to the area's established rural development and associated infrastructure as well as other land uses such as motels, caravan parks and limited commercial development.

Diagram 1 shows the regional location of the study area.



SOURCE: LAND & PROPERTY INFORMATION 9436-1-S

Nambucca Shire Council

REGIONAL LOCATION

2.3 Real Property Description

The study area comprises twelve (12) separate land holdings and these are identified as follows:

Table 1 Real Property Description and Ownership

Site	Lot Number	DP	Area (ha)	Land Owner
Site 1	3	842158	2.2 (0.575 + 1.65)	Cogold Pty Ltd
	4	749152	5.017	Cogold Pty Ltd
	9	749152	1.177	Cogold Pty Ltd
	10	749152	1.682	Cogold Pty Ltd
	2	749153	4.09	Cogold Pty Ltd
	6	749153	0.593	Cogold Pty Ltd
	8	749153	1.622	Cogold Pty Ltd
	9	749153	0.400	Cogold Pty Ltd
	10	749153	1.013	Cogold Pty Ltd
Site 2	1	1017408	2.71	M Dugdale
	2	1017408	1.00	M Dugdale
Site 3	4	749153	3.999	NSC
	5	749153	2.57	NSC
Site 4	2	541448	3.87	Porace Pty Ltd

The cadastral details of the study area are shown in Diagram 2.

2.4 Study Area Description

The study area comprises four narrow land parcels adjacent to the Pacific Highway, within the Lower Nambucca area. A description of each site within the study area follows:

Site 1

Site 1 is made up of eight separate parcels of land with a total area of 17.794ha. The site is situated on the western side of the highway and is predominantly cleared low-lying flood prone land, with forest and wetland remnants. A swathe of remnant Melaleuca quinquenervia swamp forest exists through the centre of the site and joins a gazetted SEPP 14 Wetland (No. 370) within the northern portion of the site. A car dealership has been established within the southern portion of the site adjacent to the highway. Significant earthworks have been undertaken to elevate the car dealership

1
DP 711098

104
DP 755550

PT.3
DP 842158
0.5754ha

9
DP 749152
1.177ha

5
DP 749152

1
DP 749153

2
DP 749152

PT.3
DP 842158
1.65ha

10
DP 749152
1.682ha

2
DP514920

PACIFIC

STATE FOREST

1
DP 842158
2.71ha
SITE 2

4
DP 749152
5.017ha
SITE 1

8
DP 749153
1.622ha

6
DP 749153
0.5934ha

9
DP 749153
0.4ha

2
DP 749153
4.09ha

10
DP 749153
1.013ha

17

18

5
DP 749153
2.57ha
SITE 3

11
DP 749153

2
DP 842158

12
DP 561932

301
DP 755550

SITE 3

4
DP 749153
3.999ha

525
DP 820071

524
DP 820071

HIGHWAY

SITE 4

2
DP 541448
3.67ha

12
DP 826934

SALAMANDA PDE

Tongue Ck

Nambucca

3
DP 749153

7
6
5
4
3
DP400863
14
13

11
DP129437

12
DP 129437

10
DP
129437

2
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
EDENWATER DR

RUTLAND ST

1
DP
214388

River

CADASTRAL

from the effects of flooding. Recent clearing has been carried out throughout the western portion of the site.

Photo 1 – View north-west through recently cleared land

Photo 2 – View north-east towards low-lying vegetated swamp

Photo 3 – View south- west over recently cleared land

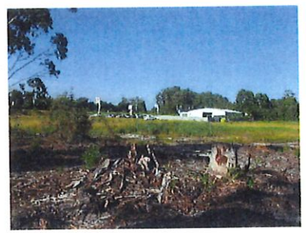


Photo 4 – View south-west towards car dealership

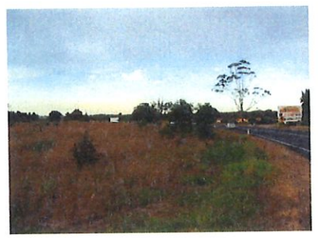


Photo 5 – View north-east with Pacific Hwy to right of photo

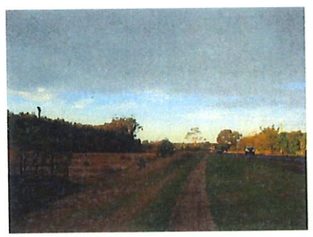


Photo 6 – View north-east with car dealership to left of photo

Site 2

Site 2 is a small irregular shaped parcel of land with an area of 3.71ha and is situated on the eastern side of the highway adjacent to the Nambucca River. Two residential dwellings have been constructed within the eastern portion of the site whilst, much of the western portion of the site supports a pecan plantation. Remnant riparian vegetation exists along the site's southern boundary.

Photo 1 – View north-east towards existing dwelling

Photo 2 – View south towards the site over Site 1.

Photo 3 – View north – west over pecan plantation

Site 3

Site 3 consists of two separate parcels of land with a total area of 6.569ha situated on the western side of the highway. Much of the site supports eucalypt forest with the exception of the western portion of Lot 4, DP 749153 which was once used as a garbage depot. Since the closure of the garbage depot much of the site has become overgrown with lantana. A SEPP 14 Wetland (No. 367) is located along the western boundary of Lot 4 DP 749153 whilst, the southern portion of Lot 5 DP 749153 is affected by SEPP 14 Wetland (No. 370). No development has occurred on the site since the closure of the depot.

Photo 1 – View through to old landfill site

Photo 2 – Example of Lantana within the site

Photo 3 – Typical vegetation within the site

Site 4

Site 4 is an L-shaped parcel of land approximately 3.87ha in area. This site is located immediately to the south of Teagues Creek, west of the highway. Much of the site has been cleared as a result of the continuing operation of a screening plant within the western portion of the site. SEPP 14 Wetlands (No. 365 & 367) adjoin and encroach on the northern and southern boundaries of the site. These areas contain Casuarina glauca and Melaleuca quinquenervia species.

Photo 1 – View west towards existing screening plant

Photo 2 – View of existing screening plant

Photo 3 – View of infrastructure associated with screening plant

Photo 4 – Entrance to site from Pacific Highway

Photo 5 – Existing drainage channel traversing site

Photo 6 – View west over low-lying drainage corridor

Diagram 3 depicts the aerial photograph of the study area.

2.5 Previous Land Uses

A number of land uses have been identified within the study area as part of a review of previous applications approved by Council.

Those applications which have been approved by Council include:

Table 2 Past Development Applications for Lower Nambucca Area

Property Identification	Date	Proposed Development	Approval
Lots 3&4 DP 570854 Lot 14 DP 238868	20/1/1983	Subdivision	Approval
Lot 2 DP 541448	18/8/1983	Service Station/ Truck Stop/ Restaurant	Approval
Lot 1 DP 511589	21/2/1985	Relocation of advertising structure 'Nambucca Motor Inn'	Approval
Lots 3 & 5 DP 514920	21/3/1985	Erection of Advertising Sign	Refused
	20/6/1985		Approval
Lot 2 DP 5411448	26/3/1986	Mobile Screen Plant, Storage Container and Mobile Office	Development recognised as enjoying 'existing consent' rights and approved accordingly
Lots 3 & 5 DP 514920	18/9/1986	Construction of dwelling and swimming pool	Approval
	21/4/1988		

SOURCE: LAND & PROPERTY INFORMATION MACKSVILLE 9436-1-S

CHD

Nambucca Shire Council

AERIAL PHOTOGRAPH

Property Identification	Date	Proposed Development	Approval
		Modification of Determination of DA	Approval
Lot 5 DP 514920	28/1/1987	Application to install a septic tank	Approved
Lot 5 DP 514920	17/5/1991	Building Application for the extension of an existing garage	Approval
Lots 3 & 6 DP 749152 Lot 3 DP 514920 Lot 18 DP 113102	3/11/1993	Boundary adjustment and consolidation (Subdivision Application)	Approval
Lot 2 DP 541448	18/9/1995	Two Lot Subdivision	Approval
Lot 3 DP 842158 Lot 9 DP 749152	6/3/1997	Motor Showroom	Approval
Lot 3 DP 842158	6/2/1997	Three illuminated pole signs	Approval
Lot 3 DP 842158 Lot 9 DP 749152	8/9/98	Erect 1.8m Satellite Dish	Approval
Lot 3 DP 842158 Lot 9 DP 749152	17/9/1998	Motor Dealership including car repair station	Approval
Lot 20 DP 873112	16/6/2000	Erection of Tourist Sign	Approval

The most noteworthy land uses which have been commenced within the study area include the following:

- Site 1 – Car dealership/repair station.
- Site 2 – Residential Dwellings.
- Site 3 – Previous Garbage Depot
- Site 4 – Screening plant operation

An Environmental Study prepared by JTCW Planning in association with Sinclair Knight and Partners and Caldwell Connell Engineers in 1985 identified Site 3 as previously being used as a landfill site, with the adjoining land (Lot 301) previously being used as a sanitary depot.

Diagram 4 illustrates the activity on Site 3 in 1980 and highlights the potential for land contamination.

2.6 Adjoining Land Uses

State Forests, SEPP 14 Wetlands, rural living areas, the Pacific Highway and the Nambucca River surround the study area. The individual sites within the study area are surrounded by different land uses and zonings. These adjoining land uses influence and affect the future development potential of each of the individual sites.

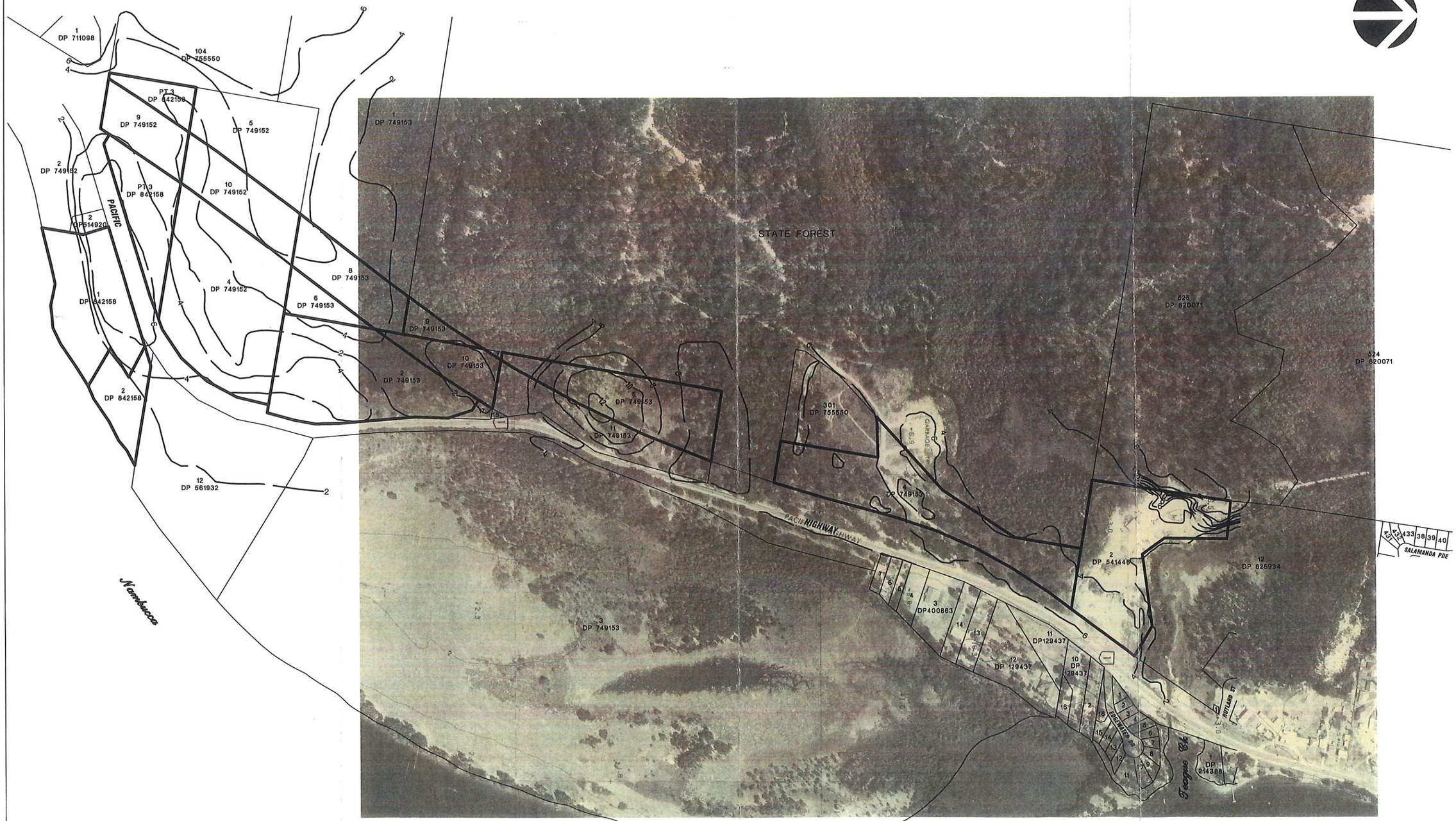
Site 1 is surrounded by several different land uses. To the west of the site is the Nambucca State Forest and SEPP 14 Wetland No. 370. The eastern boundary of the site adjoins the Pacific Highway, whilst development to the south includes the Pelican Caravan Park and a rural residential estate, known as the Kingsworth Estate.

Site 2 is located between the Pacific Highway and the bank of the Nambucca River, east of the Pelican Caravan Park.

Site 3 adjoins the Nambucca State Forest to the west and the Pacific Highway to the east. The southern portion of Lot 5 DP 749153 is covered by SEPP 14 Wetland No. 370, whilst the north western boundary of Lot 4 DP 749153 adjoins SEPP 14 Wetland No. 367. Adjoining the south west corner of Lot 4 DP 749153 is Lot 301 DP 755550, which is a known landfill and sanitary depot with potential land contamination issues.

Site 4 is bound to the west by Nambucca State Forest and to the south by Site 3 and SEPP 14 Wetland No. 367. Adjoining the site to the north is SEPP 14 Wetland No. 365 and Teagues Creek, whilst the Pacific Highway adjoins the eastern boundary of the site.

Adjoining land uses are identified in Diagram 5.



SOURCE: LAND & PROPERTY INFORMATION 1 : 4000 ORTHOPHOTO SERIES

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Nambucca Shire Council

PREVIOUS LAND USES

KINGSWORTH ESTATE

1 DP 711098

104 DP 755550

PT.3 DP 842158

9 DP 749152

5 DP 749152

1 DP 749153

PELICAN CARAVAN PARK

PT.3 DP 842158

10 DP 749152

PACIFIC

2 DP514920

NAMBUCCA STATE FOREST

1 DP 842158

4 DP 749152

8 DP 749153

6 DP 749153

9 DP 749153

2 DP 749153

10 DP 749153

5 DP 749153

17

16

11 DP 749153

CROWN RESERVE

2 DP 842158

NAMBUCCA RESORT

4 DP 749153

525 DP 820071

524 DP 820071

HIGHWAY

Nambucca

3 DP 749153

RESIDENTIAL DWELLINGS

BEATTIES CARPETS

RESIDENTIAL DWELLINGS

MOTEL JABIRU

10 DP 129437

16

2

16

1

2

EDGEWATER RESIDENTIAL ESTATE

8

9

10

11

1 DP 214388

RUTLAND ST

2 DP 541446

Feogues Ck

12 DP 826934

41 42 43 36 39 40

SALAMANDA PDE

EXISTING RESIDENTIAL DEVELOPMENT

River

GHD

Nambucca Shire Council

NAMBUCCA VALLEY

ADJOINING LAND USES

3. Consultation

3.1 Government Authority Consultation

NSC has consulted with the relevant public authorities and bodies in regards to the Lower Nambucca Local Environmental Study, pursuant to Section 62 of the *Environmental Planning and Assessment Act 1979* (NSW), as amended. The following government and statutory authorities were consulted:

- PlanningNSW (April 2003)
- Department of Infrastructure, Planning and Natural Resources (DIPNR)(July 2003)
- Mineral Resources NSW
- NSW Agriculture
- Roads and Traffic Authority
- NSW EPA (now Department of Environment and Conservation)
- NSW Rural Fire Service
- NSW Fire Brigades
- State Forests
- National Parks and Wildlife Service (now Department of Environment and Conservation)

The Section 62 referral advices that were received have identified a number of matters relating to the study area that require consideration. A summary of the key issues raised by each of the authorities is detailed in Table 3. Copies of each written response are included in Appendix A.

Table 3 Consultation with Government and Statutory Authorities

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
Planning NSW	PlanningNSW advised that an environmental study would be required pursuant to Sections 57 and 61 of the EP&A Act. PlanningNSW also specified a range of issues requiring a thorough assessment in the LES, which are identified below.	1.5
	◗ The NSW Coastal Policy and Clause 8 of SEPP 71.	4.3.1
	◗ North Coast Regional Environmental Plan.	4.3.2
	◗ Features of environmental, cultural or visual	5, 6

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
	importance with a view to maintaining their special qualities and protecting them from undesirable development.	
	◗ Ground and surface water resources. Identify planning controls to protect these areas from contamination, particularly from stormwater, urban drainage and disposal of wastewater, particularly SEPP 14 Wetland Area No 370.	4.3.1
	◗ Availability of all physical services to ensure there is capacity to cater for the proposed development.	5.15
	◗ Hazards to development of the land such as flooding, bushfire, land slip and acid sulfate soils.	5.2, 5.4, 5.7
	◗ Issues relating to road traffic and access to the site including Section 117 Direction No. S28.	4.3, 5.14
DIPNR	In addition to the matters previously raised by PlanningNSW, the issues set out below should be addressed by the LES:	
	◗ Potential impacts on Crown land.	2.6, 6, 8
	◗ Potential impacts on native vegetation. Recommended that a flora and fauna assessment be undertaken, especially on Sites 1, 3 and 4.	5.6, 8.2
	◗ Potential impacts on quality, quantity and supply of groundwater and surface water.	5.5, 8.2
	◗ Stormwater and wastewater management and disposal including reuse options.	5.5, 9.4
	◗ Land capability assessment including identification of constraints other than those mentioned in the Planning NSW letter of 15 April 2003.	6
	◗ Erosion and sediment controls (structures must not be located below the watertable if acid sulfate soils are present)	5.2, 9.3, 9.4
	◗ The need for a license under the Water Act, 1912 if structures will intercept groundwater.	4.3

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
	◗ Opportunities for environmental repair and enhancement.	9
	◗ Bushfire hazard management. Note, where proposed development adjoins Crown land or environmentally sensitive landscape features, any fire buffer must be established entirely within the freehold property.	5.7, 9.7
	DIPNR also specified the following matters that should be considered as part of the overall rezoning process:	
	◗ When addressing flooding as an issue in the rezoning process and in any future development for the subject site, it is recommended that the principles and outcomes of the Draft Lower Nambucca River Floodplain Management Study be incorporated into any decisions.	5.4
	◗ The Department will be recommending that a 50 metre buffer be adopted in regard to the creeks and wetlands adjoining and on the subject sites. Rezoning boundaries should therefore not be based on cadastral boundaries, but on landscape features and constraint mapping.	6
	◗ Any future rezoning should take into account the natural resource attributes that sustains a variety of economic activities within the Lower Nambucca area including tourism and population growth.	5, 7
	◗ It is suggested that Council, if it determines that the rezoning proposals are appropriate, consider developing the whole area under one Master Plan. This should include an integrated approach to stormwater management, road networks, signage and buffer networks.	9.2
	DIPNR also provided comments regarding several of the individual sites.	
	Site 1:	
	It is recommended that a vegetated buffer be created	6.1

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
	and maintained between any industrial activity and the highway, to ensure that natural attributes are retained in the area. It is further recommended that Council adopt a signage policy for the site that discourages large billboards and individual signage from proliferating as a result of this form of development.	
	The spatial relationship of the subject site to the Pacific Highway and any plans for the future location or expansion of this crucial corridor should be established.	5.14
	Consideration of the appropriateness of locating industrial land in close proximity to a SEPP 14 wetland, existing rural residential development and tourism activities such as the caravan park on the Pacific Highway. This may mean that some of the original 7(a) zoning on the subject land should be retained and in some cases expanded to include appropriate buffers.	6, 7, 8, 9, 10
	Site 2:	
	Siting of any buildings should be in sympathy with the landscape and its constraints, in particular there should be appropriate setbacks from environmental hazards such as flooding. Further to this issue of flooding, it is recommended that the proponent investigate the stability of the riverbank on the site and its relationship to flooding as part of the rezoning process.	5.4, 8.2
	Consideration of the need to incorporate conditions and funding requirements in any Development Consent to restore and rehabilitate the section of the riverbank.	9.2
	There are currently two licences issued by the Department of Lands for a ramp and a jetty/pontoon. Council should approach the Department of Lands to establish if, with the change of zoning, the licences and structures should continue.	9.2
	DIPNR has also drawn attention to the objectives of several relevant plans or policies which need to be satisfied. These are the outcomes, objectives and principles envisaged in the Mid North Coast Catchment Management Board Catchment Management Board Catchment Blueprint February 2003, the NSW Coastal Council, the NSW Native	4, 9.2

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
	Vegetation Conservation Strategy and the State Water Management Outcomes Plan.	
Mineral Resources NSW	Satisfied that the proposed rezoning will not adversely impact upon known or potential extractive resources. Concern raised regarding the future operational potential of Nambucca sand pit should further urban encroachment continue towards the site.	5.13
NSW Agriculture	Recommends that the following matters receive due attention in the LES process.	
	The manner in which the proposed rezonings and subsequent land uses comply with strategic planning policies, plans and principles of Council.	4.1, 4.2, 4.3
	Demonstration of due consideration of key policies such as the North Coast REP, North Coast Rural Settlement Guidelines, NSW Agricultural Policy on the Protection of Agricultural Land, Rural Land Evaluation Manual.	4.3
	Demonstration of the suitability of the subject land for the proposed land uses.	5, 6, 7, 8
	Full description of the subject and immediately adjoining lands including previous land uses, current land uses, environmental issues, flooding behaviour, agricultural productivity and agricultural potential.	2, 5.13
	The use and management of areas not suitable for development.	8.3, 10
	Compatibility of the proposed zoning and land uses with the zoning and land uses of adjoining lands.	8.2, 8.3, 10
	The location and implications of any cattle tick dip sites.	5.13
	Expected benefits arising from the proposed rezoning and subsequent land uses.	7.2
RTA	The RTA identifies the following items that would need to be addressed in considering the LEP amendment.	
	◗ Compatibility of the proposed land use with future highway function and impact on Highway users (eg likely reduced speed zones and intersection controls due to requirements of new	5.14

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
	development).	
	◗ Applicability of Direction S28 under Section 117 of the EP&A Act, particularly in regard to: ◗ The proposed rezoning to allow a Service centre at Site 4. ◗ Likely visual exposure of the retailing areas to the Highway. ◗ Promotion of new and addition use of the Highway. ◗ Location of new retail/commercial areas outside of the established centres.	4.2
	◗ Traffic generation and intersection types proposed to meet likely demand.	5.14, 8.2
	◗ The RTA have expressed concerns regarding the proposed rezoning resulting in ribbon-style development adjacent to the highway and that access to these developments will only be available via the Highway.	6, 8.2
NSW EPA	The EPA have advised that any draft LEP for the Lower Nambucca sites should contain a suite of requirements to deliver an Integrated Water Cycle Management approach using Water Sensitive Urban Design and contribute to achieving the Water Quality and River Flow Objectives for the Nambucca River Catchment.	9.4,
	The EPA have provided recommendations regarding the potential soil contamination within the investigation area. Any rezoning of land should be in accordance with SEPP 55 and with DUAP/EPA document *Managing Land Contamination: Planning Guidelines (1998)*. The EPA have also advised that the nature and extent of the contamination assessment, and the level of clean up if necessary, should be based on the proposed uses of the land to be rezoned and on an assessment of environmental/health risk to those proposed land uses and to adjacent existing land uses.	4.3, 5.8
	The EPA have also noted the potential for land use conflicts. If Site 1 is rezoned 4(b) Industrial (Business) there is significant potential for the	5.1, 8.2

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
	development of land use conflicts. Noise generated by the highway, combined with other noise and amenity issues (e.g. odours, aesthetics, etc.) arising from the adjacent industrial business is likely to be in conflict with the proposed rural residential use of Site 2. Attention has been drawn to *The New South Wales Industrial Noise Policy 2000* and the draft policy, *Assessment and Management of Odour from Stationary Sources in NSW 2001*, to provide guidance with respect to avoiding the co-location of incompatible uses.	
	A riparian buffer zone would be required between development on Site 2 and the Nambucca River.	8.2
NSW Rural Fire Service	LES should take into consideration the provisions of the publication *Planning for Bushfire Protection* 2001.	5.7
NSW Fire Brigades	Consideration is to be given to areas where development would border with bushland and the mitigation measures that would be put in place to prevent any danger to life and property.	8.2
	The other concerns expressed are in relation to the provision of adequate road access for fire fighting purposes into and out of the proposed development for emergency vehicles and water supplies. The *Brigades Vehicular Access Guidelines* have also been provided by the NSW Fire Brigades for reference on this issue.	8.2
State Forests	Consideration should be given to bushfire risk and management, impacts on SEPP 14 Wetlands, impacts on Special Management Zones, and flora and fauna values.	5, 6, 7
NPWS	Consideration to be given to threatened flora and fauna species, the SEPP 14 Coastal Wetlands, and required buffers. However reference is also made to the potential impacts of the proposed rezoning on Aboriginal heritage values and SEPP 44 Koala Habitat Protection.	5.6, 8.2
	NPWS discourages the rezoning of land to a land use that requires the placement of substantial volumes of fill. Recent illegal clearing and filling allegedly taking place within the study area should not be used to justify rezoning to an intensive form of land use, such as 4(b) Industrial Business.	5.4, 8.2

Authority	Response to NSC's written request for comments	Section of Study where matter is addressed
NSW Fisheries	LES should examine and demonstrate how impacts on aquatic biodiversity can be addressed to encourage compliance with habitat provisions in the Fisheries Management Act 1994 and the NSW Fisheries policies that underpin them.	5.6, 8.2
	In addition to the general requirements, the LES should address the following specific issues: ◗ Identification of threatened species or habitats likely to occur in the area or be affected by the proposal.	5.14, 8.2
	◗ How damage to marine vegetation and other fish habitats will be minimised.	9.6
	◗ Whether dredging, reclamation or activities that obstruct fish passage are proposed, and if so, how impacts will be minimised.	7.3
	◗ The size and location of buffer zones to fish habitats.	6.1, 8.2
	◗ Stormwater management strategies, particularly if discharge is proposed in SEPP 14 Wetlands.	8.2, 9.4
	◗ Opportunities for compensatory habitat if fish habitats are proposed to be dredged or lost.	9.6
	NSW Fisheries recommend that terrestrial areas adjoining freshwater, estuarine or coastal habitats should be carefully managed in order to minimise land use impacts on these aquatic habitats. As a precautionary approach, foreshore buffer zones at least 50 metres wide should be established and maintained with their natural features and vegetation preserved. Such buffer zones may need to be fenced or marked by signs. The width of these buffer zones may need to be increased to 100 metres or more where they are adjacent to ecologically sensitive areas.	6.1, 8.2, 9.6
	NSW Fisheries considers SEPP 14 Wetlands as environmentally sensitive areas. Any proposed works in, or changes to SEPP 14 wetlands are to be referred to DIPNR.	5.6

4. Statutory Planning Framework

The study area is affected by a number of statutes, environmental planning instruments, policies and plans. The relevant provisions of these statutory planning controls applicable to the study area are outlined in this section.

4.1 Commonwealth Legislation

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act) makes it an offence for a person to undertake an action that has the potential to significantly impact on a matter of 'national environmental significance' without first obtaining a permit from the Commonwealth Minister for Environment and Heritage. Matters of national environmental significance include: declared World Heritage areas, declared Ramsar wetlands; listed threatened species and ecological communities; listed migratory species; listed marine species; nuclear actions; and the environment of Commonwealth marine areas.

The provisions of the EPBC Act have been considered in Section 6.6 of this LES.

4.2 NSW Legislation

4.2.1 Environmental Planning and Assessment Act

Division 4 of the Environmental Planning and Assessment Act relates to the preparation of Local Environmental Plans. Specific provisions relating to this LES include Section 57, 61, 62, 63 – 70. Other provisions of the Act are addressed below.

Section 117(2) Directions

A number of directions under Section 117(2) of the *Environmental Planning and Assessment Act 1979*, are relevant in the preparation of any LEP amendment to rezone the study area. Generally these directions have been replaced by the provisions of the North Coast REP 1988 referred to in a later section of this LES, but are as follows:

- G20 – Planning for Bush Fire Protection: In preparing draft LEPs, NSC must consult with the Commissioner of the NSW Rural Fire Service and have regard to the Planning for Bushfire Protection Guide 2001;
- G27 - Planning for Bus Services: Draft LEPs must consider the provision of an adequate and efficient bus service;
- G-28 - Coal, Other Minerals, Petroleum and Extractive Resources: In preparing draft LEPs in relation to extractive resources, NSC must consult the Director-General of the Department of Mineral Resources;

- S-26 - Coastal Policy: Draft LEPs shall include provisions that give effect to and are consistent with the *NSW Coastal Government Policy*; and
- S28 – Commercial/Retail Development Along the Pacific Highway, North Coast from the Queensland Border to Hexham: In preparing draft LEPs, NSC must ensure consistency with both the objectives and principles of the direction. In this regard, the direction recognises that the Pacific Highway's function is to operate as the North Coast's primary inter- and intra-regional road traffic route, recognises and protects the very large public expenditure being invested into the Pacific Highway; specifically, to limit the need for future public expenditure (eg. further by-passes) to overcome new ribbon development; to prevent the losses in highway safety and highway efficiency caused by incremental additions of out-of-town or town fringe retail/commercial development; and to provide the food, vehicle service and rest needs of travellers on the highway.

The issues raised by the above Section 117 directions have been considered in subsequent sections of this LES. Given the proposal to develop a possible highway service centre on Site 4, Direction S28 is most relevant to the preparation of this LES. Section 5.14 details the current traffic and access issues within the study area, whilst Section 8.2 considers the likely impacts of the proposal.

4.2.2 Threatened Species Conservation Act 1995

The objects of the Threatened Species Act (TSC Act) 1995 are to conserve biological diversity and promote ecologically sustainable development, to prevent the extinction and promote the recovery of threatened species, populations and ecological communities, to protect the critical habitat of those threatened species, populations and ecological communities that are endangered, to eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities, to ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and to encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

The TSC Act includes schedules which list threatened species, populations and ecological communities and key threatening processes.

Consideration has been given to the TSC Act in Section 6.6 of this LES.

4.2.3 Native Vegetation Conservation Act 2003

The objects of the Native Vegetation Conservation Act 2003 are to provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State; to prevent broadscale clearing unless it improves or maintains environmental outcomes; to protect native vegetation of high conservation value having regard to its contribution to such matters as water quality, biodiversity, or the prevention of salinity or land degradation; to improve the condition of existing native vegetation, particularly where it has high

conservation value; and to encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

The Native Vegetation Conservation Act includes the requirements relating to the clearing of native vegetation and protected land. It is noted that under the provisions of this Act consent may be required from DIPNR or the CMA for any clearing of native vegetation.

4.2.4 Rural Fires Act 1997

From 1 August 2002, the Rural Fires and Environmental Assessment Legislation Amendment Act 2002 came into effect. This legislation amends the Rural Fires Act 1997, the Environmental Planning and Assessment Act 1979 and other miscellaneous provisions of environmental legislation. The overall effect of this legislation is to simplify and streamline the effective implementation of bush fire hazard reduction recognising the need to meet ecological sustainability principles and to increase the accountability of various players in the management of bush fire risk.

Bushfire hazard has been considered in Section 5.7 and 6.7 of this LES.

4.2.5 Water Act 1912

Pursuant to the Water Act 1912 the state has control of all water both on the surface and under the ground. It is acknowledged that a license may be required under the Water Act 1912 if any structures are to intercept groundwater flows.

Further investigations would need to be undertaken as part of any future development applications lodged for the study area.

4.3 Relevant Environmental Planning Instruments

4.3.1 State Environmental Planning Policies

SEPP No. 14 - Coastal Wetlands

SEPP No. 14 – Coastal Wetlands (SEPP 14) aims to preserve and protect the coastal wetlands in the environmental and economic interests of the State. Under the policy, activities involving land clearing, levee construction and drainage or filling of land, can only be carried out with the approval of the Director-General of the Department of Infrastructure, Planning and Natural Resources. In considering a development application the Minister will consider a number of issues such as the environmental effects, proposed measures for rehabilitation, possibility of alternatives and any representations from agencies such as the National Parks and Wildlife Service.

The policy does not apply to land dedicated or reserved under the National Parks and Wildlife Act 1974 or land to which State Environmental Planning Policy No. 26 – Littoral Rainforests applies.

Idyll Spaces Consultants have identified the vegetation communities within the study area and found inconsistencies between those areas gazetted by SEPP 14 and other areas of the study area, which have wetland attributes. Diagram 6 illustrates the gazetted and identified wetland areas within and adjacent to the study area. A summary of their findings is presented in Section 5.6.

SEPP 26 – Littoral Rainforests

SEPP 26 aims to provide a mechanism for the consideration of applications for development that is likely to damage or destroy littoral rainforest areas with a view to the preservation of those areas in their natural state. It controls development (both within a littoral rainforest area and in a 100 metre buffer surrounding the mapped area) by requiring the concurrence of the Director of Planning.

The study area does not contain any littoral rainforest and as such this policy does not apply.

SEPP 44 – Koala Habitat Protection

SEPP 44 aims to encourage the conservation and proper management of areas of natural vegetation that provide habitat for Koalas, to ensure permanent, free living populations over their present range and to reserve the current trend of population decline.

(ii) *"that in respect of rezoning, if a proposal to zone (or rezone) lands, other than environmental protection, involves an area of potential or core koala habitat then the Director of Urban Affairs and Planning may require that a Local Environmental Study (LES) be prepared."*

The study area does contain potential koala habitat. Kendall and Kendall Ecological Consultants Pty Ltd have considered the likely impacts of the proposed rezoning on koalas and their habitat. A summary of the results are presented in Section 5.6.

SEPP 55 – Remediation of Land

SEPP 55 – Remediation of Land introduces state-wide planning controls for the remediation of contaminated land. The policy states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. The policy makes remediation permissible across the State, defines when consent is required. Requires all remediation to comply with standards, ensures land is investigated if contamination is suspected, and requires Councils to be notified of all remediation proposals. To assist Councils and developers, the Department, in conjunction with the Environment Protection Authority, has prepared "Managing Land Contamination: Planning Guidelines".

Contamination issues affecting the study area have been considered in Section 5.8 of this report.

STATE FOREST

PACIFIC HIGHWAY

Nambucca River

Deepwater Ck

Rutland St

Deepwater Dr

GAZETTED SEPP 14 WETLANDS

IDENTIFIED SEPP 14 WETLANDS

GHD

Nambucca Shire Council

SEPP 14 WETLANDS

SEPP 71 – Coastal Protection

SEPP 71 – Coastal Protection, amongst other things, aims to protect and manage the natural, cultural, recreational and economic attributes of the NSW coast. The policy applies to all land within the coastal zone. As the study area is within 1 km of the mean high water mark the provisions of this policy apply. Clause 7 of the policy requires a consent authority to consider the matters listed in Clause 8 as part of the preparation of a LEP amendment.

Clause 8

(a) the aims of this Policy set out in Clause 2,

(b) existing public access to and along the coastal foreshore for pedestrians or persons with a disability should be retained and, where possible, public access to and along the coastal foreshore for pedestrians or persons with a disability should be improved,

Any future development of the study area would not further restrict public access to and along either the coastal foreshore or the Nambucca River.

(c) opportunities to provide new public access to and along the coastal foreshore for pedestrians or persons with a disability,

The only opportunity to provide new public access along the Nambucca River would be along the eastern boundary of Site 2. However, the steep topography in this location is not considered to be conducive to public access.

(d) the suitability of development given its type, location and design and its relationship with the surrounding area,

The preparation of this LES will determine the suitability of any future development within the study area. Special consideration will be given to the relationship of any future development with the surrounding area.

(e) any detrimental impact that development may have on the amenity of the coastal foreshore, including any significant overshadowing of the coastal foreshore and any significant loss of views from a public place to the coastal foreshore,

As the majority of the study area is located on the western side of the Pacific Highway, any future development is unlikely to have a detrimental impact on the coastal foreshore as a result of overshadowing or loss of views.

(f) the scenic qualities of the New South Wales coast, and means to protect and improve these qualities,

Whilst the study area is not located directly on the coastline, it will be necessary to ensure that any development of the study area does not have a detrimental impact on the scenic qualities of the Nambucca River.

(g) measures to conserve animals (within the meaning of the Threatened Species Conservation Act 1995) and plants (within the meaning of that Act), and their habitats,

Idyll Spaces Consultants and Kendall and Kendall Ecological Services Pty Ltd have undertaken detailed flora and fauna investigations of the study area. Appropriate mitigation measures have been identified in order to conserve animals, plants and their habitats in Section 8.2.

(h) measures to conserve fish (within the meaning of Part 7A of the Fisheries Management Act 1994) and marine vegetation (within the meaning of that Part), and their habitats,

Appropriate mitigation measures have been identified in order to conserve fish by Kendall and Kendall Ecological Services Pty Ltd in Section 8.2.

(i) existing wildlife corridors and the impact of development on these corridors,

Existing wildlife corridors have been identified in Section 5.6.

(j) the likely impact of coastal processes and coastal hazards on development and any likely impacts of development on coastal processes and coastal hazards,

Any future development of the study area is unlikely to be impacted by coastal processes or hazards and is unlikely to impact upon coastal processes or hazards.

(k) measures to reduce the potential for conflict between land-based and water-based coastal activities,

It is noted that Site 2 directly adjoins the Nambucca River. The development of the site for rural-residential purposes is unlikely to result in any potential conflict between land and water based activities.

(l) measures to protect the cultural places, values, customs, beliefs and traditional knowledge of Aboriginals,

Whilst the locality has been used extensively by the Aboriginal community, no items of archaeological significance were identified within the study area. Should any development take place it would be necessary to ensure that works are monitored by the Nambucca Heads Local Aboriginal Land Council.

(m) likely impacts of development on the water quality of coastal waterbodies,

The area supports a number of State significant wetlands. These wetlands represent ecologically diverse and fragile environments and have the potential to be significantly affected by the development of the study area. Possible impacts have been addressed in Section 8.2.

(n) the conservation and preservation of items of heritage, archaeological or historic significance,

Appropriate measures would need to be adopted and implemented to protect the potential item of heritage significance identified within the study area, subject to a more in depth investigation.

(o) only in cases in which a council prepares a draft local environmental plan that applies to land to which this Policy applies, the means to encourage compact towns and cities,

The development of the study area for urban purposes has the potential to increase ribbon development along the Pacific Highway and adversely impact upon the compact nature of the Nambucca urban area.

4.3.2 North Coast Regional Environmental Plan 1988

The relevant provisions of the North Coast Regional Environmental Plan (NCREP) 1988 have been addressed below:

Clause 7 Plan Preparation—Prime Crop or Pasture Land

A draft local environmental plan applying to prime crop or pasture land should:

(a) identify and include land in an agricultural protection zone and contain provisions that:

(i) prevent the subdivision of land within the zone for purposes other than commercial farming,

(ii set minimum allotment sizes which maintain the concept of a minimum area capable of efficient, sustainable agricultural production in the long term,

(iii) separate land zoned for residential use from land zoned or used for agricultural use or for intensive animal industries, and

(iv) prohibit development which is incompatible with the objectives of this Division, and

(v) rezone prime crop or pasture land for purposes other than agricultural only after a detailed analysis of the agricultural capability of the land and adjoining land has been carried out, and

(b) in relation to any prime crop or pasture land not identified and included in an agricultural protection zone in paragraph (a):

(i) include provisions that retain the land for commercial farming purposes, and

(ii) set minimum lot sizes which are sufficient to maintain commercial farming in the long term

An assessment of the agricultural resources applicable to the study area has been included in Section 5.13. The study area is not considered to be prime crop and pasture land as a result of the predominance of native vegetation.

Clause 8 Plan Preparation—Minimum Lot Size

In relation to rural land which is not prime crop or pasture land, a draft local environmental plan should set a sufficient minimum allotment size for the conduct of commercial farming.

Nambucca LEP 1995 provides a minimum allotment size for rural land.

Clause 14 Plan Preparation—Wetlands or Fishery Habitats

(1) A draft local environmental plan for land containing rivers, streams, wetland or fishery habitats should:

(a) include wetlands, fishery habitats and sufficient land to separate adjoining land uses from the wetlands and fishery habitats in an environment protection zone, and

(b) include provisions to require the council's consent for development such as agricultural uses, the clearance of vegetation, the filling or draining of land and the construction of levees in the environment protection zone referred to in paragraph (a), and

(c) be prepared only after consideration of any environmental audit or water quality study prepared by the Department of Water Resources or the Environment Protection Authority and relating to the land.

As previously indicated, those areas identified within the study area considered to contain wetland attributes would be zoned environmental protection together with any necessary buffer zones. Council approval is required for any development within the 7(a) zone pursuant to Nambucca LEP 1995.

Clause 20 Plan preparation—Rural Land Release Strategy

(1) The council should not prepare a draft local environmental plan for rural land permitting rural residential or small holding development unless:

(a) it has prepared a rural land release strategy for the whole of its area, and

(b) the Director has approved of the strategy, and

(c) the draft plan is generally consistent with that strategy.

(2) A copy of any such rural land release strategy should:

(a) be available, without charge, for public inspection and comment at the office of the council during normal office hours, and

(b) be forwarded by the council for their information to such public authorities as, in the opinion of the council, have responsibilities reasonably requiring them to be aware of the strategy.

(3) In identifying land suitable for rural housing, any such strategy is to give preference to areas which:

(a) are physically capable of supporting rural housing, and

(b) are close to existing settlements which already have services and community facilities, or can otherwise be efficiently and economically serviced, and

(c) are physically suitable for septic effluent disposal, and

(d) are not required or likely to be required for future urban expansion of existing settlements, and

(e) do not comprise prime crop or pasture land, and

(f) are not subject to significant environmental hazard, and

(g) are not of significant value for the conservation of wildlife.

(4) Any such strategy is to be based on the average number of allotments needed annually to meet genuine demand for rural residential and small holding development.

(5) The average annual number of allotments needed to meet such demand over any period agreed by the Director is not to exceed 130 percent of the average number of building approvals granted for the erection of dwellings (in the course of rural residential and small holding development) in the area in each of the preceding 5 years.

Portions of the study area are currently zoned for rural-residential purposes. This zone was recommended by the Structure Plan and Land Development Programme prepared by GHD in 1990 and ultimately rezoned by Nambucca LEP 1995. The purpose of this investigation is to determine the suitability of the study area for rural-residential purposes.

Clause 21 Plan Preparation—Dwellings on Rural Land

(1) A draft local environmental plan which permits the erection of dwellings on rural land should:

(a) in the case where only one dwelling may be erected on an allotment:

(i) identify a minimum allotment size which is suitable for the erection of a dwelling, and

(ii) provide that a dwelling may only be erected in an agricultural protection zone if in the opinion of the council the erection of the dwelling will not adversely affect the use of the land for commercial farming purposes, and

(b) in the case where a second dwelling may be erected in addition to one already erected on the allotment—provide that the second dwelling may only be erected if in the opinion of the council, the agricultural activity being carried out on the allotment requires an employee to reside permanently in that dwelling.

(2) In identifying a suitable minimum lot size for the erection of a dwelling as required by subclause (1) (a) (i), the council is to consider the desirability of the

retention of the land for commercial farming in the long term and the local circumstances.

(3) A draft local environmental plan which permits development for the purpose of caravan parks or camping grounds on land in rural or environmental protection zones should only allow the provision of temporary accommodation, unless:

(a) the land adjoins or is adjacent to land zoned for urban use, or

(b) the land is proposed for permanent residential accommodation in accordance with:

(i) a rural land release strategy referred to in clause 20 which has been approved by the Director, or

(ii) a land release program referred to in clause 38 (3) which has been agreed to by the Director.

Appropriate provisions exist in Nambucca LEP 1995 regarding the construction of dwellings on rural land.

Clause 22 Plan Preparation—Dual Occupancy

Except for the benefit of an employee referred to in clause 21 (1) (b), a draft local environmental plan applying to rural land and land zoned for environmental protection, scenic protection or escarpment preservation should not include provisions to permit the erection of more than one dwelling on an allotment of land, but may include provisions to permit:

(a) the alteration of or additions to a dwelling erected on an allotment so as to create 2 attached dwellings, or

(b) the erection of 2 attached dwellings on an allotment.

Appropriate provisions exist in Nambucca LEP 1995 regarding the construction of dual occupancy developments on rural land.

Clause 29 Plan Preparation—Natural Areas and Water Catchments

A draft local environmental plan should:

(a) retain existing provisions allowing the making of tree preservation orders,

(b) not alter or remove existing environmental protection, scenic protection or escarpment preservation zonings or controls within them, without undertaking a detailed analysis to determine whether there will be adverse environmental effects resulting from such action,

(c) include significant areas of natural vegetation including rainforest and littoral rainforest, riparian vegetation, wetlands, wildlife habitat, scenic areas and potential wildlife corridors in environmental protection zones,

(d) contain provisions which require that development in domestic water catchment areas or on land overlying important groundwater resources does not adversely affect water quality, and

(e) require consent for the clearing of natural vegetation in environmental protection, scenic protection or escarpment preservation zones.

Appropriate provisions exist in Nambucca LEP 1995 regarding tree preservation orders. Pursuant to this clause, any significant areas of natural vegetation within the study area should be included within an environment protection zone.

Clause 32A Plan Preparation—Coastal Lands

(1) This clause applies to land within the region to which the NSW Coastal Policy 1997 applies.

(2) A draft local environmental plan which applies to any such land should:

(a) include provisions that give effect to and are consistent with the NSW Coastal Policy 1997, and

(b) not remove from existing controls applying to any such land any requirement for the concurrence of the Director for consent to development in coastal protection zones, and

(c) prohibit development of buildings or other structures, except those required for erosion control works or beach management, on dunes, beaches or headlands not occupied by buildings or other structures, and

(d) when development applications are being determined, require consideration of the possibility of higher sea levels caused by climatic change, and

(e) include provisions to the effect that the council must not consent to the carrying out of development on a headland on which buildings are already situated, except where:

(i) the height and scale of any buildings that will result from carrying out the development will be no greater than those of the buildings already on the headland, and

(ii) an environmental assessment has been carried out including an assessment of the visual impact of the proposed buildings from other headlands within sight of the headland on which the development is proposed to be carried out, and

(iii) the proposed development is considered by the council to have a low environmental impact.

The provisions of the NSW Coastal policy have been considered in the preparation of this LES. Appropriate provisions exist in Nambucca LEP 1995 regarding development within the coastal zone.

Clause 39 Plan Preparation—Retail, Commercial or Business Activities

A draft local environmental plan should not provide for the establishment of significant retail, commercial or business development unless:

(a) the expansion is adjacent to or adjoins the existing commercial centre, or

(b) *if the expansion is not adjacent to or adjoining the existing centre, that development is in accordance with a commercial/retail expansion strategy prepared by the council, published for public discussion and:*

(i) be available, without charge, for public inspection and comment at the office of the council during normal office hours, and

(ii) be forwarded by the council for their information to such public authorities as, in the opinion of the council, have responsibilities reasonably requiring them to be aware of the strategy.

It is recognised that the landowner of Site 4 is interested in establishing a combination of land uses including industrial, bulky goods, retail, service centres and community facilities on the land. Whilst the site is not located adjacent to the existing commercial centre at Bellwood, it has been identified in the 1996 Commercial and Industrial Strategy.

Clause 45 Plan preparation—Hazards

(1) *A draft local environmental plan should not permit development for tourism, rural housing or urban purposes on land subject to the following hazards, namely:*

(a) coastal processes,

(b) flooding or poor drainage,

(c) dangers arising from potential or actual acid sulphate soils,

(c1) dangers arising from contaminated land,

(c2) geological or soil instability,

(d) bush fire,

(e) aircraft noise at levels of more than 25 (measured according to the Australian Noise Exposure Forecast),

(f) air or water pollution, or airborne pollution, within 400 metres of sewage treatment works,

(g) disposal of septic effluent,

(h) existing offensive or hazardous industries, and

(i) high tension electrical power lines,

unless the council has made an assessment of the extent of the hazard and included provisions in the plan to minimise adverse impact.

(2) *(Repealed)*

(3) *In the event of a bush fire hazard being identified for land on which dwellings are proposed to be permitted, the council shall not permit development unless it is satisfied that arrangements where appropriate have been made to:*

(a) require the creation of a perimeter road or reserve which circumscribes the hazard side of the land intended for that development,

(b) require the creation of a fire radiation zone located on the bushland side of the perimeter road,

(c) specify minimum building setbacks for buildings that will be erected on allotments adjoining the perimeter road,

(d) set standards for the use of fire retardant materials for buildings and building construction, and

(e) provide fire trails which link with individual access roads or a through road.

Consideration has been given to flooding, acid sulfate soils, contaminated land, geological and soil instability and bushfire as part of this LES. Details are outlined in Section 5.

Clause 45A Plan Preparation—Flood Liable Land

(1) This clause applies to flood liable land within the meaning of the Floodplain Development Manual.

(2) A draft local environmental plan should:

(a) not alter the zoning of flood liable land the zoning of which is described as special use—flood liable, rural, open space, scenic protection, conservation, environment protection, water catchment or coastal lands protection, or similarly described, to a zone described as residential, business, industrial, special use, village or similarly described, and

(b) not contain provisions which apply to flood liable land and which:

(i) permit an intensification of development on that land, or

(ii) are likely to result in an increase in the need for flood mitigation measures (including emergency measures), infrastructure or services, or

(iii) permit development to be carried out without development consent, except development for the purpose of agriculture which does not include landfill, drainage canals, fences, buildings or structures in the following places:

- floodways,
- *high hazard flood fringe,*
- *high hazard flood storage areas,*

as defined in the Floodplain Development Manual,

unless justified by a floodplain management plan prepared by the council in accordance with the Floodplain Development Manual.

(3) A draft local environmental plan should:

(a) zone land identified in accordance with the principles contained in the Floodplain Development Manual as high hazard flood liable or as floodway so as to reflect its potential for flooding, and

(b) provide that the erection of new buildings on any such land be restricted.

Pursuant to Clause 43, any draft LEP should not alter the zoning of flood liable land to a zone described as residential, business, industrial, special use, village or similarly described zone or permit an intensification of development on that land. Given the flood liability of the study area, Clause 43 acts as a major constraint to any future development of Sites 1, 2 and 4.

Clause 47 Plan Preparation and Development Control—Principles for Commercial and Industrial Development

(1) Before preparing a draft local environmental plan relating to commercial or industrial development, the council should take into consideration the following principles:

(a) strong multi-functional town centres should be maintained to focus the drawing power of individual businesses and maintain the integrity of the main business area by only zoning land for further commercial or retail development where that development adjoins or is adjacent to the existing town centre,

(b) provisions contained in local environmental plans relating to retail, commercial, business and industrial zones should be flexible, especially to enable the development of light service industry near the central business district,

(c) there should be an adequate supply of zoned industrial land located where it is physically capable of development for industrial purposes, is not environmentally fragile and can be serviced at a reasonable cost.

(d) (Repealed)

(2) Before granting consent for industrial development, the council must take into consideration the principle that land used for such development should be located where it can be adequately serviced by the transport system and is accessible from urban areas.

The Commercial and Industrial Strategy prepared in 1996 by consultants, RDM Pty Ltd, recommended that any future industrial land be located within the existing industrial areas at Macksville and Nambucca Heads. The industrial zoning of the study area would not fit with this Strategy. The 2001 Industrial Land Release Strategy, prepared by consultants, DeGroot and Benson recommends that an LES be prepared for the study area to determine its suitability for industrial purposes. As a result of this recommendation, this LES has been charged with determining whether the study area is appropriate for industrial development.

Clause 53 Plan Preparation—Primary Arterial Roads

(1) A draft local environmental plan applying to a primary arterial road should identify that road and contain provisions to promote the safety and efficiency of the road.

(2) The provision referred to in subclause (1) should:

(a) restrict access on to the road except at specially constructed intersections,

(b) where through traffic is in conflict with local traffic, make provision for traffic to bypass major urban areas, and

(c) control advertising signs and structures adjacent to or adjoining roads where, in the opinion of the council, safety, scenic or visual amenity would be impaired by the erection of those signs or structures.

Given that the Pacific Highway is a primary arterial road, special consideration would need to be given to the access requirements of any future development of the study area.

Clause 56A Plan Preparation—Bus Services

In the preparation of a draft local environmental plan involving an alteration to the zoning of land which could give rise to the need for bus services or the revision of existing bus services, the council should take into consideration the guidelines in Technical Bulletin 19—Planning for Bus Services (published in 1989 by the Department of Planning and the Ministry of Transport at that time) to ensure that the draft plan allows for the provision of an adequate and efficient bus route system.

Should this LES recommend that the study area is suitable for industrial development an appropriate bus service would be required to service the development.

4.3.3 Nambucca Local Environmental Plan 1995

Pursuant to the Nambucca LEP 1995, the study area is currently zoned part 1(a1) Rural; part 1(a2) Rural (Prime Agriculture/Flooding), part 7(a) Environmental Protection (Wetlands) and part 10 (Low Density) Tourist.

Diagram 7 illustrates the current zoning of the study area and its surrounds. The zone tables for each of the identified zones are outlined below:

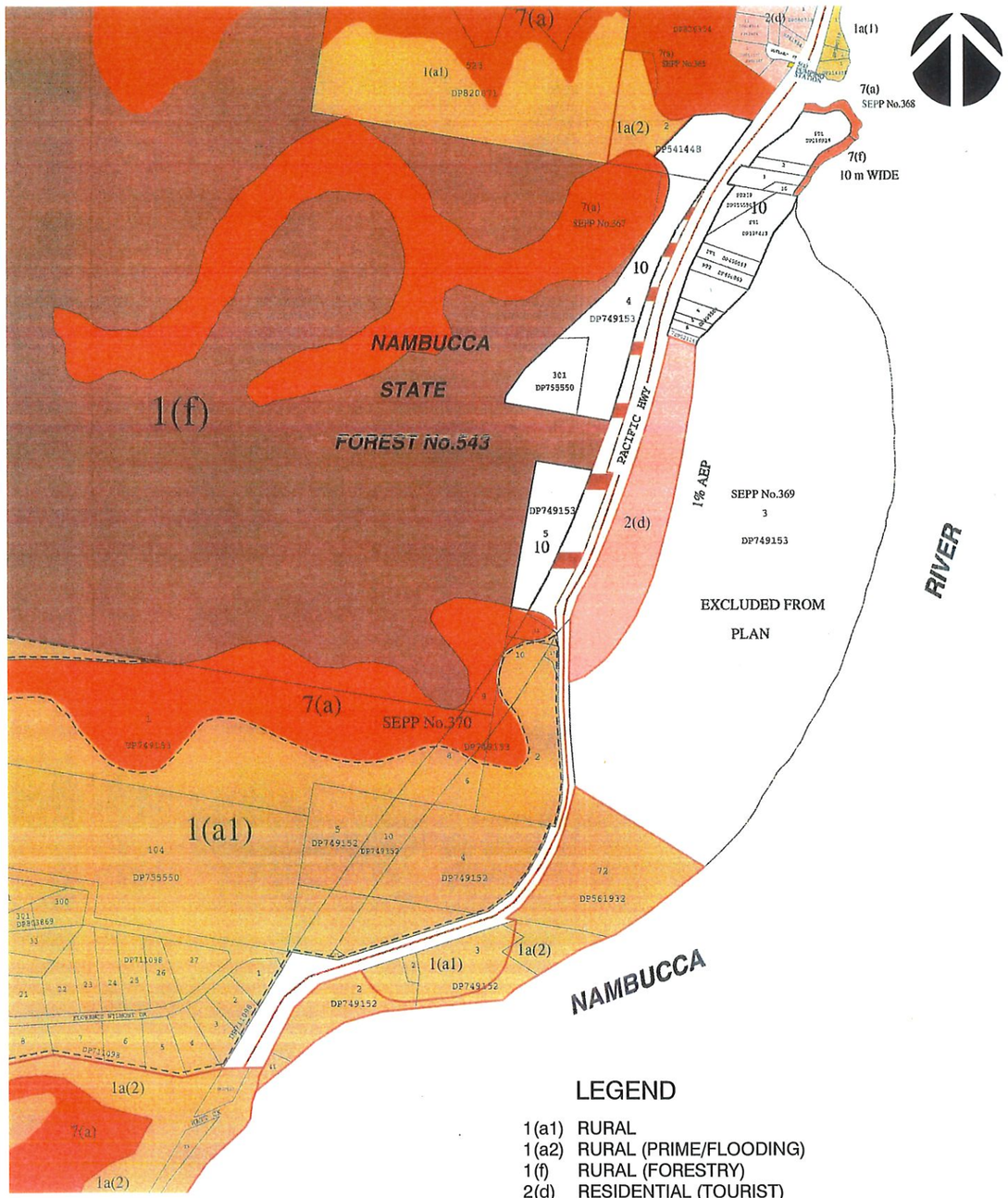
Zone 1 (a1) Rural

1 Objectives of Zone

The primary objectives of this zone are:

(a) to encourage the productive and efficient use of land for agriculture,

(b) to protect commercial agricultural enterprises,



SOURCE: NAMBUCCA SHIRE COUNCIL L.E.P. 1995

LEGEND

1(a1)	RURAL
1(a2)	RURAL (PRIME/FLOODING)
1(f)	RURAL (FORESTRY)
2(d)	RESIDENTIAL (TOURIST)
9	CLASSIFIED ROAD RESERVATION
7(a)	ENVIRONMENTAL PROTECTION (WETLANDS)
10	LOW DENSITY TOURIST

GHD

Nambucca Shire Council

CURRENT ZONING CONTROLS

(c) *to permit appropriate agriculture-related land uses and certain non agriculture related land uses which will not adversely affect agricultural productivity,*

(d) *to protect, conserve and enhance natural and scenic resources, wildlife habitat refuges and corridors, and*

(e) *to control development that could:*

(i) *have an adverse impact on rural character,*

(ii) *create unreasonable or uneconomic demands for the provision or extension of public amenities and services, or*

(iii) *cause adverse physical effects such as erosion hazard, bush fire risk, flooding and the like.*

The secondary objectives of the zone are:

(a) *to provide for small holding rural-residential living opportunities where appropriately located, and*

(b) *to control the density of rural-residential development and to ensure proper regard is given to suitable siting in regard to access, natural hazards, landscape quality and physical environment.*

2 Description of the Zone

This zone identifies land which is of secondary agriculture value and includes localities identified as appropriate for rural-residential development.

3 Without Development Consent

Development for the purpose of:

agriculture (other than animal establishments or intensive livestock keeping establishments); bush fire hazard reduction; dams used for agriculture; forestry; home-based child care; utility installations.

Exempt development.

4 Only with Development Consent

Any development not included in Item 3 or 5.

5 Prohibited

Development of land (that is not shown edged with a broken black line and as designated for rural-residential development on the map) for the purpose of:

amusement parlours; boarding houses; brothels; clubs; cluster housing; commercial premises; hospitals; housing for aged or disabled persons; industries (other than rural industries, extractive industries and industries allowed by clause 24); institutions; integrated housing; light industries; liquid fuel depots; medium density housing; motor showrooms; offensive or hazardous industries; recreation facilities; residential flat buildings; restricted premises;

service stations; shops (other than general stores); taverns; tourist accommodation (other than rural tourist facilities); warehouses.

Development of land (that is shown edged with a broken black line and as designated for rural-residential development on the map) for the purpose of:

abattoirs; aerodromes; agricultural machinery showrooms; amusement parlours; animal establishments; boarding houses; bulk stores; bus depots; bus stations; car repair stations; clubs; commercial premises; extractive industries; helipads; heliports; hospitals; industries (other than home industries); institutions; integrated housing; intensive livestock keeping establishments; junkyards; light industries; liquid fuel depots; materials recycling depots; mines; medium density housing; motor showrooms; offensive or hazardous industries; recreation vehicle areas; restricted premises; residential flat buildings; rural industries; sawmills; service stations; shops (other than general stores); stock and saleyards; timber yards; tourist accommodation (other than rural tourist facilities); transport terminals; warehouses; waste disposal depots.

Limited industrial development is permissible within the zone (except land shown inside the broken black line on the map) but is restricted to rural industries, extractive industries and industries permitted by Clause 24 of Nambucca LEP 1995. Given the nature of development proposed for all sites, an LEP amendment to Nambucca LEP 1995 would be required. Rural-residential development is permissible within the zone where identified by the broken black line. Site 1 has been identified for rural-residential development. Site 2, whilst zoned 1(a1), does not permit rural-residential development and therefore any proposal for residential or rural-residential development would require an amendment to the LEP.

Zone 1 (a2) Rural (Prime/Flooding)

1 Objectives of Zone

The objectives of this zone are:

(a) to protect commercial agricultural enterprises and land of prime agricultural value,

(b) to permit appropriate agriculture-related land uses and certain non agriculture- related land uses which will not adversely affect agricultural productivity,

(c) to prevent inappropriate development of prime crop and pasture land for purposes other than agriculture, and to discourage further subdivision,

(d) to ensure that development of land in that part of the zone which is liable to flooding is carried out in a manner appropriate to the flood hazard,

(e) to protect, conserve and enhance natural and scenic resources, wildlife habitat refuge areas and corridors, and

(f) to control development that could:

(i) *have an adverse impact on the rural character of the land in the zone,*

(ii) *create unreasonable or uneconomic demands for the provision or extension of public amenities and services, or*

(iii) *be subjected to physical limitations such as erosion hazard, bush fire risk, flooding and the like.*

2 *Description of the Zone*

This zone identifies land which is of prime agricultural value and/or is flood prone.

3 *Without Development Consent*

Development for the purpose of:

agriculture (other than animal establishments or intensive livestock keeping establishments); bush fire hazard reduction; dams used for agriculture; forestry; home-based child care; utility installations.

Exempt development.

4 *Only with Development Consent*

Any development not included in item 3 or 5.

5 *Prohibited*

Development for the purpose of:

amusement parlours; boarding houses; brothels; camping grounds; caravan parks; car repair stations (other than the storage and servicing of vehicles associated with industries allowed by clause 24); cemeteries; clubs; cluster housing; commercial premises; crematoriums; exhibition houses; extractive industries within the area identified by clause 63; generating works; group homes; helipads; heliports; hospitals; hotels; housing for aged or disabled persons; industries (other than rural industries, industries allowed by clause 24 and extractive industries other than within the area identified by clause 63); institutions; integrated housing; junkyards; light industries; liquid fuel depots; material recycling depots; medium density housing; motels; motor showrooms; multiple occupancy; offensive or hazardous industries; places of assembly; places of public worship; recreation facilities; recreation vehicle areas; refreshment rooms (other than associated with rural tourist facilities); residential flat buildings; restricted premises; service stations; shops (other than general stores); taverns; tourist accommodation; tourist facilities; warehouses; waste disposal depots.

Land zoned 1(a2) is restricted to that part of Site 2 directly adjacent to the Nambucca River and the western portion of Site 4. Dwellings are permissible within the zone however an LEP amendment would be required to permit residential, rural-residential or industrial development of the land.

Zone 7 (a) Environment Protection (Wetlands)

1 Objectives of Zone

The objectives of this zone are:

(a) to protect and conserve estuaries and wetlands to enable them to continue to function as breeding and feeding areas for birdlife, fish and shellfish,

(b) to ensure the ecological, scenic and other environmental attributes of functioning wetlands are not altered,

(c) to encourage and promote rehabilitation of previously disturbed wetlands, and

(d) to contribute to the implementation of State Environmental Planning Policy No 14—Coastal Wetlands.

2 Description of the Zone

The Environment Protection (Wetlands) zone contains all wetlands within the area of Nambucca identified in State Environmental Planning Policy No 14—Coastal Wetlands and by NSW Fisheries.

3 Without Development Consent

Nil.

4 Only with Development Consent

Development for the purpose of:

agriculture (other than animal establishments and intensive livestock keeping establishments); aquaculture; bed and breakfast establishments; building of levees; bush fire hazard reduction; camping grounds without buildings; clearing of native vegetation; drainage; dwelling-houses; environmental facilities; extractive industries; filling; home activities; recreation areas; roads; utility installations.

5 Prohibited

Any development not included in Item 4.

SEPP 14 Wetland Nos 365, 367 and 370 are located within and adjacent to the study area and have been zoned 7(a) pursuant to Nambucca LEP 1995. These wetlands would not be rezoned by the LEP amendment. Although given their boundaries have been identified as a result of site inspections, it may be appropriate to redefine these boundaries by rezoning those areas to be included under SEPP 14 and vice versa.

Zone No 10 Low Density Tourist

1 Objectives of Zone

The objectives of this zone are:

(a) to permit low density tourist development and uses associated with, ancillary to or supportive of such development which are carried out in a manner that is environmentally acceptable to the surrounding locality,

(b) to permit uses which are unlikely to place demands on water and sewerage services beyond the level reasonably required for tourist use, and

(c) to ensure the pattern of development does not prejudice the functions of the Pacific Highway by identifying by means of a development control plan suitably located vehicle access points to the Pacific Highway approved by the Roads and Traffic Authority.

2 Description of the Zone

The Low Density Tourist zone consists of land south of Teagues Creek, Lower Nambucca.

3 Without Development Consent

Exempt development.

4 Only with Development Consent

Development for the purpose of:

advertising structures; boarding-houses; cabins; camping grounds; caravan parks; dwelling-houses associated with another land use permitted within this zone; residential flat buildings and medium density housing associated another land use permitted within this zone; general stores; home activities; home occupations; hostels; motels; recreation establishments; recreation facilities; refreshment rooms; tourist accommodation; tourist facilities; utility installations; any other land use which complements, supports or is associated with the objects of this zone.

5 Prohibited

Any development not included in Item 3 or 4.

The 10 zone allows for a range of different development types but does not permit industrial development. Given the nature of development proposed for Sites 1, 3 and 4, an LEP amendment to Nambucca LEP 1995 would be required.

4.4 North Coast Planning Policies

4.4.1 NSW Coastal Policy

The NSW Coastal Policy 1997 was established as a NSW Government initiative to better manage the coastal environment by providing a framework for balanced and coordinated management of the Coast's unique physical, ecological, cultural and economic attributes.

The Coastal Policy is relevant to the preparation of the LEP amendment in two main ways as outlined in the Section 117 Direction. The Section 117 Direction (S26) requires that LEP's which apply to the defined coastal zone:

"(a) include provisions that give effect to and are consistent with the coastal policy; and

(b) not alter, create or remove existing zones unless an environmental study relating to the LEP has been prepared and considered."

The provisions of the NSW Coastal Policy have been considered in the determination of appropriate zones for the study area.

4.4.2 Rural Settlement – Guidelines on Rural Settlement on the North Coast of NSW

The document 'Guidelines on Rural Settlement on the North Coast of NSW' was prepared by the NSW Department of Urban Affairs and Planning in 1995. The Rural Settlement document provides a regional vision for rural settlement on the North Coast of NSW. The purpose of this publication is to introduce a catchment based approach for rural settlement to the North Coast Community.

The first section of this document discusses best practice in rural settlement and its implementation. The second section relates to the context of rural settlement and discusses such topics as past practice, past policy, cluster planning, resource issues, environment, service issues and social issues.

Consideration has been given to the guideline in assessing the opportunities and constraints of the study area with respect to future rural residential development.

4.4.3 North Coast Urban Planning Strategy: Into the 21st Century

The North Coast Urban Planning Strategy was released by the NSW Department of Planning in early 1995. The document provides a vision for the future for the north coast region. It aims to manage the expected growth efficiently and sustainably well into the next century. The main focus of the strategy is to identify those opportunities for the region's development which best maintain and protect its environmental qualities.

At the regional level it nominates centres best able and best located to accommodate the major share of the region's growth. At the local level the strategy looks, in some detail, at opportunities for urban expansion and the planning required by local Councils to achieve these without jeopardising the special environmental qualities of the region.

The North Coast Urban Planning Strategy estimated that the projected Nambucca Shire population in the year 2016 would be 26,000. This figure has since been revised and is expected to be in the order of 20- 21,000 persons.

The document identifies specific urban expansion opportunities within the Nambucca Shire. It identifies those areas suitable for future urban development, including an area to the north west of Nambucca Heads. The study area has not been identified as an urban expansion opportunity, thus the potential rezoning of the study area is not consistent with the North Coast Urban Planning Strategy.

4.4.4 Integrated Catchment Management Plan for the Mid North Coast Catchment 2002

The Integrated Catchment Management Plan for the Mid North Coast Catchment is a plan that is intended to guide investment in natural resource management for a sustainable future. The Plan identifies locations where needs or benefits are considered greatest and sets Targets against which investment performance can be measured. It acknowledges the importance of environmental, social and economic indicators of catchment health. The Nambucca River is part of the Mid North Coast Catchment Management Board Area and thus covered by this Plan.

The Plan outlines a number of first order objectives, which are broad visions addressing the following five major issues: land use; aquatic systems; soils; vegetation; and biodiversity. For each of these objectives a number of targets and required actions have been developed.

Given the proximity of the study area to the Nambucca River it is essential that this LES be developed in such a way that it is consistent with the objectives, targets and actions set out in the Integrated Catchment Management Plan for the Mid North Coast Catchment 2002.

4.5 NSC Development Control Plans

DCP No. 1 Off-Street Parking (2004)

This is the code for the provision of off-street vehicular parking areas required as a result of the erection, alteration, enlargement or conversion of any building. Any future development of the study area must be in compliance with this DCP.

DCP No. 10 Guidelines for Exempt and Complying Development

This Plan applies to all land identified under the Nambucca Local Environmental Plan 1995. This provides standards for exempt and complying development that ensures development is environmentally responsible and compatible with the character and amenity of surrounding development. Future development of the study area must be in accordance with the standards set out in this Plan.

DCP No. 11 Building Line Setbacks – Urban and Rural Areas

This Plan controls urban and rural building setbacks. Any future development of the study area is to be in accordance with the provisions of this policy.

DCP No. 12 Advertising of Development

This Plan identifies the types of development applications which will be advertised for neighbour or public comment before the applications are determined by Council. Any future development applications pertaining to the study area will be subject to the requirements set out in this policy.

DCP No. 14 Equity of Access and Mobility

This Plan encourages the consideration of access and mobility issues as a means of improving the comfort and adaptability of all buildings. The main emphasis of the controls contained within this Plan is on larger developments such as new residential flat buildings, commercial, industrial and public buildings. Any future proposed buildings within the study area must be in compliance with the detailed design requirements set out in Part 4 of this Plan.

DCP No. 15 Acid Sulfate Soils

This plan aims to ensure effective management of areas affected by Acid Sulfate Soils (ASS). In preparing this Local Environmental Study a preliminary acid sulfate soil assessment is to be undertaken to clarify the extent of the risk within the study area. Also a generic ASS management plan is to be prepared for the study area, in accordance with the NSW ASS Management Advisory Committee Guidelines and the provisions of this DCP.

DCP Industrial Buildings Code

The objective of this code is to facilitate the development of industrial buildings within the Nambucca Shire, in an orderly well-planned and environmentally acceptable manner. Future industrial development within the study area must comply with the requirements of this Code.

DCP Rural Subdivision

This DCP applies to all subdivisions within rural and environmental protection zones identified under the Nambucca LEP 1995. The Plan sets out the controls relating to the siting and design of rural subdivisions. Future subdivision of rural land within the study area must be in compliance with this policy.

DCP Restricted Access to Pacific Highway and Provision of Water and Sewerage Services, Lower Nambucca

This Plan aims to ensure development is arranged in a manner which does not prejudice the functions of the Pacific Highway by identifying by means of a development control plan suitably located vehicle access points to the Pacific Highway approved by the Roads and Traffic Authority. This DCP also contains provisions to ensure the capacity of water and sewerage systems related to Nambucca Heads Catchment is adequate to accommodate the development and probable future development on the land.

As the study area fronts the Pacific Highway within the Lower Nambucca area, any future development within the study area is must be in concurrence with the requirements of this Plan. This will ensure that the function of the Pacific Highway is

not compromised and that the water and sewerage systems are of adequate capacity to handle such development.

DCP Advertising Signs Code

This Code is for the erection of advertising structures on all lands within the Shire of Nambucca. Any signs to be constructed on the study area will be subject to the provisions of this DCP.

4.6 Summary

The review of the relevant statutory planning controls applicable to the proposed rezoning of the study area has identified the following issues:

- Special consideration must be given to the function and purpose of the Pacific Highway. It should be noted however, that subject to the findings of the RTA's route development investigations, the future location of the highway may not represent a constraint to the proposed rezoning of the study area.
- The study area contains State significant SEPP 14 wetlands and other areas with wetland attributes which should be gazetted as SEPP 14 wetlands.
- Pursuant to Clause 29 of NCREP, any significant areas of natural vegetation within the study area should be included within an environment protection zone.
- Pursuant to Clause 43 of NCREP, the draft LEP should not alter the zoning of flood liable land to a zone described as residential, business, industrial, special use, village or similarly described zone or permit an intensification of development on that land. Given the flood liability of the study area, Clause 43 acts as a major constraint to any future industrial development.
- Pursuant to Clause 45 of NCREP, the draft LEP should not permit development for tourism, rural housing or urban purposes on land subject to flooding, acid sulfate soils, bushfire hazard or land contamination. Given the flood liability of the study area, the presence of acid sulfate soils and bushfire hazard, Clause 45 acts as a constraint to any future urban development of the study area.
- Pursuant to Clause 47 of NCREP, the draft LEP should promote strong multi-functional town centres which should be maintained to focus the drawing power of individual businesses and maintain the integrity of the main business area by only zoning land for further commercial or retail development where that development adjoins or is adjacent to the existing town centre. The 1996 Commercial and Industrial Strategy recommended that any future industrial land be located within the existing industrial areas at Macksville and Nambucca Heads. The industrial zoning of the study area would not fit with this Strategy. The 2001 Industrial Land Release Strategy recommends that an LES be prepared for the study area to determine its suitability for industrial purposes. As a result of this recommendation, this LES has been charged with determining whether the study area is appropriate for industrial development.
- The study area is currently zoned part 1(a1) Rural; part 1(a2) Rural (Prime Agriculture/Flooding), part 7(a) Environmental Protection (Wetlands) and part 10

(Low Density) Tourist. An amendment to Nambucca LEP 1995 is required to permit industrial, residential and rural-residential development.

- The study area has not been identified as an urban expansion opportunity, thus the proposed rezoning of the study area is not consistent with the North Coast Urban Planning Strategy.

5. Baseline Environmental Analysis

This section describes the existing baseline environmental conditions at and around the study area. Consideration has been given to both the natural and built environments. This section will provide a clear understanding of the environmental constraints and opportunities presented in Section 6.

5.1 Climate

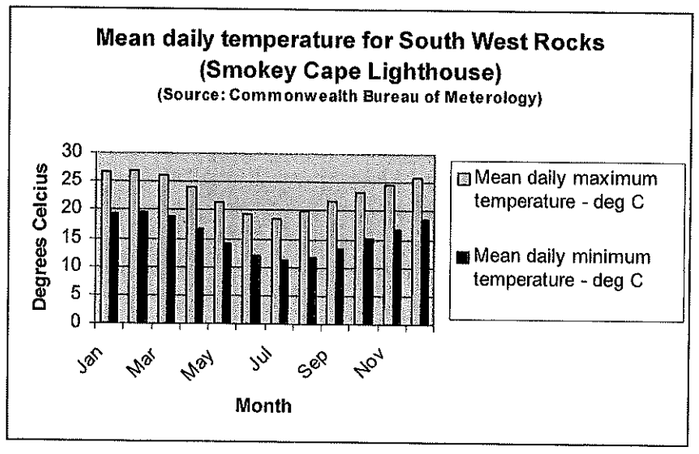
5.1.1 General

Seasonal oscillations of the anticyclone and northern tradewind belts are the major factors determining regional climate. In summer, the anticyclone belt is well to the south of the area. Consequently, warm, humid conditions associated with the tradewind belt are experienced. The anticyclone belt moves northwards during autumn and lies over the region during winter. This period is the direr part of the year and is accompanied by generally clear skies.

The climate of the Nambucca Heads area can be broadly defined as humid sub-tropical. This is characterised by warm to hot, humid summers with a strong maritime influence and mild, dry winters and cold nights.

5.1.2 Temperature

The nearest weather station that records climate averages for the Nambucca area is located at Smokey Cape Lighthouse, South West Rocks, approximately 30km south of Nambucca. Temperature data obtained from the Bureau of Meteorology relevant to the area is illustrated below.

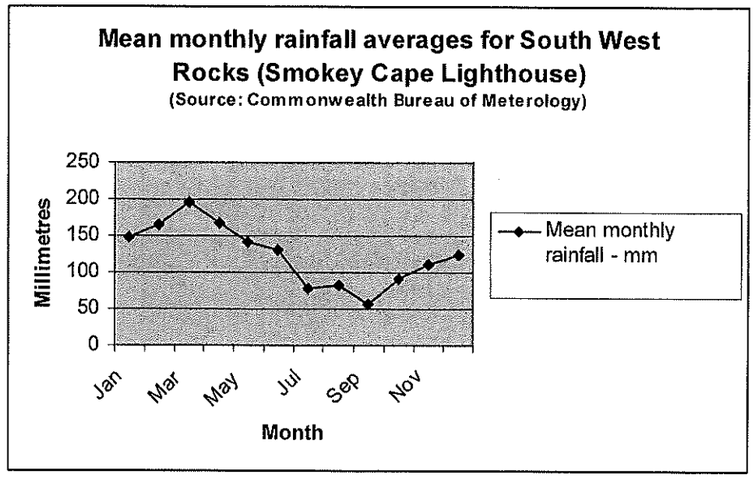


The average annual temperature is some 19.3 degrees Celsius but significant seasonal variation does occur. Summers tend to be hot with an average maximum of

26.4 degrees Celsius to an average minimum of 19.1 degrees Celsius, with February being the hottest month. Autumn and Spring are temperate seasons, having average temperatures of 23.7 degrees Celsius (maximum) to 16.5 degrees Celsius (minimum) and 23.0 degrees Celsius (maximum) to 15.0 degree Celsius (minimum) respectively. Winter days are mild but the nights are cold. The coldest month is July and the mean winter temperatures range from 19.2 degrees Celsius (maximum) to 11.7 degrees Celsius (minimum).

5.1.3 Rainfall

The six months from January to June are usually the wettest months, receiving over 63 per cent of the yearly average rainfall of 1491.9mm, although month to month variations are moderate. The average monthly rainfall figures are illustrated below.



The cyclone season along the coast of eastern Australia is from December to mid-April. The Bureau of Meteorology estimates that an average of one cyclone every five years may have some slight effect on the Nambucca Heads area.

5.1.4 Wind

Winds in the area during the summer months are primarily from the south-east. During Autumn, these winds emanate from the south, whilst in winter they blow predominately from the west, turning southerly in the afternoons. Spring winds blow from the north-east. Strong winds continuing over a period of hours come mainly from the south east quadrant and are associated with cyclonic depressions just off the coast or a little to the north-east.

Estimates of extreme wind gusts range from 134 – 170 km/ hour and occur every 10 – 100 years respectively.

5.1.5 Frosts

Frosts usually occur under anticyclonic conditions after incursions of cold air, with climatic conditions characterised by upward terrestrial radiation, weak downward atmospheric radiation and cloudless conditions.

In view of the topography and vegetative cover within the study area, very few frosts occur. Those frosts that do occur are not disadvantageous to urbanisation and industry in the area.

5.1.6 Fogs

Very few fogs occur in the area. Those that do are of limited depth (generally less than one metre), occur only in the colder months of the year and are of short duration.

5.1.7 Sunshine

The Nambucca Heads area receives an approximate yearly average of 7.2 hours of sunlight per day in the winter and 7.5 hours per day in the summer. In addition to this, NSW Agriculture advises that the area receives some of the highest levels of ultra violent radiation on the North Coast of New South Wales.

5.1.8 Atmospheric Inversions

Although no records have been kept, it is not likely that the Lower Nambucca Area would experience a high incidence of inversions. This is primarily because of the relatively flat form of the local topography.

5.1.9 Air Quality

Pollution readings across an area are influenced by such factors as the quantity of pollutants released and the prevailing macro/micro-climate. These climatic influences can concentrate or disperse pollutants in an area or transport pollutants in sufficient numbers to give high or moderate pollution readings in regions distant from the source of pollutants.

Effects of Meteorology

Although the levels of emissions in a given area may not change significantly from day to day, the extent to which emissions affect air quality is highly variable. This is because there are variations in the meteorological parameters that control the movement, dispersion, dilution and in some cases, rate of chemical reaction of pollutants. These include wind, temperature, sunlight and meteorological variability.

Local Air Quality

Local air quality is affected by land uses in the area including both rural and urban uses. Sources of air pollution include transportation (particularly the motor vehicle), incineration and domestic heating.

Very little information is available on the state of air quality in the Nambucca LGA. Either the information is non-existent or it is inaccessible. Results of previous

community consultation however, indicate that air quality is generally perceived to be good (NSC 2003: 68).

Urban areas are the main areas subject to air pollution within the NSC LGA. This air pollution tends to be associated with traffic emissions, bushfire hazard reduction, internal combustion heaters and backyard burning. Given the proximity of the study area to the Pacific Highway, traffic emissions are expected to have the greatest impact on air quality within the study area.

5.1.10 Planning Implications

The climatic conditions at the study area do not appear to represent a significant constraint to urban development. Climate would however influence the design and layout of any future rural-residential development of the study area.

While hot summers and cool winters could potentially lead to a reliance on mechanical heating and cooling systems, appropriate design principles could be adopted to reduce this potential. This could include appropriate building design and orientation, insulation requirements and other similar design measures.

Whilst air quality is considered to be good in the vicinity of the study area, special consideration would need to be given to adequate separation between any proposed rural residential and industrial land uses. Individual air quality assessments would be required for any proposed industrial development prior to approval by NSC.

5.2 Geology and Soils

5.2.1 Geology

Within the study area, the two basic geological groups are reflected by the landform types.

- The river corridor (poorly drained and low topography), together with the floors of its tributary valleys, consists of quaternary sediments. These grade from earlier estuarine sands and silts, to more recent alluvial, aeolian and paludal materials.
- The ridgelines and more elevated topography occur on Lower Permian bedrock including slates, phyllite, schistose sandstone and quartz gravels.

5.2.2 Soils

DLWC Soil Landscape Mapping of the area identifies the study area as comprising five (5) distinct soil landscape groupings, Stuarts Point (sp), Toormina (tm), Raleigh (ra), Newry (ne), and Clybucca (cy).

The location of these soil landscape groupings with respect to the study area are illustrated in Diagram 8.

The landscape and soil features together with geotechnical limitations to development associated with each of these four soil landscape groupings are outlined below:

LEGEND

- LOW RISK ACID SULPHATE SOIL AREA (FROM 1:25,000 RISK MAP)
- HIGH RISK ACID SULPHATE SOIL AREA (FROM 1:25,000 RISK MAP)
- HEAVY MINERAL SAND MINERALISATION DEFINED BY DRILLING (DEPT. OF MINERAL RESOURCES)

SOIL LANDSCAPE GROUPINGS

- sp — STUARTS POINT
- tm — TOORMINA
- ra — RALEIGH
- ne — NEWRY
- cy — CLYBUCCA

SOURCE: D.L.W.C. SOIL LANDSCAPE MAPPING

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NAMBUCCA VALLEY

GEOLOGY & SOILS

diagram 8.

Grouping	Soils	Landscape	Limitation	Erosion Risk	Urban Capability and Engineering Hazards
Stuarts Point (sp)	>300cm rapidly drained Aeric Podosols (Podzols) with shelly Cumulic Anthroposols (Prairie Soils) on midden mounds.	Low inner barrier beach ridge plain on Pleistocene sand (Qad). Relief 1-9m (usually <3m); elevation <10m; slopes <5%. Low open-forest, occasionally cleared for sand mining, pastures and horticulture.	Rapid drainage, groundwater pollution hazard, high wind erosion hazard, non-cohesive soils, very low moisture availability, high landscape fire hazard.	The fine, unconsolidated sand materials are easily transported by concentrated flows, but the risk of sheet and erosion is low because the highly permeable soil materials do not cause surface runoff. The coherence of the surface layer (sp1) is normally maintained by surface mulch and very high density of roots. There is very high wind erosion risk where the coherence of this surface layer has been destroyed by cultivation, vehicle tracks and uncontrolled fires.	Urban Capability Class *Bce*; Class *Cct* on variant **spa**. Moderate limitations due to wind erosion risk and non-coherent soil material, but foundation hazards are low. Unsuitable for soil-absorption effluent disposal due to high permeability and groundwater pollution hazard.

Grouping	Soils	Landscape	Limitation	Erosion Risk	Urban Capability and Engineering Hazards
Toormina (tm)	Sulfidic Intertidal and Supratidal Hydrosols (Humic Gleys and Solonchaks) on muddy sediments, with Arenaceous Intertidal Hydrosols (Siliceous Sans) on sand flats.	Level intertidal and supratidal flats on Holocene sands and muds (Qal). Elevation <2m. Bare sand and mud grading to mangroves, saltmarsh and swamp sclerophyll forests.	Poor drainage, tidal flood hazard, permanently high watertables, extreme foundation hazard, soil fire hazard (localised, drained supratidal flats).	The peats are very stable unless burnt. The unconsolidated sand materials are easily transported by concentrated flows and there is a high risk of scouring where storm runoff is concentrated by structures such as causeways, but the risk of sheet erosion is low because the highly permeable soil materials do not usually cause surface runoff. Extreme risk of wind erosion from scalded surfaces in dry conditions. Granularity of surface peats results from a previous drying cycle and is irreversible, exacerbating wind erosion risk and soil fire hazard. Bank erosion may be exacerbated by power boats. Further erosion may occur as equilibrium adjustments after dredging or reshaping of streambanks and adjacent foreshore areas.	Urban Capability Class *Elfy*. Extreme limitations due to flood risks, foundation hazard, high watertables and acid sulfate soil risk. Unsuitable for soil-absorption effluent disposal due to high permeability and proximity to stream channels. Excavation and disturbance is not recommended because of the extreme acid sulfate soil risk.

Grouping	Soils	Landscape	Limitation	Erosion Risk	Urban Capability and Engineering Hazards
Raleigh (ra)	>200cm moderately to poorly drained Brown Kandosols (Alluvial Soils and Prairie Soils)	Levees of the fluvial deltaic plain of the lower Nambucca and Kalang Rivers. Relief <3m; elevation <19m; slopes <2% on plains and upper surfaces, to 20% on banks. Swamp sclerophyll forests and subtropical rainforest, extensively cleated for improved pastures with fringing mangroves.	Localised poor drainage; localised high run-on; flood hazard; localised seasonal waterlogging; groundwater pollution hazard; minor sheet erosion hazard; high streambank erosion hazard; high foundation hazard; high acid sulfate soils risk.	Erosion risks are generally low, but due to high erodibility, there is a moderate risk of sheet erosion on cultivated surfaces, particularly on small steep elements and where the surface is subject to flood scour. Localised streambank erosion risk, particularly on the outside meander bends, sometimes exacerbated by powered vessels.	Urban Capability Class *Egf*. Very high limitations for urban development due to low wet bearing strength, foundation hazard, groundwater pollution hazard, flooding risk and acid sulfate soil risk. Soils are generally not suitable for soil-absorption effluent disposal due to low permeability, low cation exchange capacity and proximity to streams.
Newry (ne)	100 – 180cm moderately well drained Red and Brown Kurosols (Red or Yellow Podzolic Soils) with < 70 cm gravelly Brown Kurosols on coastal headlands and 100 – 200 cm silty textured Brown or Red Kurosols (Brown Podzolic Soils) on footslopes.	Undulating rises and low hills on meta sediments of the Nambucca Beds. Relief 10 – 30m, elevation 5 – 40m, slopes 5 – 10% on crests, up to 20% on side slopes. Tall open forests, often cleared for grazing, horticulture and urban development.	Localised poor drainage, localised high run-on, localised seasonal waterlogging, water erosion hazard, foundation hazard, complex soils.	Moderate to high erosion risk due to moderate erodibility, high rainfall erosivity and moderate slopes. Topsoil materials (ne1) are susceptible to rill erosion on steeper side slopes, where ground cover has been removed. Because of high subsoil erodibility, gully erosion will occur where drainage is concentrated on exposed surfaces.	Urban Capability Class *Beg*. Low to moderate limitation due to erosion risks, foundation hazard, low wet bearing strength and low subsoil permeability. Suitability for soil absorption effluent disposal is limited by low subsoil permeability and low cation exchange capacity.

Grouping	Soils	Landscape	Limitation	Erosion Risk	Urban Capability and Engineering Hazards
Clybucca (cy)	50-100cm poorly drained Organosols (Peats), Oxyaquic and Redoxic Hydrosols (Humic Gleys) and Semiaquic Podosols (Humic Gleys overlying Podzols)	Backbarrier muddy swale swamps and closed-depressions overlying Pleistocene sands (Qas), Relief <1m; elevation <5m; slopes <3%. Sedgelands, wet heath and *Casuarina glauca* and *Melaleuca* swamp sclerophyll forests (partly cleared for grazing).	Poor drainage, high run-on, flood hazard, permanently high watertables, groundwater pollution hazard, non-cohesive soils, high foundation hazard, soil fire hazard.	The unconsolidated sand materials are easily transported by concentrated flows. There is a locally high risk of scouring where storm runoff is concentrated by structures such as culverts, but the risk of sheet erosion is low. The peats are very stable unless burnt.	Urban Capability Class *Egfy*. Extreme limitations due to flood risks, foundation hazard, high watertables and non-cohesive subsoil materials. Unsuitable for soil absorption effluent disposal due to high watertable and high permeability. Excavation should be undertaken with caution because of the acid sulfate soil risk.

(Source: Eddie 2000: 108-111, 174-176, 187-9, 201-4 & 210-2)

5.2.3 Acid Sulfate Soils

Acid sulfate soil probability mapping has been prepared by DLWC for the study area and is illustrated in Diagram 8. The mapping illustrates that small areas of the study area are affected by acid sulfate soils which have a high probability of occurrence at or near the ground surface as the environment of deposition has been suitable for the formation of such materials. Those areas affected by these soils are generally restricted to the most north-eastern extents of both Sites 2 and 4. The remainder of the study area has been identified as either having no known occurrence of acid sulfate soils or acid sulfate soils within 1 and 3 metres of the ground surface. The later however have a low probability of occurring as the environment of deposition has generally not been suitable for the formation of acid sulfate soil materials and if present are sporadic and may be buried by alluivium and windblown sediments.

Consultants, Holmes and Holmes Pty Ltd undertook an initial assessment of acid sulfate soils for Site 1 in 2002 in response to the land owner's proposed industrial subdivision. The assessment assumed that disturbance of the soil as part of any earthworks for the proposed subdivision would be restricted to 500 – 600mm below the ground surface and therefore sampling was limited to this depth. The assessment revealed that the site consists of three terrain types, all of which represent potential sources of acid sulfate soils.

1) *The low swampy areas, particularly at the northern end of the site and running southwards as a backswamp-billabong type area. No sampling undertaken.*

2) *To the east of the low lying area, there is a flood plain terrace of alluvial clayey silts. This was sampled at four locations, as Samples 1,4, 5 and 6. The results indicate only very low levels of reduced inorganic sulphur, indicating that potential acid sulphate soils have not been encountered in the surface layer.*

3) *To the west is an elevated Aeolian sand dune from with Samples 2, 3 and 7 were taken. The results indicate that potential acid sulphate soils have not been encountered in the surface layer. It should be noted that if the dune is to be used as a source of fill material, further specific testing to the depth of the proposed excavation should be undertaken. There is a low probability that acid sulfate soils could occur at depths down to three metres in this area.*

The assessment concluded, "*we confirm that this initial investigation indicates that potential acid sulfate soils do not appear to occur in the surface layer of the site where disturbance is anticipated in the proposed development. Should excavations deeper than 700mm to 800mm be contemplated, further specific testing could be necessary.*"

GHD undertook additional investigations at Site 3 (as part of the Detailed Contamination Assessment) on a random basis to determine the likelihood of acid sulfate soils at the site. The investigation involved the collection of three opportunistic samples during the installation of groundwater monitoring bores. The three samples were collected from 2 m, 4 m and 4.4 m from below the ground surface. The results from the analysis reveal that high levels of reduced inorganic sulphur were present in the soil, indicating actual acid sulphate soil at these depths.

5.2.4 Planning Implications

Work undertaken by DLWC reveals that soils within the study area are generally not suitable for soil-absorption effluent disposal due to high permeability, low cation exchange capacity and groundwater pollution hazard. They also present extreme limitations due to flood risks, foundation hazard, and high watertable. There are also very high foundation limitations for urban development due to low wet bearing strength. Any future application for any development would therefore need to be accompanied by appropriate effluent disposal reports and geotechnical investigations.

Preliminary investigations into acid sulfate soils reveal that whilst only very low levels of reduced inorganic sulphur exist in the surface layer of parts of the study area, higher reduced inorganic sulphur levels, indicating acid sulfate soil, do exist at depths of 2 to 4 metres in other parts of the study area. Given the results of the preliminary investigations, it is recommended that any works undertaken within the study area be subject to an Acid Sulfate Soil Management Plan. Appropriate measures to be included in any ASS Management Plan are detailed in Section 9.

Due to the very low gradients across the majority of the study area, erosion caused by high velocity run off is not likely to be a major constraint to urban development.

No evidence of scouring or erosion was observed during site inspections. Erosion could be expected, however, from wind action on any exposed sand surfaces. Steeper slopes within Sites 2 and 4 of the study area could be subject to significant erosion if run off is not adequately managed.

Natural tidal movement in Teagues Creek would be expected to continue to impact on the banks of the creek, however the existing mangroves in this area appear to be currently contributing to adequate erosion protection.

5.3 Topography and Landform

The study area contains two main landform units. These are low-lying, flood prone areas exhibiting little change in relief and the ridge system providing a backdrop to the study area. To the west of the study area is a north-south descending ridge system that provides a significant topographical backdrop to the study area and supports the Old Coast Road. Jacks Ridge Road which links the Pacific Highway with the Old Coast Road through the study area, has been constructed on top of an east-west running ridge which rises to over 30m AHD to the west of the study area. Less prominent east-west ridges exist to the north and south of the study area.

The majority of the study area is low lying, with some areas subject to flooding and inundation. Water features dominate the landscape, with Teagues Creek adjoining the study area (adjacent to Site 4) to the north and the Nambucca River forming the eastern limit of the study area (adjacent to Site 2). Watt Creek is located approximately 300m south of the study area.

Despite the low-lying nature of the study area, minor variations in elevation do exist. Site 1 is relatively flat with elevations in the order of 2 – 4 metres AHD. The site contains a natural low-lying drainage corridor, which lies in a north-south orientation

across the site. Site 2 is slightly more elevated than Site 1 and rises steeply from the banks of the Nambucca River. Contours range from 4- 6 m AHD across the site. Site 3 exhibits the highest elevation within the study area with contours in the order of 4m across the northern portion of the site rising up to 12 m in the most southern portion of the site. Site 4 also exhibits steeper elevations adjacent to its western boundary however the majority of the site lies at about 4m AHD.

Several wetlands, designated under SEPP 14, are also located within and adjacent to the study area. Wetland No. 370 covers the north-western corner of Site 1, whilst Wetland No. 367 adjoins the western boundary of Site 3 and the southern boundary of Site 4. Wetland No. 365 adjoins the northern boundary of Site 4.

The topography and landform of the study area is illustrated in Diagram 9.

The land form of the study area can be characterised as low lying land containing a broad river system with adjoining wetlands, surrounded by a significant north-south ridge system to the west of the study area, with lower east-west ridges intersecting the lowland study area.

5.3.1 Planning Implications

The relatively flat nature of the study area ensures its suitability for urban development. However, the lower lying wetland areas within the study area represent an absolute constraint to intensive development, due to their environmental significance and inundation requirements. Given the potential of urban development to adversely impact upon these areas, it is recommended that the draft LEP rezone all identified wetland areas in an environmental protection zone. Furthermore, environmental protection zones should be extended to include appropriate buffers around all wetlands. This rezoning would be consistent with Clause 29 of the NCREP.

5.4 Hydrology and Flooding

5.4.1 Catchment Areas

The study area forms part of the Jacks Ridge and Teagues Creek catchments and is described as being 'low-lying in nature, sandy alluvial soil and subject to a seasonally high water table. Both the Jacks Ridge and Teagues Creek catchments drain a number of streams off the ridges to the west into an extensive freshwater wetland area, adjacent to the study area.

The Jacks Ridge and Teagues Creek catchments form part of the Nambucca River catchment, with a catchment size of 1,476 km^2. The Nambucca River enters the Pacific Ocean at the township of Nambucca Heads. This entrance is approximately 3.5 km downstream from Teagues Creek, north of the study area. The river, as well as the associated creeks in the vicinity of the area, is still under tidal influence and exhibits a tidal range of up to 1.6 m.

The local catchments within the locality are shown in Diagram 10.

STATE FOREST

PACIFIC

HIGHWAY

Nambucca River

Teagues Ck

SALAMANDA PDE

RIDLAND ST

GREENTREE DR

1 DP 711098
104 DP 755550
PT 3 DP 842158
9 DP 749152
5 DP 749152
1 DP 749153
2 DP 749152
PT 3 DP 842158
10 DP 749152
2 DP 514920
DP 842158
4 DP 749152
8 DP 749153
6 DP 749153
9 DP 749153
2 DP 749153
10 DP 749153
2 DP 842158
11 DP 749153
12 DP 561932
301 DP 755550
4 DP 749153
525 DP 820071
524 DP 820071
2 DP 541448
12 DP 826934
3 DP 749153
3 DP400863
11 DP129437
12 DP 129437
10 DP 129437
1 DP 214388

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NAMBUCCA VALLEY

TOPOGRAPHY & LANDFORM

diagram 9.

5.4.2 Review of Existing Documentation

The following flood studies and assessments have been reviewed by GHD as part of the flood assessment for this LES:

- Pacific Highway Deviation Watts Creek to Teagues Creek, Environmental Impact Statement (EIS) for Roads and Traffic Authority by GHD 1991;
- Preliminary Flood Assessment – Part Lot 3 and Lot 4, DP 749152, Lot 2 DP 749153, Pacific Highway, Lower Nambucca, Resource Design and Management Pty Ltd, May 1994; and
- Lower Nambucca River Flood Study, NSW Public Works Department, February 1994.

Relevant extracts of the above studies and assessments are outlined below:

Pacific Highway Deviation EIS, GHD 1991

The following extract from Section 6.2 of this EIS provides details of catchments and the nature of flooding in and around the study area:

> *"6.2 HYDROLOGY AND FLOODING*
>
> *6.2.1 Introduction and Methodology*
>
> *The predominance of low-lying areas and wetlands traversed by the proposed deviation indicates that the area is prone to flood inundation. This is compounded by the proximity of the Nambucca River. Flooding of the Nambucca River was studied in the Nambucca Valley Floodplain Management Study (GHD 1981). A detailed updated study is currently underway with the Public Works Department.*
>
> *6.2.2 Existing Hydrology and Flooding*
>
> *The Nambucca River, with a catchment size of 1,476km^2, enters the Tasman Sea at the township of Nambucca Heads. This entrance, which is 6km downstream of Watts Creek and 3.5km downstream from Teagues Creek, at the northern end of the proposal, marks the beginning of the deviation proposal. At this point, the river, as well as the associated creeks, is still under tidal influence and exhibits a tidal range of up to 1.6m.*
>
> *The study area consists of four main catchments west of the existing Pacific Highway.*
>
> - *Watt Creek catchment with an area of 780 ha;*
> - *An unnamed catchment to the south of Jacks Ridge Road (called Jacks Ridge Catchment for the purposes of this report) with an area of 240 ha;*
> - *A small catchment between Jacks Ridge and the old rubbish dump with an area of 20 ha;*
> - *Bellwood Swamp/Teagues Creek catchment with an area of 620 ha.*
>
> *East of the existing highway and between Watt Creek and Teagues Creek there are an additional two sub-catchments; a small sub-catchment of Watt Creek (at*

the caravan park with an area of 6ha), and the eastern extension of the Jacks Ridge catchment (about 70 ha). The study area is bounded to the east by the Nambucca River and to the south and west by the Newee Creek catchment. Old Coast Road follows the watershed between the two catchments. To the north, the study area is bounded by the Swampy Creek catchments. Bellwood Road follows the ridge separating Teagues Creek and Swampy Creek catchments. Jacks Ridge Road separates Jacks Ridge catchment and Bellwood Swamp. Florence Wilmont Drive separates Jacks Ridge catchment and Watt Creek catchment.

Major catchment flow paths are shown in terms of the 10m (AHD) contour taken from the CMA 1:25000 topographic map (Macksville 9436-1-S) which shows the detailed topography of the lower Jacks Ridge catchment and the floodplain beyond the present Pacific Highway (to the east).

- *The Watt Creek catchment contains a number of streams which drain off the Old Coast Road ridge to the east into Watt Creek and 160 ha of low-lying ground which is drained into Watt Creek via a system of drainage ditches. Of this low-lying land, 140 ha is swamp, 40 ha to the east of the creek and 100 ha to the west. The lower portion of Watt Creek is tidal and supports saltwater wetlands. The creek is spanned by a bridge at the Pacific Highway.*
- *The Jacks Ridge catchment drains a number of streams off the ridges into an extensive freshwater wetland area. This wetland comprises a number of low-lying 'soaks' or swales (<1.0m AHD) which are interconnected via sills (between 1.5 and 2.5m AHD) and drain via a culvert under the Pacific Highway at the north-eastern corner of the catchment. These 'soaks' collect the runoff from their catchment and allow the water to sit. When it reaches a certain height it spills out over the sills. A portion of the wetland is designated under SEPP 14 (Wetland No. 370). East of the present highway, the catchment drains to the north via another freshwater wetland system which connects to Nambucca River via an extensive saltwater wetland. The wetland to the east of the highway comprises a SEPP 14 identification. Wetland No. 367 formerly drained to Teagues Creek via a well-developed saltwater wetland (Stewart 1986). The connection now appears to be confined to a narrow drain. The main Bellwood Swamp drains into Teagues Creek. The lower portion of Teagues Creek is tidal and supports a saltwater wetland. A bridge spans the creek at the Pacific Highway.*
- *The small (rubbish tip) catchment to the north of Jacks Ridge catchment drains to Wetland No. 368 via drainage easement connected to a culvert under the highway.*

GHD in 1981 determined the relevant Nambucca River flood heights to be as follows:

- *100 year flood 2.7m AHD*
- *50 year flood 2.5m AHD*
- *20 year flood 2.46m AHD*

The extent of flood-prone land reached by the Nambucca River floodwaters includes a large are on the west of the existing highway. Floodwaters from the Nambucca River do, in fact, have limited access t the catchments between Watt Creek and Teagues Creek. Using the creeks, they can push upstream under the bridges before spreading out over the wetland. The Watt Creek Bridge has a deck platform at AHD 2.31m. This would be affected by flooding with a recurrence interval of 1 in 20 years. Flooding problems along the Pacific Highway have been causing traffic delays of up to thirty-six hours at numerous locations (GHD 1981). Apart from Watt Creek, flooding occurs at Teagues Creek and at a portion of the highway just north of the access road to the Hacienda Motel where the highway is at an AHD of less than 2.7m.

Jacks Ridge catchment, not affected by either Watt or Teagues Creeks, allows the passage of flood waters from the east side of the existing highway via an existing culvert made up on five 900mm pipes. This culvert also allows water on the western side to pass out to the Nambucca River floodplain on the eastern side. The flood flows obtained from the Nambucca River are held back by the existing highway and can only gain access to the western side of the highway within the study area by the creeks (as suggested before) and by the piped culverts. The size of these culverts restricts flow into the Jacks Ridge and other catchments. Therefore, flooding would not reach this catchment until it overtops the existing highway.

Flows from the western side of the existing highway come from small catchments and do not reach the levels of the Nambucca River 1 in 100 ARI floods. When flows reach a certain level on the western side they spill out over the sill created by the highway culvert. Discussion with landowners suggested problems arise when flows off the housing estate run into the Jack Ridge catchment, collect in the soaks and build up., Water then reaches a level whereby it flows over the culvert sill and floods the Hacienda Motel property before entering the Nambucca River. The water also finds a localised depression on this property and sites for extended periods."

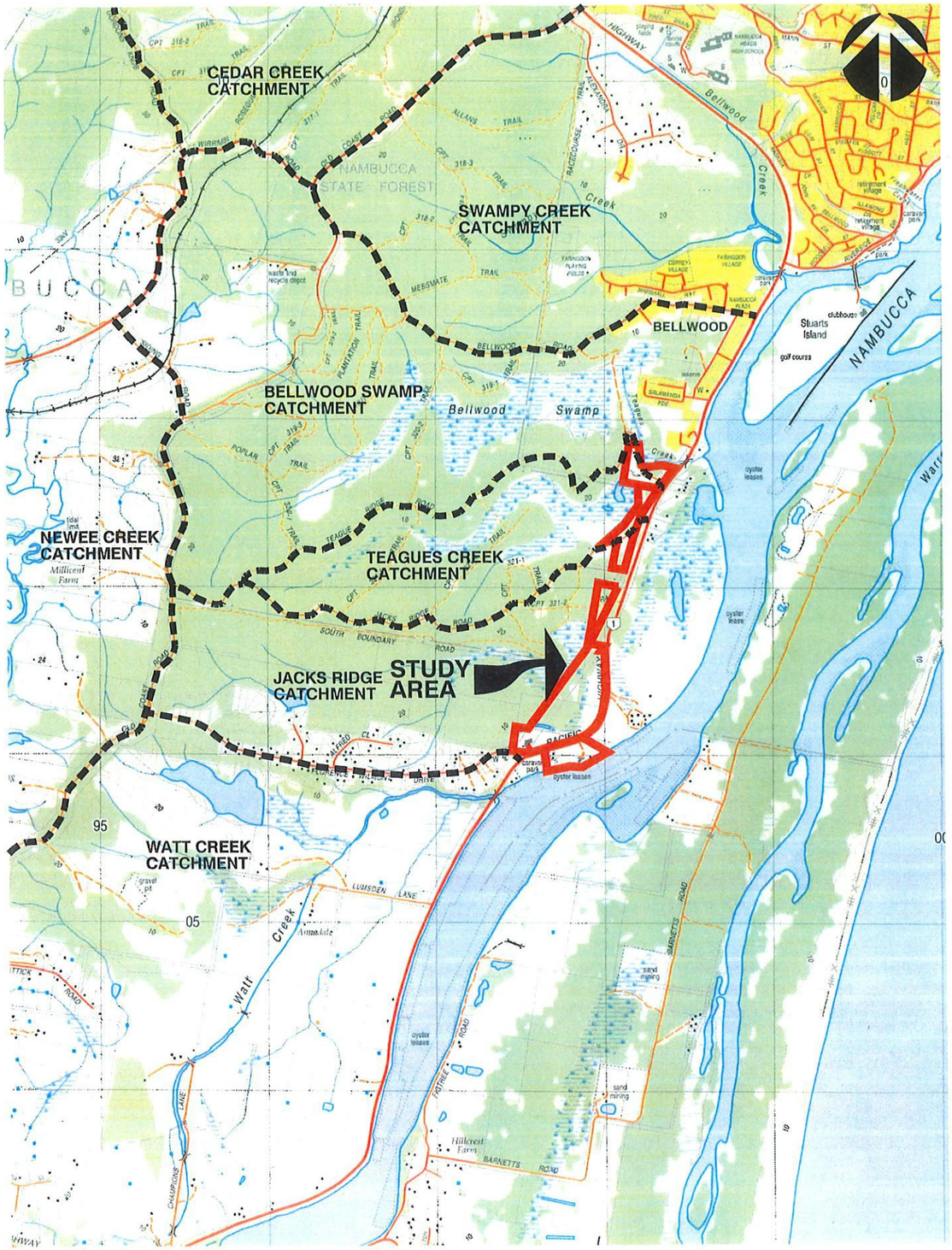
The flood study undertaken for the Pacific Highway Deviation EIS was used as a general reference only with respect to flood behaviour and definition of the various major catchment and sub-catchments contributing to local flooding of the study area.

Flood levels quoted in this report for the 1%, 2% and 5% flood events were not used in this flood assessment as more updated flooding information has been made available by NSW Department of Public Works and Services (DPWS) in their report dated February 1994.

Preliminary Flood Assessment, RDM Pty Ltd, 1994

Local consultants, RDM Pty Ltd, were engaged by Townplanning Consultants and Drafting Services Pty Ltd in 1994 to prepare a preliminary flood assessment for a proposed industrial subdivision of Site 1 within the study area.

The following extract from this assessment describes Site 1 and addresses the nature and extent of flooding from the Nambucca River, based on the draft DPWS report



SOURCE: LAND & PROPERTY INFORMATION 5436-1-S

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LOCAL CATCHMENTS

diagram 10.

dated September 1992, together with a preliminary assessment of flooding from the local catchments and a concept for stormwater drainage waterways.

> *"The site comprises approximately 11 ha and is divided by a drainage channel which collects runoff from a local catchment of approximately 30 ha to the south of the site.*
>
> *The drainage channel is heavily vegetated, runs generally north/south and collects runoff from the proposed development site and discharges under the Pacific Highway via 5 No. 850mm diameter pipe culverts at the northern end of the site.*
>
> *The eastern portion of the development site varies in level from a maximum of RL 5m AHD near Florence Wilmont Drive to RL 2.5 at the northern end and slopes generally from east to west at grades of approximately 2 – 5%.*
>
> *The western portion of the development site is generally at a level of RL 2.5 to 3.5m AHD and slopes from west to east at approximately 2%.*
>
> *To the north and west of the development site there is a wetland area which collects runoff from an area of approximately 2.15km^2 known as Jacks Ridge Catchment.*
>
> *The wetland area flows into the drainage channel from the site and discharges under the Pacific Highway via the pipe culverts described above.*
>
> *The Lower Nambucca River Flood Study by the DPWS indicates that flood levels in the Nambucca River adjacent to the site are as outlined in Table 1 below.*

3. *Mainstream Flooding from the Nambucca River*

TABLE 1 – NAMBUCCA RIVER FLOOD LEVELS	
ARI (Years)	*Flood Level (AHD)*
100	*2.7m*
50	*2.5m*
20	*2.2m*

The low lying portions of the site are affected by mainstream flooding by the Nambucca River. Flood waters back up through the culverts under the Pacific Highway at the northern end of the site and gradually fill the low lying wetland and storage area of the Jacks Ridge Catchment and the drainage channel through the site.

High velocities will occur through the culverts and immediately adjacent, however elsewhere, flow will be slow and result in a gradual rise of water level as the storage areas are filled. Once the river level over tops the low point on the Pacific Highway at the northern end of the site (RL 1.8m AHD), high velocity flow is likely to occur over the highway if the storage area to the west has not completely filled.

The proposed development site will require some filling to raise low lying areas above the 100 year ARI flood level. Provided the filling on the site is contained to the area south of the point where the Pacific Highway is over topped there will be no increase in flood velocities over the highway as a result of the fill.

The area where fill is proposed has been assessed as mainly flood storage in accordance with the NSW Governments Floodplain Development Manual. As the volume of fill is infinitely small in comparison to the storage area of the overall catchment, the placement of fill will not cause any adverse affects to mainstream flood behaviour.

4. Local Runoff

Runoff from the drainage channel through the site and Jacks Ridge Catchment has been assessed based on the probabilistic rational method outlined in Australian Rainfall and Runoff 1987 by the Institution of Engineers Aust. Results are summarised in Table 2 below.

TABLE 2
Peak Discharge From Local Runoff at Various Locations for the 100 Year ARI Storm Event

Catchment	Area (km^2)	Time of Concentration (hrs)	Discharge (cumec)
(i) Drainage channel at western end of the site	0.3	0.5	7
(ii) Peats Ridge Catchment	2.1	1.0	34
Combined catchments (i) and (ii) at the Pacific Highway	2.4	1.1	38

The drainage channel through the site is approximately 20m wide with an irregular bed and is overgrown with dense vegetation in places. A preliminary assessment has been made of flood levels in the drainage channel using the computer model HEC 2 by the US Corps of Engineers using available survey data. The level of the Pacific Highway at the northern end of the site was taken as the downstream control.

It is concluded that it will be feasible to design a drainage channel through the site to ensure there will be no adverse hydraulic impacts and to limit flood levels from the local catchment to below the 100 year ARI mainstream flood level of 2.7m AHD. Design considerations for the drainage channel will include the removal of dense vegetation and the provision of a channel of uniform width, longitudinal gradient and side batters.

Runoff from the Peats Ridge Catchment will be attenuated by the large storage area in the catchment and the flows outlined in Table 2 will be an upper limit. The culverts under the Pacific Highway (5 No 850mm diameter) have insufficient capacity for the 100 year ARI flow from the catchment and there will be

considerable ponding on the western side of the highway in a 100 year storm event in the local catchment. The level of flooding on the western side of the highway will be controlled by the level of the Pacific Highway at this point (RL 1.8m AHD). Any excess flows will pass over the Pacific Highway as weir flow.

5. Conclusions

(i) The 100 year ARI flood level at the site is approximately RL 2.7m AHD based on Ref 2.

(ii) The Mainstream flooding will result in gradual inundation of the low lying storage area adjacent to the site. In general, these areas have been assessed as flood storage. The minor loss of storage area resulting form any filling on the site will have no discernable affect on mainstream flood behaviour.

(iii) As the Nambucca River rises in a major flood the Pacific Highway will be overtopped and high velocity flow could occur while the storage area to the west are being filled. To ensure there is no reduction in flow area and increase in flood velocities over the highway any filling on the site should be limited to the area to the south of the RL 2.7m contour on the Pacific Highway.

(iv) Appropriate design of the drainage channel through the site will ensure there are no adverse affects form local runoff on the proposed development site and adjacent areas. Such design considerations would include the construction of a uniform channel with stable side slopes and improved hydraulic efficiency."

The flood level quoted in the RDM Report for the 1%, 2% and 5% flood events were not used in our flood assessment as the DPWS September 1992 report was updated in the later report titled "Lower Nambucca River Flood Study – DPWS, February 1994", details of which are summarised below.

Lower Nambucca River Flood Study, DPWS, February 1994

The following 1%, 2% and 5% flood levels as they relate to the study area have been interpolated from the DPWS Lower Nambucca River Flood Study prepared in February 1994.

Table 4 Interpolated Nambucca River Flood Levels

AEP	ARI (Years)	Southern End	Northern End
1%	100	3.03m AHD	2.79m AHD
2%	50	2.88m AHD	2.68m AHD
5%	20	2.53m AHD	2.35m AHD

Diagram 11 illustrates the extent of the 1% AEP flood event from mainstream flooding of the Nambucca River. Diagram 12 shows the 'flood limits' and flood depth contours for the 1% AEP flood, based on the existing landform, without improved waterways or land filling, which would be required as part of the site development.

5.4.3 Flood Assessments

Site 1

Site 1, comprising Part Lot 3 and Lot 4, DP 749152, Lots 2, 6, 8, 9 and 10, DP 749153, Lot 3, DP 842158, Lot 9 and 10 DP 749152 is situated between the Pacific Highway and SEPP 14 Wetland No. 370, north of Florence Wilmont Drive.

This site grades generally toward a central natural waterway which flows under the Pacific Highway through five 850mm diameter reinforced concrete stormwater culverts, into SEPP14 Wetland No. 368, eventually flowing into the Nambucca River. The elevation of this relatively low lying site is between 1.6m and 5.0m AHD. The majority of this site, as indicated in Diagram 11, is subject to inundation in a 1% AEP flood.

Mainstream Flooding from the Nambucca River

As described in detail in the RDM Preliminary Flood Assessment 1994, the low lying portions of Site 1 are affected by mainstream flooding of the Nambucca River. Water backs up through the culverts under the Pacific Highway at the northern end of this site and gradually fills the low lying areas within the site.

A review of the RDM Flood Assessment (May 1994), has been undertaken, covering Site 1, using predicted 1% AEP flood levels reported in the "Lower Nambucca River Flood Study 1994" and survey data prepared by *Smith and Laundry Consulting Surveyors, Kempsey in March 2002.*

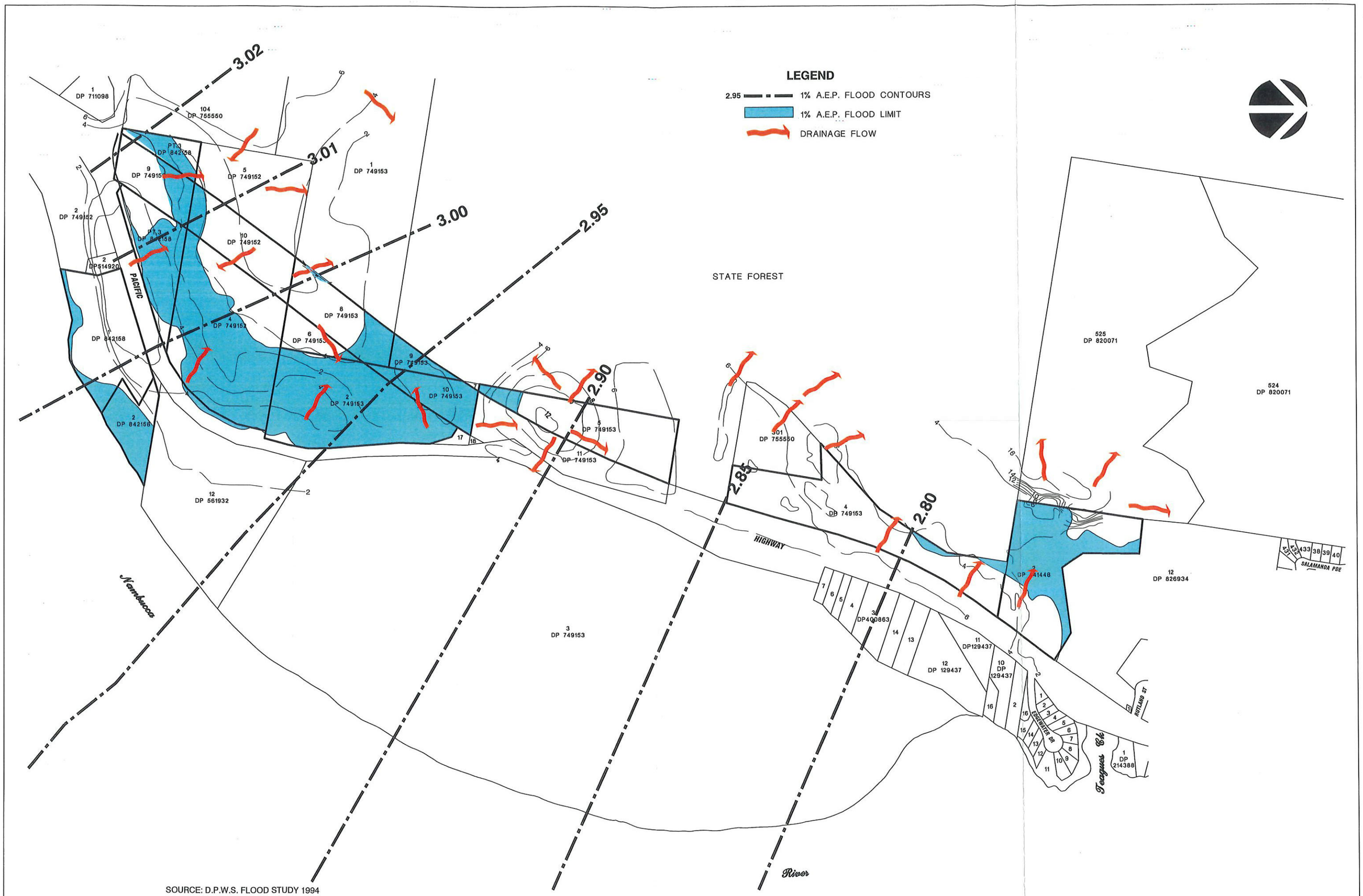
An estimate of the loss of flood storage as a result of filling required for the development of the site was also undertaken.

Flood contours were produced for the 1% AEP flood event for the subject site through interpolation of flood contours from survey data by *Smith and Laundry Consulting Surveyors, March 2002.* 1% AEP flood limits and flood depth contours were produced, as shown in Diagram 12.

As can be seen from these diagrams, depth of flooding of Site 1 from mainstream backwater flooding from the river would be up to 1.5 metres. Velocity of floodwaters through the five 850mm diameter culverts under the Pacific Highway and adjacent to areas at the northern end of Site 1 would be relatively high, representing a significant hazard for this site in its present condition.

Local Stormwater Runoff

Local runoff from Site 1, along with a local catchment of approximately 30ha to the south of this site, drains via a natural low lying area through the centre of the site, discharging into an improved earthen waterway and under the Pacific Highway through five 850mm diameter culverts.



SOURCE: D.P.W.S. FLOOD STUDY 1994

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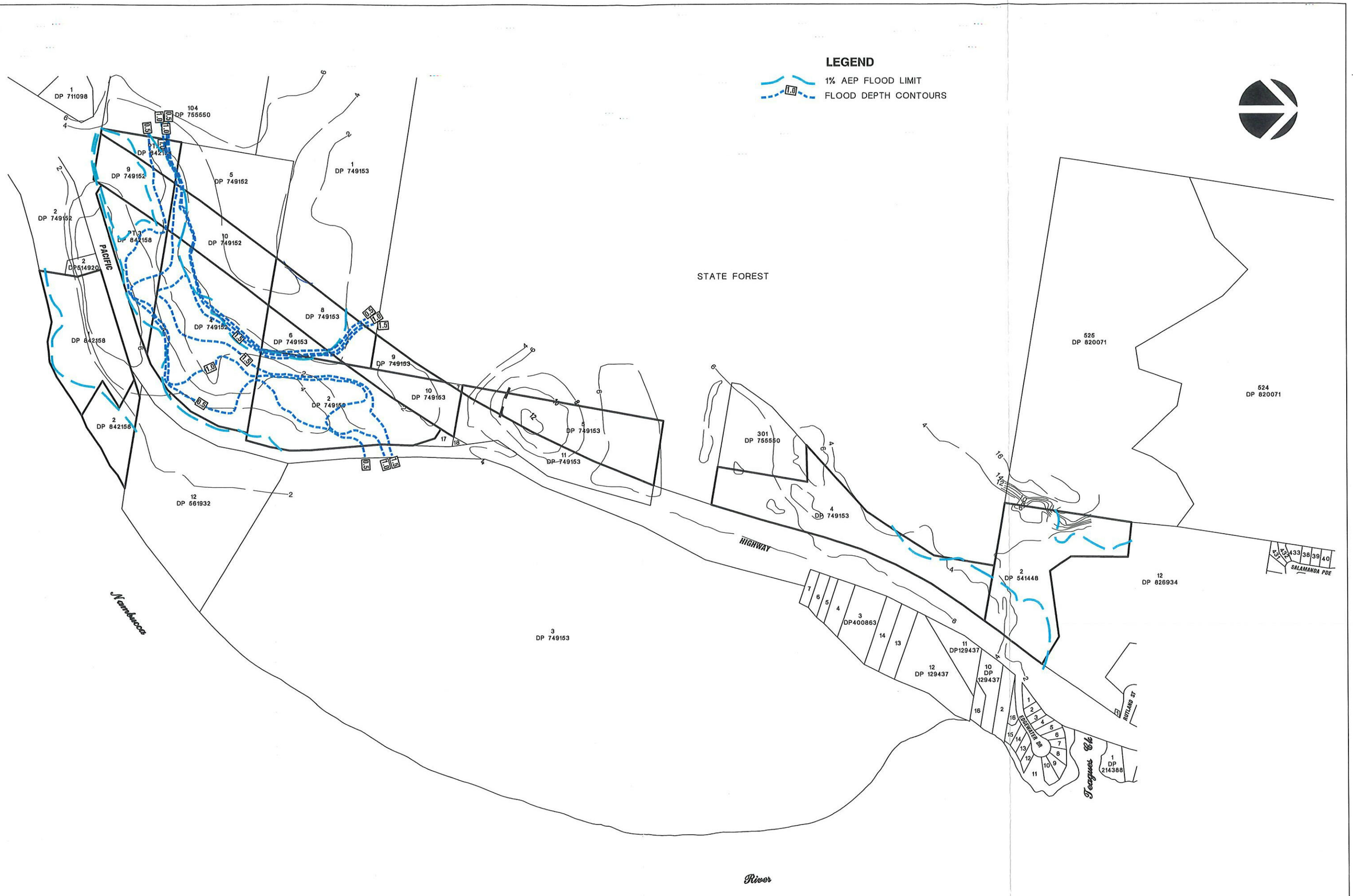
HYDROLOGY AND FLOODING

diagram 11.



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FLOOD LIMITS AND FLOOD DEPTH CONTOURS

diagram 12.

Site 2

Site 2, comprising Lots 1 and 2, DP 842158 is situated on the south-eastern side of the Pacific Highway, due east of the intersection with Florence Wilmont Drive, and fronts the Nambucca River.

With the exception of a small area at the eastern end of Lot 1 and the south-eastern portion of Lot 2, adjacent to the Nambucca River, the majority of this site is elevated above the 1% AEP flood level, with reduced levels generally between 4 and 6 m AHD. The 1% AEP flood level at this location is approximately 3.0m AHD.

This site grades from the elevated central shallow ridge at relatively flat gradient to the Nambucca River to the south-east, and into a formed table drain on the south-eastern side of the Pacific Highway.

Mainstream Flooding from the Nambucca River

The Lower Nambucca River Flood Study by NSW Public Works February 1994 indicates 1% AEP flood levels in the vicinity of Site 2 at approximately 3.0m AHD.

The small low lying area adjacent to the Nambucca River at the south-eastern side of this site would be inundated in a 1% AEP flood through direct overbank flooding from the Nambucca River, with floodwater depth of up to 1 metre within 20 metres from the river bank, and extending up to 90 metres at relatively shallow depth at the eastern extremity of Lot 2.

Local Stormwater Runoff

There are no major water courses within this site and local stormwater drainage via shallow board-sheet flow would result in effective drainage of this site, in its undeveloped state, into the Nambucca River, or into the formed stormwater drainage system adjacent to the Pacific Highway.

Site 3 (Southern Portion)

Site 3 (southern portion), comprising Lot 5 DP 749153, of approximately 2.57 ha is situated between the Pacific Highway to the east and Nambucca State Forest to the west.

The central and northern portions of this lot is flood free, being at elevations of between 6 and 12m AHD, the 1% AEP flood stage height for mainstream Nambucca River flow being approximately 2.90m AHD in this locality.

The southern portion of this site, representing approximately 10% of the area, is flood prone, and comprises the eastern extremity of SEPP 14 Wetland No. 370.

This site grades from the elevated central/southern region, generally at grades between 5% and 10% into wetlands (SEPP No. 370) to the south and west, and into Nambucca State Forest to the north and west with the exception of the wetlands to the south, there are no major water courses within this site.

SEPP 14 Wetland No. 370 discharges under the Pacific Highway via five 850mm diameter culverts into SEPP 14 Wetlands No. 368 to the west of the highway eventually flowing into the Nambucca River.

Mainstream Flooding from the Nambucca River

The low lying portion of the site to the south, including SEPP14 Wetland No. 370 is affected by mainstream flooding in Nambucca River to approximately 2.90m AHD. Flood waters back up through the existing five 850mm diameter culverts under the Pacific Highway.

Although relatively high velocities will occur through the culverts and immediately adjacent waterways, flow within the flood prone portions of the site will be very slow, as water levels rise gradually as storage areas within wetlands and waterways to the south rise.

Local Stormwater Runoff

Runoff from the site is generally via broadsheet overland flow from the elevated central area to the lower lying extremities of the site.

Stormwater runoff would therefore not represent a significant hazard, in accordance with classification under the NSW Government Floodplain Development Manual.

Site 3 (Northern Portion) and Site 4

Site 3 (northern portion) and Site 4, comprising Lot 4, DP 749153 and Lot 2, DP 541448, is situated between the Pacific Highway to the east and Nambucca State Forest, SEPP 14 Wetland No. 367 to the west.

With the exception of a small area in the north-eastern corner, Lot 4, DP 749153 is not flood prone, being at elevation of generally between 4.0 and 6.0m AHD, the 1% AEP flood stage height for mainstream Nambucca River at this location being approximately 2.79m AHD.

The central portion of Lot 2, DP 541448 is subject to backwater flooding from the Nambucca River, via Teagues Creek, in major floods, as shown in Figure 11.

The north-eastern extremity of SEPP 14 Wetland No. 367 extends into the south-eastern corner of Lot 2. The southern extremity of SEPP 14 Wetland No. 365 also extends into the northern portion of Lot 2.

Teagues Creek traverses the central – northern portion of Lot 2, within the SEPP 14 No. 365 wetland area.

A floodway traverses the centre of this site in a south to north direction, being the discharge waterway from the SEPP 14 Wetland No. 367 into Teagues Creek. The majority of Lot 2 is gently sloping at between 0 to 5% with levels grading generally between 5m AHD to 2m AHD at the cental floodway.

The western end of Lot 2 slopes steeply to approximately RL 16 AHD at the top of the escarpment, and represents the current screening plant face.

The site is currently utilised as a rock screening plant, with the screening plant face located at the western extremity of the site.

Mainstream Flooding from the Nambucca River

The low lying portion of Lot 2, DP 541448, including the Teagues Creek channel, SEPP 14 Wetland No. 365 and the central floodway between the SEPP 14 Wetland No. 367 and Teagues Creek, are flood prone in major floods.

Water depth from backwater flooding from the Nambucca River, via Teagues Creek would be up to 1 metre. Velocity of flow would be relatively high at the restricted waterway between the Wetlands and Teagues Creek during rising and falling Nambucca River levels, however flow within Teagues Creek and the Wetland areas would be low as water levels rise and fall gradually as storage areas rise and fall.

Lot 4, DP 749153 is reasonably elevated, being at RL 4.0 to 6.0m generally, with only two small areas at the north-eastern extremity of SEPP 14 Wetland No. 367 being prone to flooding.

Mainstream "backwater" flooding from the Nambucca River in a 1% AEP flood event would inundate the small areas at the north-western end of this site, as shown in Diagram 11.

Local Stormwater Runoff

Local runoff from the Lot 2 DP 541448 into Teagues Creek would be through broadsheet overland flow, considering the relatively small catchment areas and general gradient toward Teagues Creek.

Local runoff from the southern sub-catchment for Bellwood Swamp and Teagues Creek (SEPP 14 Wetland No. 367) flows into Teagues Creek through a restricted waterway at the north-eastern end of this wetland. Velocity of flow at this discharge route into Teagues Creek would be high for extreme flood events for this sub-catchment.

Depth of flow and relatively high velocities expected during major flood events would represent significant hazard to pedestrians and motor vehicles attempting to negotiate this floodway in its present state.

Local runoff from Lot 4, DP 749153 would flow via broad sheet overland flow, into the SEPP 14 Wetland No. 367. Depth of flow and velocity of stormwater overland flow would be relatively low, not representing a hazard under present undeveloped conditions.

5.4.4 Development Implications

Impact of Development within Site 1

The development of Site 1 will require approximately 250 to 300 mm additional filling over that originally proposed, to raise the level of allotment above the updated 1% AEP flood level. Providing such additional filling is limited to the area south of the point where the Pacific Highway is overtopped, there will be no increase in flood velocities over the Highway as a result of filling.

Filling however should not be placed within a 20m buffer zone adjacent to the identified wetland.

The total volume of fill proposed to raise the level of any future development above the amended 1% AEP flood levels, based on survey by consulting surveyors, Smith and Laundry, and predicted 1% AEP flood levels by DPWS (1994) is approximately 58,000m^3.

The impact of the updated flood levels, resulting in between 250mm and 330mm increase in the predicted 1% AEP flood level, will not have a significant affect on the nature of flooding. The extent of flooding from the Nambucca River will still be confined to the subject site and the Jacks Ridge Catchment.

The general nature of flooding will not be affected and relatively high velo
the culverts and immediately adjacent areas will still occur under the high
flood levels as reported in the DPWS 1994 Flood Study.

Considering the flood storage area, and volume, for the total Nambucca
upstream of this site, the proposed volume of fill (and hence loss of stora
will be infinitesimally small in comparison, and therefore would result in r
increase in upstream or downstream flood levels within the Nambucca R
nor result in any adverse affects on flood behaviour, as a result of site fil

Impact of development within Site 2

Development of Site 2 would involve filling of up to 1 metre depth at the eastern corner of Lot 2, DP 842158, to raise ground level to 3.0 m AHD.

Filling should not be placed within a 20m buffer zone adjacent to the Nambucca River.

The relatively small area and volume of fill required for placement on this site would be infinitesimal in comparison to the area and volume of storage within the tidal zone of the Nambucca River System and such filling would therefore have no significant impact on upstream or downstream flooding as a result of loss of storage within the site, nor have any significant affect on the local drainage regime.

The minor increase in stormwater runoff flows and volume which could be expected as a result of increase in impervious areas is unlikely to have any significant impact on the local drainage system, nor flood flow or depth in the Nambucca River.

Incorporation of detention storage within the development, and incorporation of semi-pervious paving and maximising landscaped area, are means available to mitigate against increase in stormwater runoff volume and peak flows, which could be considered if necessary at the time of detailed investigation and design of the development ultimately proposed for this site.

Development of this site would require installation of conventional stormwater drainage system, incorporating road drainage to kerb and gutter, kerb inlet pits into a piped drainage system, discharging into the Nambucca River or the Pacific Highway table drain system, which eventually discharges into the Nambucca River.

Impact of development within Site 3 (southern portion)

Development of this site would not involve significant filling or earthworks affecting the general stormwater drainage regime.

The eastern extremity of the SEPP 14 Wetland No. 370 would be retained in its present form.

Development of this site would therefore have no impact on mainstream flooding of the Nambucca River as a result of loss of storage, nor change in local drainage regime.

The minor increase in stormwater runoff flow and volume which could be expected as a result of increase in impervious areas, is unlikely to have significant impact on local drainage systems, nor flood flow in the Nambucca River.

Incorporation of detention storage within the development, and incorporation of semi-pervious paving and maximising landscaped areas, are means available to mitigate against increases in stormwater runoff volume and peak flows, which could be considered if necessary at the time of detailed investigation and design of the developments ultimately proposed for this site.

Impact of Development within Site 3 (northern portion) and Site 4

Development of Site 3 (northern portion) and Site 4 would involve filling of the flood prone area between SEPP 14 Wetland No. 367 and Teagues Creek, and construction of a formalised drainage channel with raised access roadway and multicell culverts designed to accommodate up to 1% AEP flood flows resulting from mainstream backwater flooding via Teagues Creek.

Hydrological analyses of the Bellwood Swamp/Teagues Creek southern sub-catchment was carried out and conceptual design prepared for a formalised trapezoidal waterway channel and access roadway crossing, including multicell reinforced concrete box culverts (RCBC), to permit development and provide flood free access to the western end of Lot 2 DP 541448.

A suitable design trapezoidal section main outfall channel from the southern portion of Bellwood Swamp (SEPP 14 Wetland 367), assuming a gradient of 0.5%, would have bed width of approximately 8 metres, depth of 1.0 metre with 25% batter slope, with batters adequately stabilised with vegetative cover.

In order to prevent lowering of the existing water low level in Bellwood Swamp, the invert level of the outfall channel, (or new outfall weir level), would match the existing channel outfall structure weir level.

A suitable access road crossing over the outfall channel would be a multicell RCBC structure, consisting of five 1200 x 2400 precast box culverts, with wing walls and gentle transitions to the 24m wide trapezoidal outfall channel upstream and downstream of the road crossing.

No filling or other earthworks would be undertaken within the SEPP 14 Wetland areas No. 367 and 365.

The relatively small volume of fill proposed on the site would be insignificant in comparison to the area and storage volume within the local catchment and wetlands, and in comparison to the area and storage within the Nambucca River System and the relatively small loss of storage resulting from filling for development of this site would

therefore have no significant impact on upstream or downstream flood levels within the Nambucca River system, Teagues Creek or wetlands area.

Development of Lot 4 DP 749153 would not involve significant filling and therefore would have no impact on mainstream flooding in the Nambucca River system, nor flooding within local catchment areas.

With development of this allotment, minor event drainage would consist of kerb and guttering, kerb millet pits and piped stormwater drainage system, discharging to adjacent wetlands. Major event drainage would be via overland surcharge pathway and possibly via depressed roadways, discharging to wetland areas.

The minor increase in stormwater runoff peak flows and volume of runoff from the site, which could be expected as a result of increase in impervious areas, could be minimised where necessary by employing measures such as provision of detention storage within the stormwater system, provision of semi-pervious pavement and maximising landscaped areas.

The minor increase in stormwater runoff flow or volume, which could be expected as a result of increase in impervious areas on this site, would have no significant impact on local drainage systems, nor flood flow in the Nambucca River.

5.4.5 Planning Implications

Assuming that fill can be imported cost effectively, it appears from the desktop review that the hydrological characteristics of each respective site do not appear to represent a significant constraint to urban development, provided appropriate stormwater controls are installed and maintained. Provided fill can be placed cost effectively without any undue impact on adjacent wetlands, the development of the study area would be consistent with Clause 45 of the NCREP.

5.5 Stormwater and Water Quality

The activities that have occurred on and around the study area that may influence ambient water quality include land clearing, cattle grazing, land filling, previous land uses such as the old rubbish depot on Site 3, burning off, fertiliser application, liming, ploughing, rural residential development off Florence Wilmont Drive, road construction and stormwater management works.

Pollutants entering waterways may be in the form of siltation, heavy metals, constituents causing a change in pH, or excessive nutrients such as nitrogen and phosphorus. Pollutants entering the study area's waterbodies are typically from diffuse sources primarily associated with agricultural activities.

Almost half of the Nambucca River catchment is State Forest. Much of the remainder is steep freehold land under the native forest. As such, there has been little disturbance of vegetation within the catchment and water quality is considered to be good, based upon visual inspections of the river. There are two small sewerage treatment plants discharging into the river at Bowraville (into the north arm of the river) and at Macksville.

The river is of a tidal nature in the vicinity of the study area, therefore providing an estuarine environment. Mean spring and neap tidal ranges are 0.70 and 0.47 m respectively. The total tidal prism of the Nambucca River between mean high water and mean low water is about 7 million cubic metres. Tidal currents are low and even during spring tides are less then 0.1 m per second. Bedload sediment transport under tidal action is low and consequently water clarity during dry weather is good.

Based on an inspection of the study area, the water quality within the various wetland communities is considered to be good and do not appear to have sustained any significant impacts. This is supported by the following:

- SEPP 14 Wetland No. 370 is surrounded by State forest. While portions of this forest have been logged in the past, there is no evidence of soil erosion in the vicinity of the wetlands. Old logged areas support extensive regrowth. Site inspections reveal that there is little to no flow from the wetlands, indicating that the wetlands act as retention basins, collecting local runoff.
- Both SEPP 14 Wetlands No. 367 are bordered by native woodlands to the west. Previous land uses such as the old rubbish disposal site and soil depot on and adjacent to Site 3 were situated in close proximity to Wetland 367. Nambucca Shire Council does not have any water quality data available for the wetlands in the vicinity of the site, but the water quality is not considered to be a problem. Site inspections reveal that there are no obvious impacts on water quality of the wetland adjacent to the tip (i.e. no discolouration, odours or excessive algal growth).
- The estuarine (saltwater) portion of the Teagues Creek, SEPP 14 Wetland No. 365, is bounded by a screening plant on the southern side, a road easement and sub-division on the northern side and the Pacific Highway to the east. There was evidence of erosion of the screening plant and a substantial amount of sand within the lower creek appeared to have been derived from the erosion. Water within the creek was observed to be of good quality. Juvenile fish and mullet were noted in the tidal portion of the creek.

5.5.1 Planning Implications

The development of the study area could adversely affect runoff water quality. Such activities have been shown to increase particulate matter, or the suspended solid load, as well as to increase concentrations of a wide range of organic, inorganic and metallic pollutants. These include oils, polynuclear aromatic hydrocarbons (PAHs), leads and zinc.

The hydrological conditions of the study area leave the wetlands vulnerable to increased pollutant loads. The wetlands, however, do have a limited capacity to assimilate some of these pollutants. To ensure pollutants do not impact upon water quality, appropriate wetland mitigation measures would be required.

Consideration would need to be given in the detailed design of stormwater systems, measures to prevent erosion and sedimentation of waterways and to maintain stormwater quality and prevention of contamination of wetland areas. Such measures

could include detention ponds, gross pollution ponds, vegetated filter zones and scam protection measures at points of discharge into wetlands.

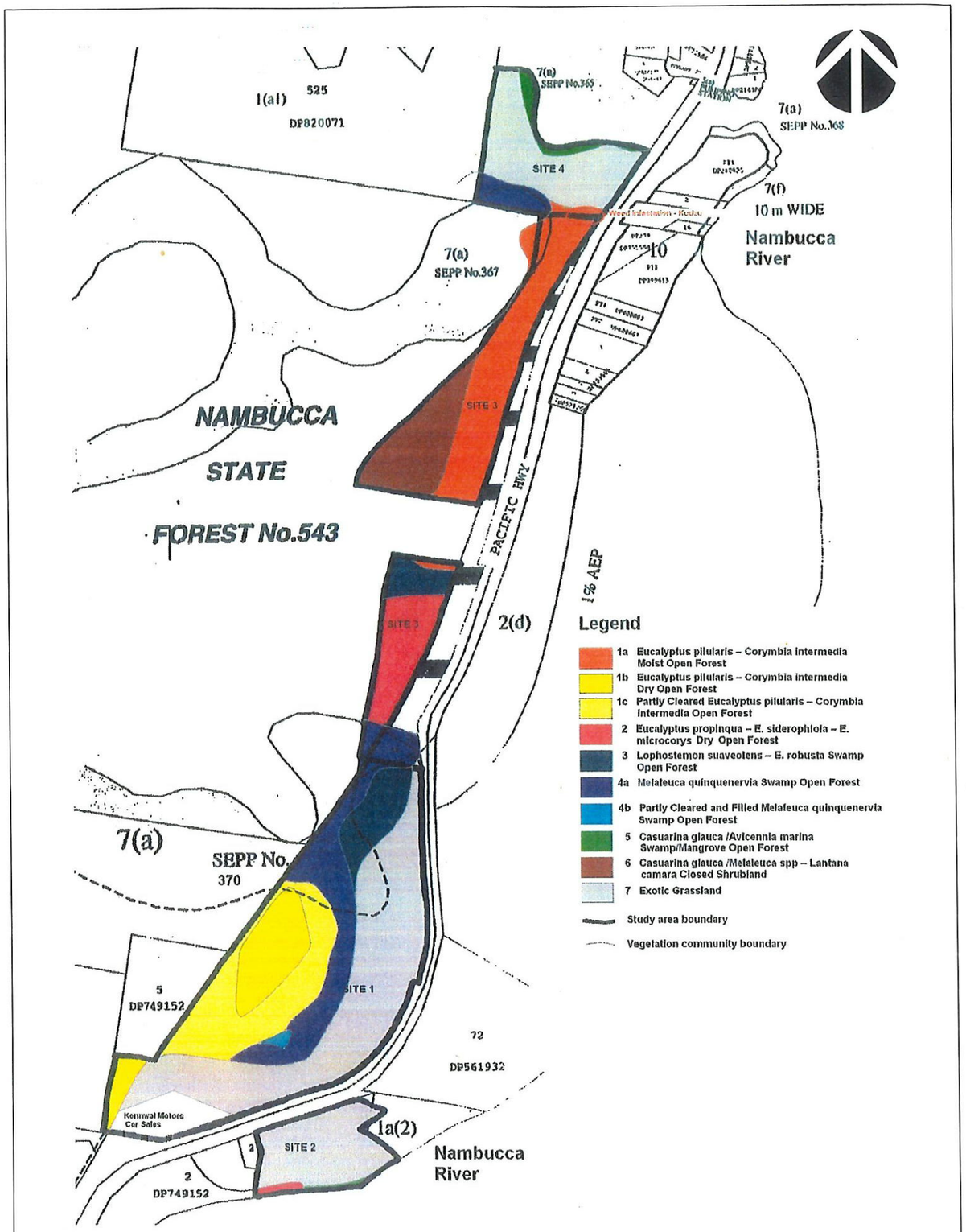
Providing appropriate measures are incorporated into the stormwater system design to mitigate against impacts of development, there would be no detrimental affects on wetland areas.

5.6 Flora and Fauna

5.6.1 Flora

A flora assessment has been prepared by Idyll Spaces Consultants as part of this LES. A copy of the report is contained in Appendix B. The aim of the assessment was to describe the vegetation of the study area and examine the potential for occurrence of, and impacts on, threatened flora species, populations or ecological communities, or their habitats. An extract of the Idyll Spaces report is provided below:

> ***Vegetation Communities***
>
> *"The assessment identifies seven vegetation communities within the study area including:-*
>
> - *1a Eucalyptus pilularis – Corymbia intermedia Moist Open Forest;*
> - *1b Eucalyptus pilularis – Corymbia intermedia Dry Open Forest;*
> - *1c Partly Cleared Eucalyptus pilularis – Corymbia intermedia Open Forest;*
> - *2 Eucalyptus propinqua – E. siderophloia – E. microcorys Dry Open Forest;*
> - *3 Lophostemon suaveolens - E. robusta Swamp Open Forest;*
> - *4a Melaleuca quinquenervia Swamp Open Forest;*
> - *4b Partly Cleared and Filled Melaleuca quinquenervia Swamp Open Forest;*
> - *5 Casuarina glauca /Avicennia marina Swamp/Mangrove Open Forest;*
> - *6 Casuarina glauca /Melaleuca spp – Lantana camara Closed Shrubland; and*
> - *7 Exotic Grassland.*
>
> *The vegetation communities within the study area are illustrated in Diagram 13.*
>
> ***Threatened Species***
>
> *No threatened species, populations or ecological communities listed under the EPBC Act have been detected in the study area or proximal habitats, its my opinion that application of the administrative guidelines would indicate that the proposal would not be a matter of national environmental significance, and that referral to the Federal Environment Minister would not be required.*



SOURCE: FLORA REPORT, IDYLL SPACES CONSULTANTS

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VEGETATION COMMUNITIES

diagram 13.

Although no threatened species, populations or ecological communities, or critical habitat listed under the TSC Act have been detected in the study area or proximal habitats, potential habitat for threatened species may occur. Therefore, application of the 8-part test would be required".

5.6.2 Fauna

A fauna assessment has been prepared by Kendall and Kendall Ecological Services Pty Ltd as part of this LES. A copy of the report is contained in Appendix C. The aim of the assessment was to describe the fauna of the study area and examine the potential for occurrence of, and impacts on, threatened fauna species, populations or ecological communities, or their habitats. An extract of the Kendall and Kendall report is provided below:

"In total, one hundred and sixteen vertebrate fauna species were recorded on the study area including:

- *three species of microbats considered probable identifications by ultrasound bat call analysis;*
- *one species of microbat considered a possible identification by ultrasound bat call analysis; &*
- *thirteen bird species which were recorded flying over the study area.*

In addition twenty-two invertebrate species were recorded on the study area and three additional bird species were recorded just off site and would be expected to occur in habitats on the study area.

Threatened Species

Of the one hundred and nineteen species recorded on or near the study area there were:

- *eighty-three bird species recorded:*
  - *one of which is listed on schedule 2 of the TSC Act and also under the provisions of the EPBC Act;*
  - *six others which are listed under the migratory provisions of the EPBC Act; &*
  - *one of which is listed as a CRA priority species in north-east NSW*
- *nineteen mammal species recorded,:*
  - *one of which is listed as threatened under the provisions of the EPBC Act and on the schedules of the TSC Act;*
  - *three others species including one probable identification which are listed on schedule 2 of the TSC Act;*
  - *two species including one probable identification of species listed as a CRA priority species in north-east NSW*
- *nine reptile species recorded one of which is listed as a CRA priority species in north-east NSW; &*

- *eight frog species recorded.*

Habitat Values

Habitats on and near the study area are diverse and in some locations relatively undisturbed in addition the study area adjoins and is contiguous with larger naturally vegetated areas. This has enabled the study area to support a high range of fauna species and the study area could be said to have high biodiversity.

The northern end of the study areas contains key habitat identified in the NSW NPWS key habitats and corridors study.

Important habitat areas observed on the study area include vegetation communities containing:

- *hollow bearing trees;*
- *wetland attributes;*
- *plant species capable of producing high nectar flows; &*
- *Allocasuarina spp trees the food source of the threatened glossy black cockatoo.*

Koalas & SEPP 44 Assessment

There are seven koala records within 10 km of the study area on the DEC wildlife atlas with the closest being approximately 6.7 km from the study area. Four of the records occur to the west of Valla where there is a known local population. The other three are more separated records, one occurs about midway between Macksville and Bowraville, one just to the south of Warrell Creek and the third near Macksville.

A number of 30 metre x 30 metre quadrats were located in various vegetation communities in the study area. The locations of the quadrats are indicated on map 2. Within each quadrat the numbers of each tree species were counted and the percentage of SEPP 44 koala habitat protection – schedule 2 tree species were calculated. This data is presented in Appendix 2. SEPP 44 defines "potential koala habitat" as:

> *areas of vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.*

The vegetation communities on the study area that are considered "potential koala habitat" as defined in the SEPP are:

- *Eucalyptus propinqua – E. siderophloia – E. microcorys Dry Open Forest*
- *Lophostemon suaveolens - E. robusta Swamp Open Forest.*

Although as indicated in Appendix 2 the Eucalyptus pilularis – Corymbia intermedia Dry Open Forest contained 14.8% schedule 2 koala food tree species indicating that one the basis of one count it almost qualified as potential koala habitat.

Other vegetation communities that occur on the study area are considered possible koala habitat as they contain tree species known to be eaten by koalas, though not listed on schedule 2 of SEPP 44. These trees include blackbutt and broad-leaved paperbark. Also koalas may shelter in vegetation not containing food tree species. The only vegetation association which could not be considered possible koala habitat on the study area would be the area mapped as exotic grassland.

SEPP 44 defines core koala habitat as:

> *"an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is females with young) and recent sightings of and historical records of a population".*

During the field survey in the daytime trees were searched for koalas and during the evening spot-lighting was conducted, no koalas were observed. Koala scat searches were conducted in the areas assessed for SEPP 44 potential koala habitat, along elliot trap lines and opportunistically under koala food tree species in other locations, no koala scats were found. There is also a lack of records of koalas on the study area. Therefore it is considered that the study area is not core koala habitat as defined in the SEPP.

However as there are koala records within 10 km of the study area and the study area contains suitable habitat for koalas it is considered that koalas may infrequently occur on the study area and any future assessment such as an 8 part test should consider impacts on koalas."

5.6.3 Planning Implications

Flora

Idyll Spaces Consultants have identified the following impacts of urban development on flora within the study area:

> *"The proposal would result in increased cover of buildings and roads, with associated decrease in cover of vegetation, both native and exotic, and increased runoff from the sites to adjoining watercourses.*
>
> *It is likely that the proposal would also require the filling of flood-prone land and the construction of drainage structures. In comparison to likely impacts of development under the current zoning it is likely that this would have additional direct and indirect impacts on any retained vegetation and vegetation of adjoining areas".*
>
> *"Direct impacts would include*
>
> - *loss and fragmentation of existing native vegetation cover;*
> - *modification of existing vegetation from hazard reduction in fire buffer zones, and*
> - *increased cover of weeds in and adjoining areas disturbed by clearing, filling, drainage, hazard reduction and general construction activities.*

Indirect impacts are likely to include long-term changes in the floristics and structure of retained vegetation resulting from

- *changed fire regimes,*
- *altered hydrology and drainage, and*
- *changes to soil nutrient levels."*

Preliminary assessment of impacts on flora

"As no threatened species, populations or ecological communities listed under the EPBC Act have been detected in the study area or proximal habitats, it my opinion that application of the administrative guidelines would indicate that the proposal would not be a matter of national environmental significance, and that referral to the Federal Environment Minister would not be required.

Although no threatened species, populations or ecological communities, or critical habitat listed under the TSC Act have been detected in the study area or proximal habitats, potential habitat for threatened species may occur. Therefore, application of the 8-part test would be required.

After consideration of the individual points of the 8-part test, given the information currently available to me, it is my opinion that points (a) to (f) and part (h) would be answered in the negative, and only point (g), being 'whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process', would be triggered".

"Threatening processes potentially operating as a result of the proposal include direct and indirect impacts above, as well as the following Key Threatening Processes:

- *Clearing of native vegetation (Scientific Committee 21/09/01);*
- *Invasion of native plant communities by bitou bush (Scientific Committee 12/3/99);*
- *Invasion of native plant communities by exotic perennial grasses (Scientific Committee 12/09/03), and*
- *Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands (Scientific Committee 31/05/02).*

If no threat abatement plans have been prepared for the threatening processes (which is currently the case), the impacts of the proposal on these processes would be assessed in a generic sense, and it would therefore be desirable that the proposal incorporate measures to minimise these impacts".

"Appropriate measures would include:

- *minimising the area of native vegetation cleared or otherwise disturbed wherever possible;*
- *control of bitou bush on and around the study area;*

- *minimise the invasion of exotic perennial grasses into retained vegetation and adjoining habitat by means of prompt revegetation and weed control, and*
- *minimising the impact of drainage works on the flow regimes of watercourses and wetlands in the study area.*

Given incorporation of such measures into the development proposal, it is considered unlikely that there would be a significant impact on threatened species, populations or ecological communities or their habitats, and an SIS would therefore not be required".

Recommendations

"Given the occurrence of Rare, Vulnerable or Conservation Priority vegetation communities in the study area, these being:-

- *Site 1 – mapped vegetation communities 3, 4a*
- *Site 2 – mapped vegetation community 5*
- *Site 3 - mapped vegetation community 4a*
- *Site 4 – mapped vegetation communities 4a, 5*

It is recommended that the area occupied by these vegetation communities be rezoned to environmental protection.

In addition, in order to minimise the impacts of key threatening processes on native flora and potential habitat for threatened species it is recommended that

- *the area of native vegetation cleared or otherwise disturbed be minimised wherever possible;*
- *the invasion of exotic perennial grasses into retained vegetation and adjoining habitat be minimised by means of prompt revegetation and weed control following soil or vegetation disturbance, and*
- *the impact of drainage works on the flow regimes of watercourses and wetlands in the study area be minimised."*

Fauna

Kendall and Kendall Ecological Services Pty Ltd have identified the following impacts of the proposed land uses on fauna within the study area:

"The proposal would result in increased cover of buildings and roads and other structures associated with urban development including fencing. There will be a corresponding decrease in the cover of vegetation and hence area of fauna habitat. The increase in hard surfaces such as roads, roofs and driveways will increase surface water runoff onto adjoining land and watercourses.

Future development may require the filling of flood-prone land and the construction of drainage structures.

In comparison to likely impacts of development under the current zoning it is likely that this would have additional direct and indirect impacts on any retained

areas of vegetation and vegetation of adjoining areas and hence on areas of retained habitat and habitat of adjoining areas.

Direct impacts would include:

- *loss and fragmentation of existing native vegetation cover and hence habitat;*
- *modification of existing habitat from hazard reduction in fire buffer zones;*
- *increased cover of weeds in and adjoining areas disturbed by clearing; & filling, drainage, hazard reduction and general construction activities.*

Indirect impacts are likely to include long-term changes to fauna habitat resulting from:

- *changed fire regimes;*
- *altered hydrology and drainage;*
- *changes to soil nutrient levels; &*
- *other impacts created by human intrusion.*

Important fauna habitat features that may be impacted upon by future development include:

- *tree hollows which are most prevalent in the Eucalyptus pilularis – Corymbia intermedia Moist Open Forest on the northern section of site 3;*
- *wetland habitats in the swamp open forest vegetation communities;*
- *nectar producing plants over most of the study area; &*
- *Allocasuarina spp trees that are the food source of the TSC Act threatened glossy black cockatoo.*

Potential impacts on wildlife corridor values

The study area is recognised as part of a regional corridor by the NSW NPWS. Field observation confirmed that the study area does contain habitat that would contribute to the corridor and hence to the movement of potentially occurring and known to occur fauna species on the study area that comprise the fauna assemblages that were used to derive the corridor.

Both the direct and indirect impacts described above have the potential to impact on habitat in the corridor and consequently its wildlife connectivity value.

Preliminary assessment of impacts on fauna

EPBC Act

"No threatened fauna populations or ecological communities listed under the EPBC Act have been detected in the study area or proximal habitats.

The grey-headed flying-fox, a species listed as threatened under the provisions of the EPBC Act, was observed at a number of locations within the study area, it was observed feeding on flowering pink bloodwood trees. No flying-fox camps

are known to occur on the study area, however swamp forests on the study area provide suitable potential habitat for flying-fox camps. The great egret, cattle egret, whimbrel, osprey, white-throated needle-tail, rainbow bee-eater and black-faced monarch were recorded during the field survey, these species are listed under the migratory provisions of the EPBC Act. All of these except the black-faced monarch are listed on international bird migratory agreements i.e. Chamba and/or Jamba.

It is considered that if the proposed ameliorative measures detailed below are implemented then the application of the EPBC Act administrative guidelines would indicate that the proposal would not be a matter of national environmental significance, and that referral to the Federal Environment Minister would not be required".

TCS Act

"The grey-headed flying-fox, osprey, little bent-wing bat and large-footed mouse-eared bat listed under schedule 2 of the TSC Act and were recorded during the field survey. In addition there was a probable recording of an eastern freetail bat by ultrasonic analysis of bat calls this species is also listed under schedule 2 of the TSC Act.

Previous fauna records indicate that the black-necked stork a species listed under schedule 1 of the TSC Act has previously been recorded in the study area.

As threatened species have been recorded in the study area and the study area contains potential habitat for other threatened species an EP&A Act section 5A assessment would be required at the development application stage of any proposed future development or activity.

After consideration of the individual points of the 8-part test, given the information currently available to the author, it is considered that (b) to (f) and part (h) would be answered in the negative, and that points (a) and (g) i.e.

- *"in the case of threatened species, whether the life cycle of these species is likely to be disrupted such that a viable local population of the species is likely to be placed at risk of extinction"; &*
- *"whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process"*

would be triggered.

Local populations of potentially occurring and known to occur TSC Act threatened species that depend on the important habitat features that occur in the study area such as:

- *tree hollows which are most prevalent in the Eucalyptus pilularis – Corymbia intermedia Moist Open Forest on the northern section of site 3; &*
- *wetland habitats in the swamp open forest vegetation communities may be placed at risk of local extinction through potential future development*

Threatening processes potentially operating as a result of the proposal include direct and indirect impacts above, as well as the following Key Threatening Processes:

- *Clearing of native vegetation (Scientific Committee 21/09/01);*
- *Invasion of native plant communities by bitou bush (Scientific Committee 12/3/99);*
- *Invasion of native plant communities by exotic perennial grasses (Scientific Committee 12/09/03), and*
- *Alteration to the natural flow regimes of rivers, streams, floodplains & wetlands (Scientific Committee 31/05/02).*

If no threat abatement plans have been prepared for the threatening processes (which is currently the case), the impacts of the proposal on these processes would be assessed in a generic sense, and it would therefore be desirable that the proposal incorporate the following recommended ameliorative measures to minimise these impacts.

It is considered that the development of the land that has already been cleared of native vegetation for a number of years would have the least likely impact on threatened fauna and provides the most appropriate area for future development in the study area. It is considered that the proposed subdivision plans for sites 1 & 3 does not recognise the native fauna values of the study area and that if the proposed subdivision plan is submitted as part of a future D.A. serious consideration as to the need for the production of a Species Impact Statement would be necessary.

If the recommended ameliorative measures are implemented it is considered unlikely that there would be a significant impact on threatened fauna species, populations or ecological communities or their habitats from future development in the study area, and the preparation of a Species Impact Statement would not likely be required."

Recommended ameliorative measures are:

- *minimising the area of native vegetation cleared or otherwise disturbed wherever possible;*
- *preserving areas of swamp forest under environmental protection zones;*
- *preserving areas containing hollow bearing trees under environmental protection zones;*
- *preserving the area identified as key habitat by the NSW NPWS;*
- *preserving a buffer to swamp forests and areas containing tree hollows under environmental protection zones;*
- *retaining areas containing Allocasuraina spp trees;*
- *control of pest species including weeds and feral animals;*

- *minimising the impact of drainage works on the flow regimes of watercourses and wetlands in the study area."*

Conclusion

"It is considered the study area supports a high range of fauna species and the study area could be said to have high biodiversity. The northern end of the study areas contains key habitat identified in the NSW NPWS key habitats and corridors study.

Important habitat areas observed on the study area include vegetation communities containing:

- *hollow bearing trees;*
- *wetland attributes;*
- *wetland buffer areas;*
- *plant species capable of producing high nectar flows; &*
- *Allocasuarina spp trees the food source of the threatened glossy black cockatoo.*

It is considered that areas containing the above attributes are worthy of protection under environmental zones. These areas include the:

- *Eucalyptus pilularis – Corymbia intermedia Moist Open Forest on sites 3 & 4 which contains hollow bearing trees;*
- *Lophostemon suaveolens - E. robusta Swamp Open Forest on sites 1 & 3 which would provide high nectar flows and also act as a buffer to wetland areas;*
- *Melaleuca quinquenervia Swamp Open Forest on sites 1, 3 & 4 which are wetlands; &*
- *Casuarina glauca /Avicennia marina Swamp/Mangrove Open Forest on site 4 which is a wetland.*

Future development of the study area has the potential to impact on

- *significant fauna species known and likely to occur on the study area;*
- *important fauna habitat including important habitat features;*
- *key habitat identified by the NSW NPWS;*
- *adjoining areas of habitat; &*
- *wildlife corridor values.*

However if the above recommended ameliorative measures are implemented it is considered unlikely that there would be a significant impact on threatened fauna species, populations or ecological communities or their habitats from future development in the study area, and the preparation of a Species Impact Statement and referral to the federal environment minister would not likely be required.

It is considered that the development of the land that has already been cleared of native vegetation for a number of years would have the least likely impact on threatened fauna and provides the most appropriate area for future development in the study area. It is considered however that the proposed subdivision plans for Sites 1 & 3 do not recognise the native fauna values of the study area."

5.7 Bushfire Management Issues

5.7.1 Bushfire Hazard

Pursuant to NSC's Bushfire Control Officer, the majority of the study area has been categorised as having a high to medium bushfire hazard risk whilst a small section of the study area, which has been cleared and adjoins the Pacific Highway has a low risk.

Land surrounding the study area to the west has been categorised as having a high bushfire risk.

Diagram 14 illustrates the bushfire hazard applicable to the study area.

5.7.2 Management Of Bushfire Hazard

There are two options to manage bushfire hazard in a proposed urban environment: exclusion and development controls. The following discussion of these options is taken from the document titled *Planning for Bushfire Protection (2001)*.

I) Exclusion of Development from High Hazard Areas

This is a viable option if:

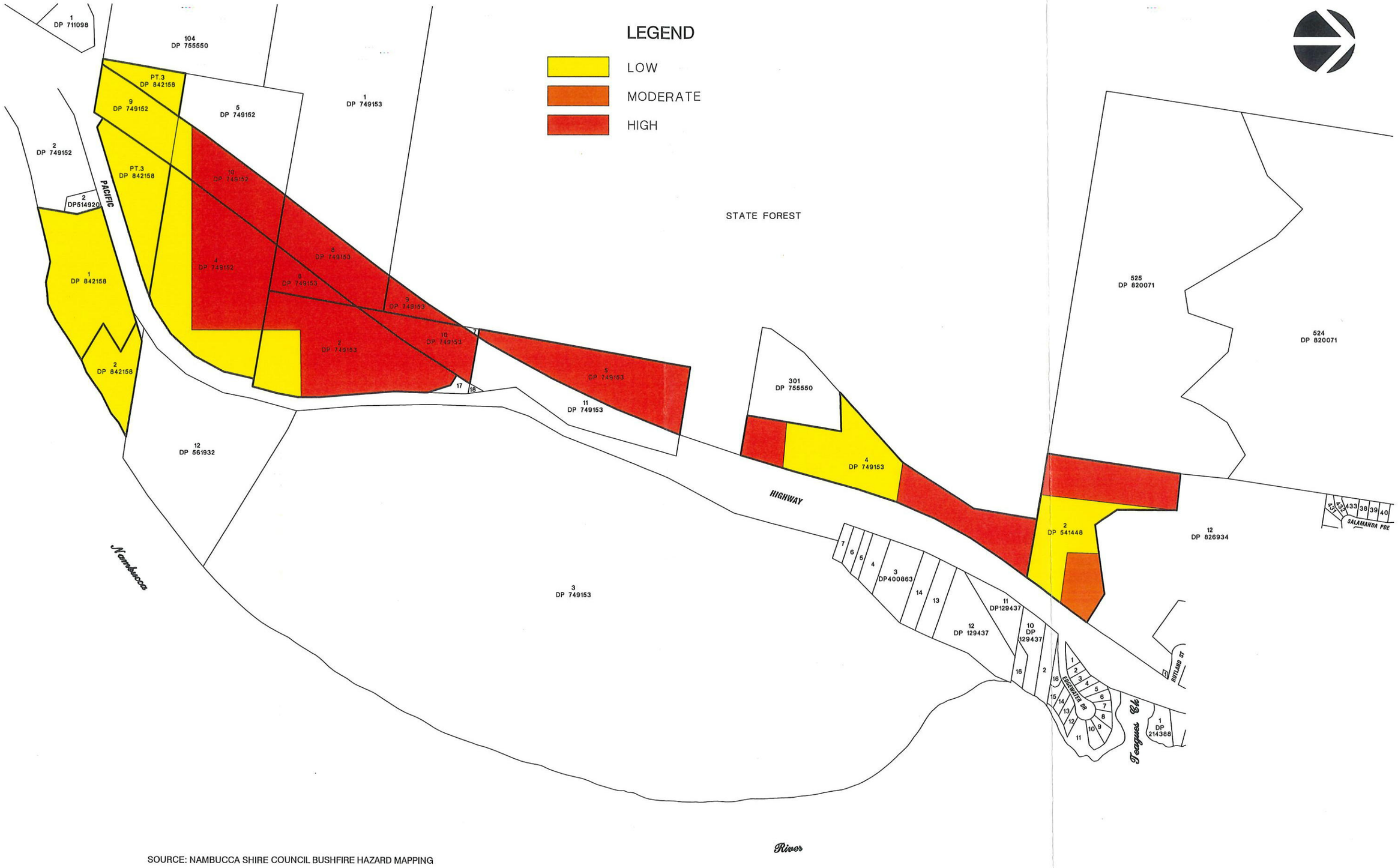
- the development cannot be afforded appropriate setbacks; or
- the development is likely to facilitate the spread of bushfire to neighbouring developments in a time of bushfire; or
- the development is likely to be difficult to evacuate; or
- the development is likely to create control difficulties during a bushfire; or
- the development is of a type that should not be permitted (as set out in Chapter 3 of *Planning for Bushfire Protection* document), or
- there are alternative acceptable sites for the same development.

Exclusion of the development is also a viable option where:

- the environmental constraints to the development and problems with its site access cannot be overcome, and
- the protective works required to reduce the threat to the development would incur too high a cost in terms of direct financial or environmental costs.

ii) Planning Controls

Outside of those areas containing high and/or medium-high ecological constraints, development in a bushfire-prone area should only be able to proceed if planning



SOURCE: NAMBUCCA SHIRE COUNCIL BUSHFIRE HAZARD MAPPING

GHD

22 11572

Nambucca Shire Council

BUSHFIRE HAZARD

diagram 14.

controls can deliver satisfactory protection of the property, its residents, and fire fighting personnel during the time of an emergency.

5.7.3 Local Environmental Plan Considerations

To give statutory effect to the need for proper bushfire planning, the Minister issued a Direction No. G20 – Planning for Bushfire Prone Land which prescribes the matters that must be considered, the requirements that must be met and the consultation procedures that must be followed when preparing an LEP for bushfire prone land.

Where a draft LEP proposes to permit development of land found to be bushfire-prone, Direction G20 makes specific reference to the *Planning for Bushfire Protection (2001)* document and prescribes the provisions that are to be complied with in an LEP. In particular, Direction G20 and the companion guidelines recommend that the Plan should:

- provide an *Asset Protection Zone* (APZ) incorporating at a minimum:
  - i) an *Inner Protection Area* bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development, and has a building line consistent with the incorporation of an APZ within the property. This area is to be maintained in a fuel-free state;
  - ii) an *Outer Protection Area* managed for hazard reduction, and located on the bushland side of the perimeter road;
- contain provisions for two-way access which links to the road or fire trail network;
- contain provisions for adequate water supply for fire fighting purposes(that is, adequate static or mains water supply);
- minimise the perimeter of the area of land, interfacing the hazard, which may be developed;
- introduce controls which avoid placing inappropriate developments in hazardous areas;
- introduce controls on the placement of combustible materials within the Inner Protection Area; and
- ensure that bushfire hazard reduction is not prohibited within the *APZ.*

Council must also consult the NSW Rural Fire Service during its preparation of the LEP which affects a bushfire-prone area.

5.7.4 Planning Implications

Discussions with the NSW Rural Fire Service indicate that the bushfire protection provisions contained within the "Planning for Bushfire Protection 2001 – A Guide for Council's, Planners, Fire Authorities, Developers and Home Owners", is not applicable to industrial land development as this document relates specifically to residential and associated uses.

Notwithstanding this however, and consistent with the Section 117(2) G20 Direction, an assessment has been undertaken of the appropriate bushfire protection and

mitigation measures appropriate to be implemented in any future development of the study area.

Bushfire Protection Requirements

The provisions of the Section 117(2) G20 Direction require an asset protection zone, incorporating an inner protection area and an outer protection area, together with a perimeter access road, and provision of adequate water supply for fire fighting purposes.

The adoption of a 30 metre asset protection zone which would incorporate the 20 metre wide subdivision road as the outer protection area and a 10 metre wide building line setback on the development side of the perimeter road as the inner protection area is considered appropriate. This asset protection zone would be adequate in providing appropriate asset control to bushfire progressing from the bushland side of the development.

Any future development of the study area for intensive industrial development would be subject to reticulated water supply being provided. As part of the subdivision it would be appropriate that fire hydrants associated with the supply to be provided throughout the development which would provide a satisfactory standard of fire fighting water.

On the basis of the bushfire protection measures as identified being undertaken, then the requirements pursuant to Section 117(2) G20 – Planning for Bushfire Protection – and the general methodology advocated by "Planning for Bushfire Protection 2001" document would be generally satisfied.

5.8 Potential Land and Groundwater Contamination

Preliminary Site Contamination Assessments were carried out by GHD for the study area as part of this LES. The objectives of the investigations were:

- To identify past and present potentially contaminating activities within the study area;
- To report on the condition of the study area;
- To assess whether contamination is likely to be an issue for any proposed redevelopment of the study area; and
- To recommend any further investigations that may be required.

The assessments were carried out in general accordance with the requirements for a Preliminary Site Investigation as described in the NSW EPA Guidelines for Consultants Reporting on Contaminated Sites (1997).

The Preliminary Site Contamination Assessments were designed to assess the past and present activities and conditions that could result in soil and/or groundwater contamination, and obtain limited representative data to support the assessments. To this end the following was undertaken:

The Stage 1 investigations included "desktop" assessments and site visits to establish past site usage and identify and locate any past contaminating activities. Limited soil sampling

was also undertaken to assess the presence of contamination on the site. The desktop assessment included:

- Review of relevant Lands Title information and NSC Section 149 Certificates;
- Review of published geological, topographical and soil landscape maps;
- Review of DLWC hydro geological database search results;
- Review NSC documents and previous contamination assessment reports for the study area and provide a summary of the history and prior land uses of the study area;
- Review of past aerial photographs of the study area.
- A detailed site inspection to assess the current condition of the property, including potential sources of contamination and to undertake shallow soil sampling in areas of concern;

Selected soil samples were analysed for typical contaminants related to agricultural and industrial sites based on consideration of the historical review. Limited shallow sampling included:

- Sampling and analysis of selected samples for organochlorine pesticides (OCPs) and heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn and Hg), PAH and TPH; and
- Preparation of a report summarising the results of each site investigation according to the requirements of NSC and any recommendations for further assessment.

In addition to the Preliminary Site Contamination Assessments, GHD also undertook a Detailed Phase 2 Assessment for Site 3a due to the site previously being used as a garbage depot. The investigation consisted of:

- Excavation of testpits at 28 locations to depths of up to approximately 1.8m, refusal, or 0.5m into natural material, which ever occurred first;
- Collection of 85 surface and subsurface soil samples (including QA/QC samples) from 28 sampling locations generally at nominal depths of 0.0-0.3m, 0.2-0.3m, and 0.3-0.5, and then at intervals dependent on site conditions, but generally from the upper most section of each individual strata encountered,
- Undertaking geological logging at each test pit location, logging all relevant information during sampling, including descriptions of material type, evidence of contamination etc.
- Laboratory analysis of representative soil samples (including QC samples) for:
  - pH, metals (As, Cd, Cu, Cr, Pb, Ni, Zn and Hg), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), Total Poly Chlorinated biphenyls (PCBs), Total Petroleum Hydrocarbons (TPH), benzene, toluene, ethyl benzene and xylenes (BTEX) and Peroxide Oxidation Combined Acidity and Sulfate (POCAS);
- Installation of three groundwater monitoring wells on the site:
- Purging and sampling of groundwater from the monitoring wells;

- Analysis of groundwater samples for heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn and Hg), TPH and PAHs; and
- Preparation of a report summarising the results of the site investigation according to the requirements of Council.

A copy of each assessment is contained in Appendix E.

5.8.1 Planning Implications

Site 1

The historical review indicated that potentially contaminating activities undertaken on the site were limited to those activities associated with the agricultural activities and possible sand mining. Hence there is likely to be little potential for sources of significant contamination other than those associated with agricultural use or the sheds located on the site.

To investigate potential contamination of soils, a total of 16 shallow pits were excavated across the site, with selected samples analysed for TPH, BTEX, pH, heavy metals, PAHs and OCPs/PCBs.

The results of the investigation reported heavy metal concentrations TPH/BTEX, PAHs, OCPs and PCBs generally below the relevant EILs and in most cases below the relevant laboratory PQLs.

Based on the scope of work and findings of the historical review and site investigations, it is considered that the site is suitable for zoning for industrial purposes.

Site 2

To investigate potential contamination of soils, a total of 4 hand auger holes were excavated across the site, with two samples collected from each hole. Selected samples were analysed for TPH/BTEX, PAHs, OCP/PCBs, pH and heavy metals.

The results of the investigation reported a single sample exceeding the EILs at one location. All other samples analysed for heavy metals returned values below the EILs. All but one of the samples analysed for TPH and BTEX were below laboratory PQLs. The one sample above PQL for TPH was significantly below assessment criteria. PAHs and OCP/PCBs were not detected in any samples analysed.

Based on the scope of work and findings of the historical review and site investigations, it is considered that the site is suitable for zoning for either residential or rural-residential purposes.

Site 3a

As part of the investigation for Site 3a, a total of 28 testpits were excavated using a backhoe, with 85 samples (including QA/QC) being collected. In order to investigate potential impacts on the groundwater, three groundwater-monitoring wells were installed at locations on the southern, western and northern boundaries.

The results of the investigation reported lead concentration exceeding HIL F (health-based criteria for commercial/industrial purposes) at one location. This sample was

associated with buried waste material at a depth of 0.6m. The corresponding surface sample was significantly below the EILs. No organic contaminants were detected in any of the samples analysed. Buried waste was observed in 9 locations across the site.

Sample location P3a12 is considered to be a lead "hotspot" requiring remediation. There may be other isolated areas of contamination across the site, and there may be some phytotoxicity issues associated with zinc (and to a lesser extent arsenic, cadmium, chromium, copper nickel and lead) concentrations in soils in some areas of the site.

Concentrations of heavy metals and TPH in groundwater exceeded relevant assessment criteria at MW01, on the western side of the site (in an area apparently affected by waste materials from former landfilling activities). This may be indicative of broader impacts in the landfill area.

POCAS testing revealed that the TSA values for soil sample MW2-4.0 exceeded the action criteria for management of potential acid sulphate soils.

Based on the scope of work, findings of the historical review and site investigations, it is considered that the site is suitable for rezoning to an industrial use, however, issues associated with the buried waste and potential acid sulphate soils should be addressed prior to redevelopment of the site.

Site 3b

To investigate potential contamination of soils, a total of 13 soil samples were systematically collected from 13 locations across the site, with selected samples analysed for TPH (C_6-C_{36}), heavy metals, PAHs and OCPs.

The results for all samples analysed were below the relevant EILs, and in most cases below the relevant laboratory PQLs.

Based on the scope of work and findings of the historical review and site investigations, it is considered that the site is suitable for rezoning for industrial purposes.

Site 4

To investigate potential contamination of soils, a total of 7 hand auger holes were excavated across the site, with one to two samples taken per hole from different depth intervals. Selected samples were analysed for TPH, BTEX, pH, heavy metals, OCPs, PCBs and PAHs.

The results of the investigation reported TPH C_6-C_{36} concentration exceeding the threshold concentration at sample location P4-1. Hydrocarbon staining was also noticed at sample location P4-3 in the vicinity of the front end loader bay. These areas will likely require remediation followed by soil sampling and subsequent analysis to validate the remediation. No other exceedences of assessment criteria were found.

Island Reserve (gazetted in 1883) near the mouth of the Nambucca River. Other campsites occupied around the turn of the century were Goat or Moses islands (NPWS Site No. 21-6-6) in the Nambucca River and Tilly Willy campsite (NPWS Site No. 21-6-5)."

Site Location Patterns based upon previous surveys

"To date, no archaeological sites have been recorded within the area covered by the proposed alignment.

Based on existing site records, a tentative site location model can be postulated for the Nambucca/Macksville area. Existing sites occur within the Nambucca River wetland corridor on elevated, well-drained ground adjacent to freshwater wetlands and creeks, particularly where ridgeline spurs descend to the river margins. Even cosmological sites conform to this pattern of site distribution, i.e., sites on creek mouths, carved trees on ridges, etc. It is therefore probable that spurlines were the preferred access routes to the wetlands and the Nambucca River and offered the easiest travel corridors, i.e., sparse undergrowth sclerophyll forest structure as opposed to dense creek corridor vegetation and inundated or marshy land. The river would have offered good canoe access."

Investigation methods and procedures

Review of existing documentation

"A range of documentation was used in assessing the state of archaeological knowledge for the Nambucca/Macksville area. This material was reviewed prior to field survey in order to determine if known sites were located in the vicinity of the area under investigation, and to place the area within an archaeological and resource management context.

Sources included:

- *Information contained in the NSW National Parks and Wildlife register of Sites, associated files and archaeological survey reports;*
- *Ethnographic literature, journal articles and theses held in the library of the Institute of Aboriginal and Torres Strait Islanders Studies"*

Field survey and sampling strategy

"A comprehensive survey of the proposed route was undertaken with particular attention being given to areas of higher archaeological potential. The identification of these areas was based on:

- *Previously determined location patterns for Aboriginal sites recorded elsewhere on the New South Wales Coast and particularly in the local area;*
- *Assessment of the prehistoric resource zones in the area;*
- *The evaluation of previous landuse impact within the study area.*

Higher potential areas were defined as: locally elevated areas such as elevated sand bodies around wetlands and areas subject to inundation; elevated areas

Island Reserve (gazetted in 1883) near the mouth of the Nambucca River. Other campsites occupied around the turn of the century were Goat or Moses islands (NPWS Site No. 21-6-6) in the Nambucca River and Tilly Willy campsite (NPWS Site No. 21-6-5)."

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"To date, no archaeological sites have been recorded within the area covered by the proposed alignment.

Based on existing site records, a tentative site location model can be postulated for the Nambucca/Macksville area. Existing sites occur within the Nambucca River wetland corridor on elevated, well-drained ground adjacent to freshwater wetlands and creeks, particularly where ridgeline spurs descend to the river margins. Even cosmological sites conform to this pattern of site distribution, i.e., sites on creek mouths, carved trees on ridges, etc. It is therefore probable that spurlines were the preferred access routes to the wetlands and the Nambucca River and offered the easiest travel corridors, i.e., sparse undergrowth sclerophyll forest structure as opposed to dense creek corridor vegetation and inundated or marshy land. The river would have offered good canoe access."

Investigation methods and procedures

Review of existing documentation

"A range of documentation was used in assessing the state of archaeological knowledge for the Nambucca/Macksville area. This material was reviewed prior to field survey in order to determine if known sites were located in the vicinity of the area under investigation, and to place the area within an archaeological and resource management context.

Sources included:

- *Information contained in the NSW National Parks and Wildlife register of Sites, associated files and archaeological survey reports;*
- *Ethnographic literature, journal articles and theses held in the library of the Institute of Aboriginal and Torres Strait Islanders Studies"*

Field survey and sampling strategy

"A comprehensive survey of the proposed route was undertaken with particular attention being given to areas of higher archaeological potential. The identification of these areas was based on:

- *Previously determined location patterns for Aboriginal sites recorded elsewhere on the New South Wales Coast and particularly in the local area;*
- *Assessment of the prehistoric resource zones in the area;*
- *The evaluation of previous landuse impact within the study area.*

Higher potential areas were defined as: locally elevated areas such as elevated sand bodies around wetlands and areas subject to inundation; elevated areas

along, or adjacent to, the downslope ends of descending spurlines, and the crests of ridges and spurlines; and areas which had suffered minimal European impact.

The survey team comprised the consultant and three representatives of the Nambucca Heads Local Aboriginal Land Council, Mr Gary Williams, Ms Phillipa Williams and Mr Bob Davis. The survey strategy involved walking the length of the proposal route and alternatives. Inundated wetlands were not surveyed and it is estimated that (excluding wetlands) 70% of the proposal route was comprehensively surveyed. The remaining areas, all of which were classified as low potential, were sampled with approximate 10% coverage."

Visibility

"Visibility varied throughout the study area. A recently ploughed field, areas of sparse vegetation associated with the old rubbish disposal site and drained wetland areas provided good visibility (averaging 70%) over much of the study area. Erosion scars, including manmade drainage channels, provided fair visibility around the banks of Teagues Creek (varying from 10 to 80%). Visibility was limited by dense vegetation in most areas adjacent to the paperbark wetlands; however, logging activities did provide some visibility in these areas."

Assessment of impacts

"No lithic artefactual material was found during the course of the survey. Shell material was noted in three areas within the study area…(1. Grid Ref. 49835, 660757; 2. 49819, 660736; 3. 49783, 660596)

No definitive archaeological sites were located in the course of the survey. Shell location 2 is a highly disturbed area which may contain the isolated remnants of a now destroyed site. Shell location 3 is an area of high potential but does not contain definitive artefactual material.

The failure of the survey to locate sites in the study area is considered to be a real indication of the nature of the surviving archaeological resource rather than the result of visibility problems".

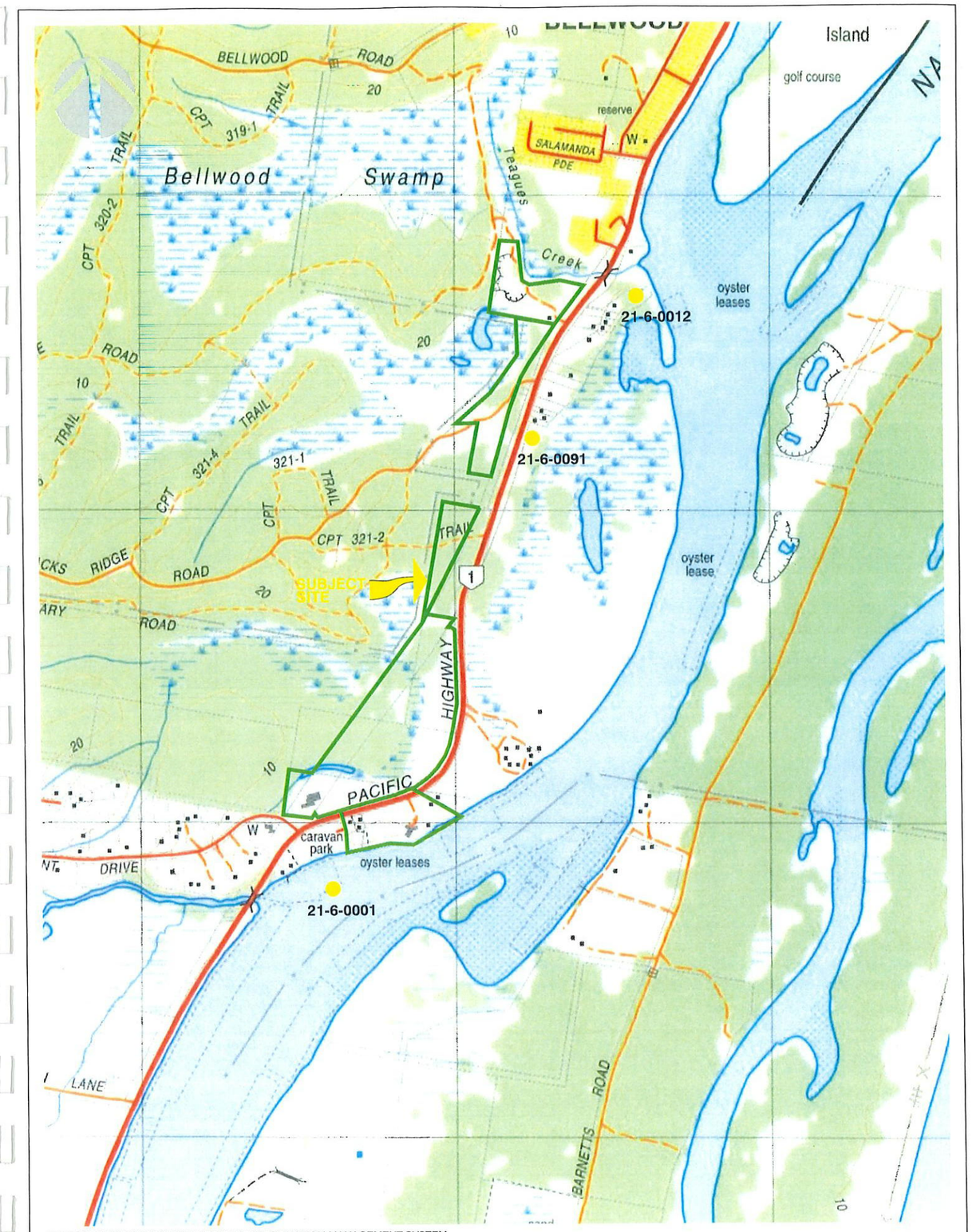
5.9.2 Search of NPWS Aboriginal Heritage Information Management System

A search of the NPWS Aboriginal Heritage Information Management System (AHIMS) was undertaken as part of this LES (see Appendix D). The results of the search revealed that a number of Aboriginal sites are located in close proximity to the study area but none are located within the boundaries of the study area.

Diagram 15 illustrates the location of the various Aboriginal sites.

5.9.3 Consultation with Nambucca Heads Aboriginal Land Council

GHD consulted with the Nambucca Heads Local Aboriginal Land Council as part of this LES. Terry Donovan and GHD staff undertook a site inspection of the study area on 4 June 2004. The inspection did not reveal any sites of heritage significance but the



SOURCE: NPWS ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM

22 11572

ABORIGINAL ARCHAEOLOGY

diagram 15.

LALC representative did advise that further consultation would be required prior to any development proceeding within the study area.

5.9.4 Planning Implications

Formal consultation has been held with the Nambucca Heads Local Aboriginal Land Council and previous assessments and searches of the NPWS Aboriginal Heritage Information Management System have been undertaken as part of the investigations into Aboriginal archaeology. These investigations have not identified any items of Aboriginal heritage within the study area. Those items which were identified are located outside of the boundaries of the study area and would not be impacted by its future development.

5.10 European Heritage

A preliminary assessment was undertaken to define any potential sites of heritage value within the study area and to assess the impact of the proposed rezoning on any identified sites and recommend safeguard measures that would preserve the historical integrity and significance of such sites.

5.10.1 Historical context

The Pacific Highway Deviation EIS prepared by GHD in 1991 provides a historical context in relation to European heritage of the area.

> *"In 1770 Captain Cook saw smoke at the mouth of the Macleay River at an area he referred to as 'Smoky Cape", 32 km south of Nambucca Heads.*
>
> *Mathew Flinders discovered the inlet of the Nambucca River in 1814. The river was subsequently visited in 1817 by a Captain White, and in 1820 by Surveyor General John Oxley. Oxley's party briefly explored the river entrance in the schooner Prime Regent. None of these explorers recorded any observations of Aborigines in the area (Prentis 1984).*
>
> *In the early 1800's the number of European people visiting the Northern Rivers district was generally limited to escaped convicts and wood cutters seeking the pine and cedar forests.*
>
> *Between 1825 and 1830 at least 10 escapees from Moreton Bay traversed the Nambucca area as they travelled south to Port Macquarie. Other escaped convicts arrived in the areas in the 1830's. In 1835 Constable John Mackintosh explored the area from the Clarence River south to Port Macquarie (Prentis 1972: 108-110, 115).*
>
> *By 1839 cedar cutters were to be found on the Bellinger River and in 1841 cedar cutting commenced on the Nambucca River.*
>
> *White settlement of the area from Kempsey north to Grafton was not uniform. Land was not permanently settled by whites in the Nambucca region until after the Robertson Land Act of 1861 (Nambucca District Historic Society 1969:44). Timber cutting and gold mining were the primary land uses in these latter areas."*

5.10.2 Sites of European heritage derived from archival and current sources

There are no current listings of sites of heritage significance with the National Trust, Australian Heritage Commission or NSC. Similarly, during field investigations, no sites of heritage significance were identified within the study area.

In preparing the Pacific Highway Deviation EIS in 1991, GHD identified a site of potential heritage significance within Lot 2 DP 749153 (Site 1). The potential heritage item includes an old weatherboard house and grave site. Inspections of the site reveal that the old weatherboard house still exists on the site but no evidence was found in relation to the alleged grave site. According to the EIS, two children were buried there in the 1800's (pers comm. Mrs J.L. Wilson 1991). The headstone of the grave was weathered and illegible at the time and no exact date was identified.

5.10.3 Planning Implications

There are no current listings of sites of heritage significance with the National Trust, Australian Heritage Commission or NSC. Similarly, during field investigations, no sites of potential significance were identified within the study area.

The only site of potential significance in the study area is located within Site 1 (Lot 2, DP 749153) and includes an old weatherboard structure and possible grave site. According to the Pacific Highway Deviation EIS prepared by GHD in 1991, two children were buried there in the 1800's but the headstone on the grave was weathered and illegible. However, GHD's most recent inspections of Site 1 did not identify the grave or headstone.

As any future development of Site 1 would impact on the weatherboard structure and grave site, it is recommended that further investigations be undertaken to determine whether the site should be protected or relocated.

5.11 Landscape and Visual Amenity

The study area represents a typical combination of agricultural, rural/residential and naturally vegetated areas that can be found along the coastal fringe of the North Coast of New South Wales.

The topography of the study area and surrounding land ranges from level, low-lying flood plains adjacent to the Nambucca River, rising to gently undulating and wooded country to the west.

Rural land use plays a significant part in forming the landscape character of the region, resulting in large, cleared areas used for grazing purposes interspersed with pockets of indigenous vegetation, including protected wetland environments. The Nambucca River itself is visually important and is the focus for views from much of the surrounding countryside.

Because of the sheltered location of the study area surrounded by hills and the river, it has a limited visual catchment in terms of distant views to and from the study area.

Development occurs along a narrow band, constricted by riverine and wetland environments, and it is in this location that the views are predominantly concentrated.

Even at this scale however, low-lying views are restricted in some places by vegetation and to a lesser extent, buildings.

Along the section of the existing Pacific Highway corridor, landscape features vary from woodland and forest vegetation; open grassed/grazing areas; the Nambucca River landscape; rural/residential development; a motel and a caravan park; wetland areas; and detailed elements such as bridges and drainage channel crossings at certain locations.

5.11.1 Planning Implications

At a regional level, this area is typical of the combination of agricultural, rural/residential and naturally vegetated areas that can be found along the coastal fringe of the North Coast of New South Wales.

The topography of the study area and surrounding land ranges from level, low-lying flood plains adjacent to the Nambucca River, rising to gently undulating and wooded, hilly country to the west.

Rural land uses play a significant part in forming the landscape character of the region, resulting in large cleared areas used for grazing purposes interspersed with pockets of indigenous vegetation, including protected wetland environments. The river itself is also visually important and is the focus for views from much of the surrounding countryside.

Because of their sheltered locations surrounded by hills and the river, the existing Pacific Highway has a limited visual catchment in terms of distant views to and from the road corridor.

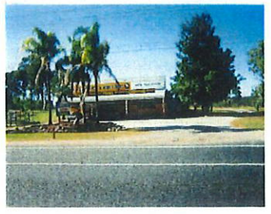
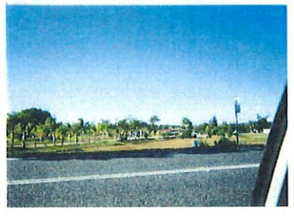
The existing Pacific Highway is a road feature which offers many views towards the Nambucca River and west towards the vegetated hills associated with the Nambucca State Forest. Unfolding views are available to motorists along the road as it passes through the study area. The surrounding landscape within the vicinity of the study area has suffered disturbance and change from its natural condition owing to the area's established rural development and associated infrastructure and other land uses such as motels, caravan parks and car dealerships.

Any urban development of the study area, including residential, rural residential and industrial uses, would further deteriorate the visual amenity of the area and undermine its rural character. Any such development would therefore need to be screened from view in order to maintain the existing amenity of the area.

5.12 Building Types and Form

As previously indicated, development occurs along a narrow band, constricted by riverine and wetland environments. A range of building types exist within this area including detached residential dwellings, a caravan park dominated by caravans and mobile homes, a single storey motel and a car dealership incorporating an industrial building. Despite the narrow area within which the development occurs, all of the

buildings are separated by large areas of cleared land or native vegetation. Photos of the various building types within and adjacent to the study area are illustrated below.

 Photo 1 – Kenwal Motors	 Photo 2 – Pelican Caravan Park	 Photo 3 – Beatties Carpets and Home Centre
 Photo 4 – Residence on Site 2	 Photo 5 – Nambucca Resort	 Photo 6 – Jabiru Motel

5.12.1 Planning Implications

Any development of the study area would significantly change the character and appearance of the locality. The nature and extent of this change would be dependent upon the precise development types, layout, design and landscaping, the degree of exposure to the Pacific Highway and the degree to which comparisons might be made with ad-hoc development under the existing zones. Any future urban development of the study area would require adequate buffers from the highway to ensure that development does not adversely affect the visual amenity and rural character of the area.

5.13 Agricultural/ Extractive Resources

Although the study area is zoned rural, this zoning is somewhat arbitrary with respect to the agricultural qualities and capabilities applicable to the locality.

The NSW Department of Agriculture together with the Department of Conservation and Land Management have previously undertaken a number of broad scale agricultural suitability investigations within the Nambucca Shire. The study area has been identified as having a low agricultural value and is not classified as being prime crop or pasture land nor is it suitable for intensive cultivation.

The existence of large tracts of native vegetation within the study area, with only minimal cleared areas, creates a situation where the land in its present form is not agriculturally viable or sustainable for grazing or cultivation activities.

The surrounding land, particularly to the west offers similar agricultural potential due to the extensive forest vegetation.

A gravel and sand screening plant currently operates on a sporadic basis within the western portion of Site 4 and has approval to remove up to 230m^3 of material per week or 11,960m^3 per year. The exact quantity of the remaining resource is unknown however given current extraction rates it would be expected that the screening plant could operate for at least another 5 years.

No other extractive resources exist within the study area which would defer or limit any future urban development of the study area.

5.13.1 Planning Implications

Given the low agricultural capability of the study area, its rezoning to an alternative land use is not considered to have a significant impact upon the agricultural economic potential of the Shire. The rezoning of the land for non-agricultural land uses is therefore considered to be appropriate under the circumstances.

It is recognised however that the extractive resource located within Site 4 is considered to be an important resource which should be exhausted prior to any future development of Site 4.

5.14 Traffic and Access

An assessment of the current traffic access arrangements within and adjacent to the study area has been undertaken as part of this LES.

5.14.1 Background

A number of recent studies undertaken by RoadNet Pty Ltd have examined the traffic and access implications of rezoning parcels of land located on the western side of Pacific Highway between Florence Wilmont Drive and Teagues Creek. The parcels of land investigated in these reports include the majority of the lots identified in the LES for Lower Nambucca except for Site 2 (Lot 3 DP 749152). These studies have recommended a number of access options to cater for the future rezoning of parcels of land identified in the LES.

The views of the Roads and Traffic Authority of NSW were sought as part of the LES process. A letter prepared by the RTA (dated 18 August 2003) stated that the following issues should be considered as part of the any LEP amendment:

- *"Compatibility of the proposed land use with future highway function and impact on the Highway users (eg. likely reduced speed zones and intersection controls due to requirements of new development);*
- *Applicability of S28 under Section 117 of the EP&A Act particularly in regard to:*

- *The proposed rezoning to allow a service centre on Site 4;*
- *Likely visible exposure of the retailing areas to the highway;*
- *Promotion of new and additional use of the highway;*
- *Location of new retail/commercial areas outside of the established centres*

- *Traffic generation and intersection types proposed to meet likely demand.*

The RTA are concerned about ribbon-style development adjacent to the highway and that access to these developments will only be available via the highway. The study should consider the future location and form of the Pacific Highway. The RTA is currently developing route options for the future highway route with an early outcome of the RTA's route study being the identification and display of a number of route options, one of which is highly likely to be the current highway route. The RTA is targeting November 2004 at the latest for the identification of the preferred route."

5.14.2 Regional Road Network

The study area is ideally located in close proximity to the Pacific Highway which is a major State Highway providing important inter-regional (long distance) links along the North Coast of NSW. The Pacific Highway near the study area incorporates a two-lane undivided carriageway carrying in the order of 13,000 vehicles per day.

This section of highway is currently under investigation to be upgraded to a four-lane dual carriageway as part of the 10-year Pacific Highway Upgrading Program, which commenced in 1996. It is pertinent to note that the final route for the Pacific Highway at the present time has yet to be finalised. The RTA has advised that a decision regarding the preferred route for the Pacific Highway is likely to occur in November 2004.

5.14.3 Local Road Network

The only formalised road connection on the Pacific Highway between Watts Creek and Teagues Creek is Florence Wilmont Drive. Florence Wilmont Drive is a local road under the care and control of NSC and is connected to Pacific Highway at its eastern end and links with the Old Coast Road at its western end. Florence Wilmont Drive near Pacific Highway has a sealed carriageway approximately 8m wide incorporating two travel lanes, one lane in each direction. Florence Wilmont Drive provides access to rural-residential properties to the west of the Pacific Highway.

Recent peak period counts conducted by RoadNet (2003) on Florence Wilmont Drive revealed that:

- the two-way traffic flows on Florence Wilmont Drive west of Pacific Highway during the morning peak period (8:45am-9:45am) are in the order of 33 vehicles per hour (veh/hr) with eastbound traffic flows predominating (22 veh/hr).
- the two-way traffic flows on Florence Wilmont Drive west of Pacific Highway during the afternoon peak period (3:30pm-4:30pm) are in the order of 63 vehicles per hour (veh/hr) with westbound traffic flows predominating (36 veh/hr).

5.14.4 Access

Existing Access Locations

There are currently numerous access points fronting the Pacific Highway between Watts Creek and Teagues Creek providing access to various land uses (i.e. residences, shop, motels, caravan park etc). The intersection of the Pacific Highway and Florence Wilmont Drive also provides a formalised access point to rural-residential properties located to the west of the highway. This intersection comprises a typical Type 'C' treatment with right turn and left turn storage bays.

5.14.5 Service Roads and Connections

The use of service roads for the proposed rezoning is considered imperative to provide for adequate interaction between the Pacific Highway and the proposed land uses. The main advantage of a service road is that it minimises interference on through traffic flows on major roads by reducing the need for multiple access points. A service road ensures that an equitable balance occurs between the safety and efficiency of road users including the needs of property-owners requiring access for commercial viability.

The service roads proposed by RoadNet essentially run parallel to the Pacific Highway on both the eastern and western sides of the road reserve and are designed to ensure the smooth and efficient flow of traffic to Sites 1, 3 and 4.

The connection between Site 1 and Site 3 (immediately north of Site 1) on the western side of the highway is separated by an open swamp forest, which limits the continuation of a service road between these two sites without introducing additional access points on the highway. A service road connection between northern and southern portions of Site 3 is also separated by the Nambucca State Forest preventing a contiguous road connection.

Connections to/from the Pacific Highway for Site 2 have not been addressed in previous traffic reports conducted for the Lower Nambucca. The site is located some 300m north of Florence Wilmont Drive, and is likely to serve only 2 to 3 rural residential lots or 14 residential lots if rezoned. It is considered that existing access points immediately to the north (Lot 72, DP 561932) and south (Lot 2, DP 749152) of Site 2 be rationalised to include the provision of a service road parallel to the frontage length of these sites. The likely connection to the Pacific Highway for Site 2, and the existing adjoining sites, could be via a new eastern approach at Florence Wilmont Drive, which should be restricted to the least disruptive left-in/left-out movements only.

In summary, it is considered that service road arrangements for Site 1, Site 2, Site 3 (northern portion) and Site 4 can be satisfactorily provided to ensure the smooth and efficient flows of vehicles to/from the highway. Internal service road connections to/from Site 3 (southern portion) is constrained by an open swamp forest at its southern end and the Nambucca State Forest at its northern end. Connection to Site 3 (southern portion) could be achieved by introducing additional access points on the highway although this is not considered desirable.

5.14.6 Planning Implications

This section reviews the principles of access management on major roads and discusses the appropriate access locations and access controls for the study area. As no decision has been made on the future route of the Pacific Highway, the access management strategies have been based on the Pacific Highway being upgraded along the existing route alignment. This section also reviews the likely traffic implications as part of the proposed rezoning, which has been primarily based on previous traffic studies undertaken for Lower Nambucca.

Access Implications

This section provides a brief review of the principles regarding major road access management and discusses the suitability of access locations and access design details.

Access Management Philosophy

The Roads and Traffic Authority's 'Guide to Traffic Generating Developments' (2002) explains that access control and access management on major roads are important parts of the planning process in order to:

- maximise road safety;
- provide efficient traffic flow and access to properties; and
- protect the environment.

On the issue of access to developments off major roads, the RTA Guidelines states:

> *'Generally, it is advisable to avoid direct access between developments and major roads. If such access is proposed, the RTA requires studies which demonstrate that the resulting situation does not adversely affect safety. Where possible, vehicle access to developments should be from service roads/lanes.*
>
> *Vehicles entering and leaving an isolated development are a potential hazard to other vehicles and to traffic flow in general, even if sight distance is good. Also, high speed accidents in rural areas can occur where traffic enters from isolated developments and where main road traffic operates at high speed. Such situations should be avoided.'*

The RTA Guidelines also recognises the merit of site consolidation with respect to access management. This could be thought of in the terms of a service centre or a light industrial business park similar to the proposed rezoning, where larger development sites provide the opportunity for a higher standard of access. In this context, the RTA Guidelines states:

> *'Development or redevelopment of sites fronting major roads should not extend or intensify traffic conflicts. Redevelopment in particular, and in some cases new development, frequently provides an opportunity to consolidate individual sites, thereby reducing fragmented roadside activity. Site consolidation design should keep direct access to major roads at a minimum.*

While site consolidation often causes and increase in higher density land use, it may also facilitate an improvement in traffic conditions which may not have occurred had the sites been developed independently. An improvement in traffic efficiency occurs when resources are allocated to improvements, thereby lessening access points to the road network.'

While the general principle of *'restricted access'* for the major road network is recognised, there is a strong argument permitting limited development of 'highway oriented' uses on major road frontages. Service centres fall within the category of 'highway oriented' development. In recent years, the RTA has permitted, and even encouraged, service centre development on major roads.

The principle of permitting limited 'highway oriented' development on major highways is well established. The same logic is applicable to the proposed rezoning by providing justification for direct access off the Pacific Highway for a service centre, light industrial business park, bulky goods, rural residential properties incorporated in the proposed rezoning.

While the principle of providing direct access for 'highway oriented' development off the major road system is clear, such access is only feasible in practice if it can be achieved without significantly affecting traffic safety and efficiency on the major road system. That requirement generates the need for potential development sites to satisfy accessibility performance standards which, in conjunction with zoning requirements, will have the effect of limiting the number of developments which can be located on any particular section of the major road network.

In that regard, direct vehicular access for 'highway oriented' development off the major road frontage should be acceptable if vehicles can enter and depart the site without compromising traffic safety and efficiency on the major road. Although the access arrangements required to satisfy that criterion will vary from site to site, auxiliary lanes and service roads are the most frequently used measures for developments.

Access Options

In 1996, consultants RoadNet Pty Ltd undertook a detailed access study of Lower Nambucca and made a number of recommendations with respect to access options along the Pacific Highway.

The specific access options proposed by RoadNet along the Pacific Highway (between Watts Creek and Teagues Creek) near the vicinity of the parcels of land subject to rezoning (i.e. Sites 3 and 4) are described below:

- Option A – Offset Type 'C' intersections (i.e. two separate T-junctions) located on both the eastern and western sides of the Pacific Highway (south of Teagues Creek).
- Option B – Cross Type 'C' intersections (i.e. two separate 4-way intersections) located on both the eastern and western sides of the Pacific Highway (south of Teagues Creek).

- Option C – Roundabout (4-way intersection) providing access to both the eastern and western sides of the Pacific Highway (south of Teagues Creek).

In a further recent traffic study prepared by RoadNet (2003), the existing intersection of the Pacific Highway and Florence Wilmont Drive (Type 'C') was recommended to provide future access to Site 1. Both the reports prepared by RoadNet for Lower Nambucca did not address future access arrangements to Site 2 located on the eastern side of Pacific Highway.

Access Locations

The location of access points on high speed rural roads is typically governed by one of the following factors:

- Sight distance during the day and night;
- Spacing of upstream or downstream intersections/access points;
- Site constraints;
- Speed zoning;
- Through and turning traffic volumes; and
- Land use and topography.

Based on the above RoadNet options, the number of new access points on the Pacific Highway is likely to range from 1 to 2 over a 1.5km length of road between Florence Wilmont Drive and Teagues Creek depending on which option is chosen. The existing intersection of the Pacific Highway and Florence Wilmont Drive will increase the number of proposed access points to either 2 or 3, this equates to a separation distance of say 500-750metres between access points on the Pacific Highway assuming all access points are located at equal intervals.

The closer spacing of access points along the Pacific Highway fronting the subject parcels of land has the potential to increase the risk of accidents. Even though rural roads have lower turning volumes than urban roads, high speed accidents are more prevalent on rural roads due to lower driver expectation of turning vehicles. Therefore access points on the Pacific Highway should be located sufficiently far apart to separate traffic movements at each access point and to provide a reasonable time interval between drivers decisions, which is particularly of concern on high speed rural roads.

Given the above factors, it is recommended that the maximum number of access points fronting the Pacific Highway (between Florence Wilmont Drive and Teagues Creek) should be in the order of two (2). The above number of access points should be adequate to provide access to the subject sites with the aid of service roads and side roads.

The proposed access points likely to serve the rezoning sites should be provided at the following locations (subject to RTA approval):

- utilise the existing intersection of the Pacific Highway and Florence Wilmont Drive; and

- provide a new access point on Pacific Highway (say) 300metres south of Teagues Creek.

Access Control

The degree of access permissible from the Pacific Highway is generally determined by the access control (i.e. T-junctions, signalised, roundabouts or 4-way intersections). It is considered that intersections on the Pacific Highway and major development accesses (e.g. service centres, light industrial business parks, bulky goods etc) should include the provision of deceleration lanes, acceleration lanes and right turn lanes. These auxiliary lanes will be required to provide adequate intersection capacity and improve safety for road users particularly on the highway.

The various intersection controls that can be provided on the Pacific Highway to provide access into private developments include:

- T-junction (all movements or left-in/left-out)
- 4-way intersections (Type 'C' arrangement)
- Roundabouts
- Traffic Signals
- Seagull island treatment

The access options developed for the Pacific Highway (between Watts Creek and Teagues Creek) by RoadNet involved a combination of the first three intersection controls listed above. A discussion regarding the most appropriate access controls as part of the rezoning is provided below.

Priority controlled intersections such as T-junctions and 4-way intersections are commonly used on high speed rural roads such as the Pacific Highway. These intersection controls are usually supported by auxiliary lanes and channelisation to improve safety. However, these controls can increase potential conflicts particularly during cross-over type movements, when motorists attempt to find a suitable gap on high-speed rural roads which carry uniform traffic flows.

A roundabout significantly reduces traffic conflicts, assists traffic flow more smoothly and safely, reduces approach speeds and provides for all movements increasing accessibility. The major advantage of roundabouts is that they perform well in balanced flow conditions with circulating movements breaking up traffic flows.

Traffic signals are primarily used in built up urban environments and are effective in minimising delays, improving capacity and safety for all road users. It is considered that traffic signals along this section of the Pacific Highway would not be looked upon favourably by the RTA due to the interruption of traffic flows along the highway. For major roads such as the Pacific Highway, the RTA attempts to maximise traffic flow and traffic safety by ensuring that these high speed rural roads remain uninterrupted flow facilities.

Seagull island treatment improves safety, capacity and protects right turning traffic on the highway by allowing motorists to perform the desired manoeuvre in two stages

rather than one. Seagull island treatments are usually provided in conjunction with auxiliary lanes and channelisation.

Given the above factors, intersection controls considered suitable for the Pacific Highway at the proposed access locations is either a roundabout and/or seagull island treatment. The preferred intersection controls for the access locations are highlighted below (subject to RTA approval):

- Pacific Highway/Florence Wilmont Drive – installation of seagull channelisation with full access to Florence Wilmont Drive and left-in/left-out movements permitted on the new eastern approach of Florence Wilmont Drive. This intersection will provide access to the following sites:
  - Site 1
  - Site 2
- Pacific Highway mid-block access (south of Teagues Creek) – installation of a roundabout with full access (all movements permitted) to both the eastern and western sides of the Pacific Highway. This intersection will provide access to the following sites:
  - Site 3 northern portion only
  - Site 4 immediately south of Teagues Creek
  - Existing properties located on the eastern side of the highway directly opposite to Site 3 and 4

Traffic Implications

Peak Hour Flows

The previous traffic reports prepared by RoadNet also reviewed the peak hour flows to ascertain whether the road network for Lower Nambucca is carrying acceptable levels of traffic during these periods. The report prepared by RoadNet (2003) indicated that the future two-way traffic flow on Florence Wilmont Drive would increase from 66 veh/hr to 110 veh/hr during the peak period based on full development of Site 1 for light industrial purposes. This increase in traffic along Florence Wilmont Drive is well within acceptable traffic volumes for a local road (i.e. two-way traffic flows below 250 veh/hr).

The traffic report also indicated that the future two-way traffic flow on the Pacific Highway would increase from 940 veh/hr to 1,400 veh/hr for horizon year 2013. The future horizon year analysis undertaken by RoadNet (2003) was based on the following assumptions:

- Full development of Site 1 for light industrial purposes.
- A background traffic growth rate of 3% per annum over 10 years.
- 15% of total highway flow comprising heavy vehicles.

The future traffic flows determined by RoadNet will reduce the operational performance of the Pacific Highway from Level of Service 'D' (approaching unstable flow) to Level of Service 'E' (unstable flow) during horizon year 2013.

Even though the projected future traffic flows do not include the traffic generation potential of Site 2, Site 3 and Site 4, it is expected that the level of traffic activity on the Pacific Highway will be approaching its design capacity objective in 2013 should current growth continue unabated. In this context, the RoadNet (2003) report highlights that the Pacific Highway near Lower Nambucca is being investigated to be upgraded to a four-lane dual carriageway, which would significantly increase the road carrying capacity of the highway. In that regard, the future amplification of the highway will more than adequately accommodate the projected traffic generation potential of Site 2, Site 3 and Site 4 in the future.

Intersection Performance

The traffic reports prepared by RoadNet examined the operating performance of key intersections of the road network. The intersections that were modelled are highlighted below:

- Pacific Highway/Florence Wilmont Drive[1]
- Pacific Highway/Riverside Drive[2]
- Pacific Highway/Bellwood Road[2]

Notes:
(1) source from RoadNet (2003)
(2) source from RoadNet (1996)

Intersections were analysed for peak period conditions using the INTANAL model. The intersection performance was based on the average vehicle delay (AVD) per vehicle (expressed in seconds per vehicle). It is pertinent to note that the average vehicle delay is equated to a corresponding level of service (LoS) from A (best) to F (worst). The results of the analysis undertaken by RoadNet is briefly summarised below.

Pacific Highway/Florence Wilmont Drive

The existing traffic conditions at this intersection were considered to be very good, operating at a LoS 'A'. The intersection will continue to operate at a LoS 'A' should Site 1 be fully developed. As previously mentioned, the preferred access control for any intersection should be in the form of a seagull island treatment. Under this arrangement, it is expected that the operational performance of this intersection would improve as compared to the existing configuration.

Pacific Highway/Bellwood Road, Pacific Highway/Riverside Drive

The existing traffic conditions at this intersection were considered to be good, operating at a LoS 'B'. The intersection will operate at LoS 'C' based on Site 4 being developed into a service centre. It is pertinent to note that the analysis was undertaken in early 1996, and it is reasonable to expect that the current operational performance of this intersection would likely decline possibly to LoS 'C' or LoS 'D' (this will need to be confirmed by further modelling).

Pacific Highway/Riverside Drive

The existing traffic conditions at this intersection were considered to be good, operating at a LoS 'B'. The intersection will continue to operate at LoS 'B' based on Site 4 being developed into a service centre. It is pertinent to note that the analysis

was undertaken in early 1996, and it is reasonable to expect that the current operational performance of this intersection would likely decline possibly to LoS 'C' (this will need to be confirmed by further modelling).

Proposed Mid-block Intersection on the Pacific Highway

No previous modelling was undertaken for the proposed mid-block intersection located on the Pacific Highway (south of Teagues Creek). It is envisaged that future through traffic (on the highway) and cross traffic movements at this intersection would result in excessive delays for conventional priority controlled intersections (i.e. T-junction or 4-way). As mentioned earlier, the preferred access control for this intersection would be in the form of a roundabout. The provision of either a single or two lane roundabout at this location should be adequate to cater for the future traffic demands likely to be generated by Sites 3 and 4 including the through traffic flows on the highway.

In summary, it can be concluded that key intersections near the proposed rezoning sites are likely to operate at a satisfactorily level of service under future traffic flow conditions during the morning and afternoon peak periods, however this will need to be further examined and investigated as part of any development application.

5.15 Utility Services

5.15.1 Water Services

An existing DN100 asbestos cement (AC) water main runs along the Pacific Highway for the entire frontage of the development. It is supplied from the north where it connects to an existing DN200 reticulation main at the corner of Rutland Street and the Pacific Highway (just north of Teagues Creek). This DN200 is in turn supplied from a DN375 main that extends south to Bellwood Creek.

The Kingsworth Estate adjoining the southern end of the proposed development is supplied directly from a trunk main to its west. The existing DN100 AC main connects into the Kingsworth estate but is isolated by a normally closed valve.

5.15.2 Sewerage

The area of the development is not currently sewered. The closest existing sewer is in Edgewater Drive just south of Teagues Creek.

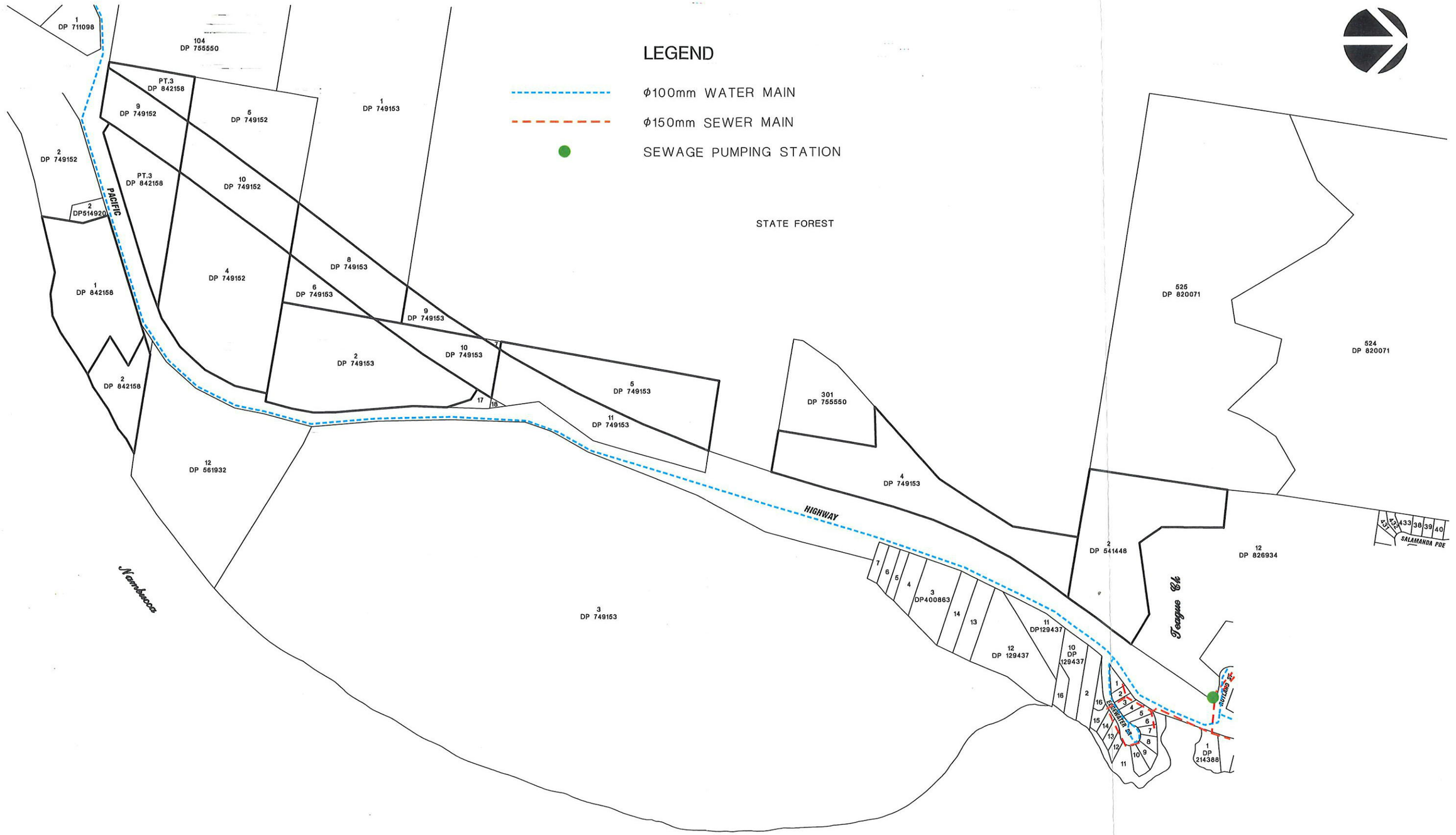
NSC are currently reviewing the possibility of servicing the existing rural residential development within the Kingsworth Estate, south of the study area. The results of these investigations have not yet been finalised.

Existing utility services are shown in Diagram 16.

5.15.3 Planning Implications

Water Services

Any future development of the study area would be served from the reticulation to the north. Demand assessment has been based on the following criteria:



SOURCE: NAMBUCCA SHIRE COUNCIL UTILITY SERVICES

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Nambucca Shire Council

EXISTING UTILITY SERVICES

diagram 16.

- 10 ET (equivalent tenements) per gross hectare;
- Peak instantaneous flow of 0.15 L/s per ET.
- Required fire flow 20L/s based on BCA and AS2419.1 requirements.

This assessment (peak instantaneous plus fire) indicated that the existing DN100 main was inadequate to serve the proposed development and in any case it is in poor condition.

Information on expected pressures at the connection point, were not available at the time of writing this report, that are required to check the size of a new main to serve the development.

An assessment was made of DN200 and DN250 mains and it was found that a DN250 main is required, on the basis of acceptable pressure losses. It would extend from the connection in Rutland Street to the southern end of the development a distance of approximately 2,200 metres.

The sizing will need to be confirmed once pressures in the existing system at the connection point have been assessed. It may be that amplification of the existing system upstream of the connection point is required to cope with the 64 L/s demand under peak instantaneous plus fire flow conditions.

The DN 250 should be capable of supplying development further to the south.

The peak day demand of the development is calculated to be 0.4ML/day that will be imposed on the trunk and source systems.

Sewerage Services

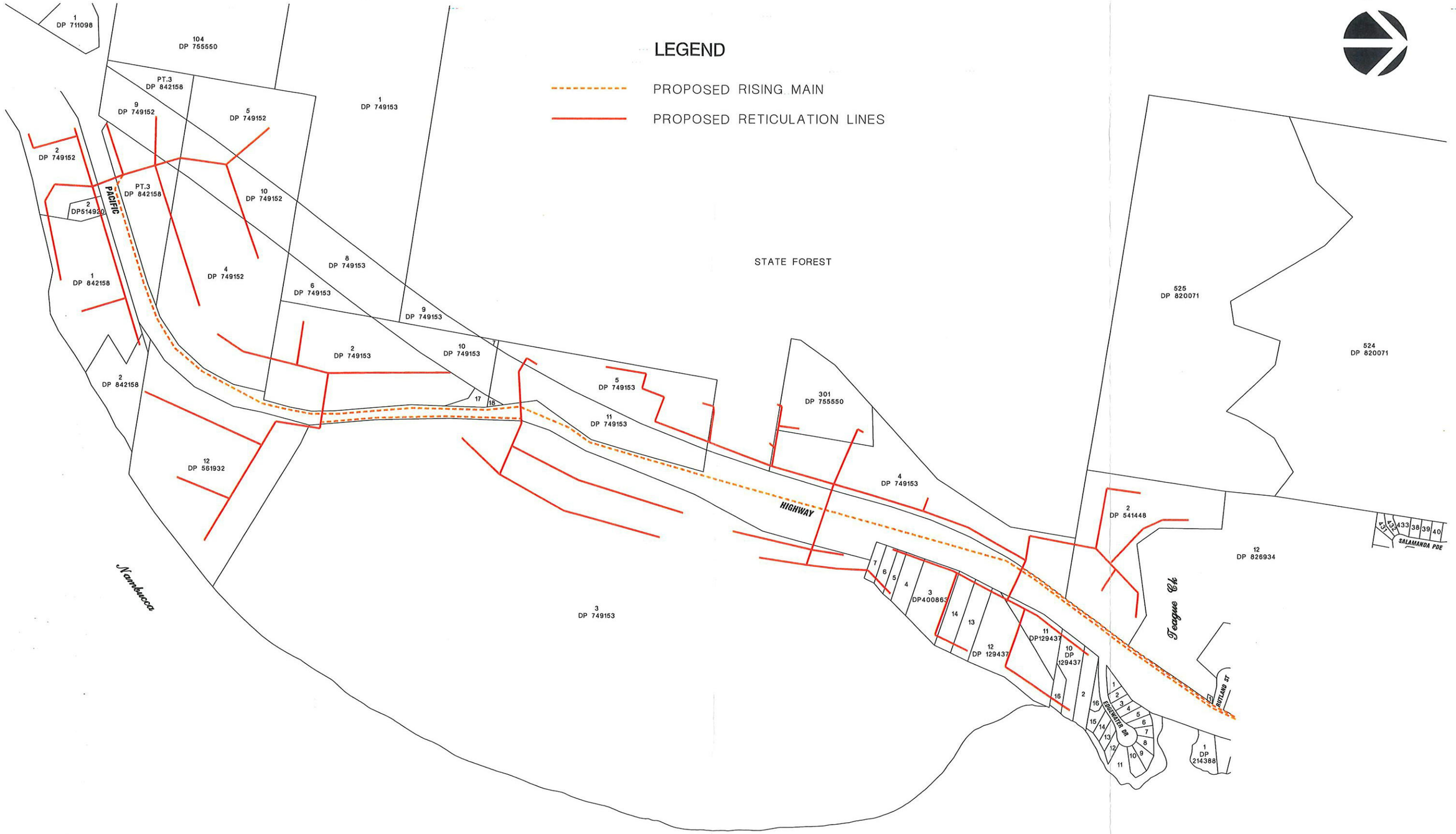
A reticulation collection system will be required to serve the development.

A study is currently being undertaken by consultants, DeGroot and Benson Pty Ltd, into the sewer system of an area that covers the proposed development (see Diagram 17).

This would have to be adapted to suit the proposed development mainly as follows:

- An indicative layout for Site 1 prepared by Townplanning Consultants & Drafting Services has a drainage reserve running to the north through the centre of the area. It is likely therefore that at least the northern part of the area would drain directly to the north (SPS SN 2) rather than to the south (SPS SN 3);
- Should residential development not be found suitable foe Site 2, it would be worth examining LPSS (lower pressure sewerage system) systems to service any proposed rural residential development.

Sewer system loads as follows have been assessed based on 10 ET (equivalent tenements) per gross hectare for industrial/business:



SOURCE: DE GROOT BENSON PTY. LTD.

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NAMBUCCA VALLEY

PROPOSED SEWER DESIGN

diagram 17.

Table 5 Sewer System Loads

Site	ADWF (L/s)	PWWF (L/s)
1	1.96	16.1
2	0.02	0.26
3	0.72	6.28
4	0.4	3.7
Total	3.2	26

6. Identification of Development Constraints and Opportunities

An investigation of the environmental, physical and infrastructure characteristics of the study area provides the basis for the determination of the future applicable land uses and development of the land. These characteristics either act as constraints or opportunities to the future development potential of the study area.

This section of the report addresses the development constraints and opportunities of the study area in relation to urban development based on sound land use planning principles.

6.1 Development Constraints

Table 6 Development Constraints Assessment

Environmental Attribute	Evaluation
Topography, Geology and Soils	The study area contains significant areas of low-lying flood prone land. The majority of the soils within the study area are generally not suitable for soil-absorption effluent disposal due to high permeability, low cation exchange capacity and groundwater pollution hazard. They also present extreme limitations due to foundation hazard and high watertable. Many have very high foundation limitations for urban development due to low wet bearing strength. PASS is present at 2- 4 metre depths.
Surface and Groundwater Hydrology and Quality	Areas identified within the 1 in 100 year flood event are not considered to be a significant constraint to development. This is because fill can be used to modify the profile of the development area and those areas that are flood affected. The major impediment to filling however is the potential impact it may have on identified wetlands. Any filling of the study area would therefore need to be accompanied by an assessment into the potential impacts on identified wetlands. There were no groundwater characteristics evident in parts of the study area which were considered to constitute a significant constraint to development. The areas identified as having a 'high' sensitivity to pollution from surface runoff generally comprise the identified wetlands within the study area and are considered to be a significant constraint to development. Any development of the study area would need to be accompanied by appropriate stormwater management measures to protect these areas.

Environmental Attribute	Evaluation
Flora and Fauna	The vegetation communities incorporating Eucalyptus pilularis – Corymbia intermedia Moist Open Forest, Lophostemon suaveolens – E. robusta Swamp Open Forest, Melaleuca quinquenervia Swamp Open Forest and Casuarina glauca/ Avicennia marina Swamp/ Mangrove Open Forest have been identified as being of high conservation significance are considered to be a significant constraint to development.
Heritage	The old weatherboard house and associated grave site within the northern portion of Site 1 should be considered a constraint until further research is undertaken to establish the validity and significance of the heritage item.
Bushfire Hazard	Bush fire hazard is considered to be a constraint to development given the high to extreme risk presented by the close proximity of the Nambucca State Forest. Appropriate asset protection zones would be required as part of any future development of the study area.
Contamination	Preliminary and detailed contamination assessments undertaken at each site has revealed that Site 4 reported a TPH C_6-C_{36} concentration exceeding the threshold concentration at sample location P4-1. Hydrocarbon staining was also noticed at sample location P4-3 in the vicinity of the front end loader bay. These areas will require remediation followed by soil sampling and subsequent analysis to validate the remediation
Visual and Scenic Quality	As the study area is located directly adjacent to the highway appropriate buffers would be required to screen any future development from view. Whilst not considered to be a significant constraint to development, it further restricts the potential development envelope of the study area.
Extractive Resources	The screening plant currently operating within the northern part of the study area (Site 4) is considered to represent a constraint to the further development of Site 4 until such time as the resource has been exhausted.
Traffic and Access	There is the potential to adversely impact upon the function and purpose of the Pacific Highway in allowing access to any development of the study area. It should be noted however, that subject to the findings of the RTA's route development investigations, the future location of the highway may not represent a constraint to the proposed rezoning of the study area.
Servicing and Infrastructure	There is currently no sewer servicing the study area. Substantial costs would be required to extend services to the study area which could ultimately act as a significant constraint to development.

In determining whether the study area is capable of being developed, the following attributes have been identified as representing significant constraints to development:

- areas of high geotechnical constraints;
- areas of high water quality sensitivity including SEPP 14 wetlands and other identified wetlands;
- areas of high ecological significance, particularly those areas identified as containing Eucalyptus pilularis – Corymbia intermedia Moist Open Forest, Lophostemon suaveolens – E. robusta Swamp Open Forest, Melaleuca quinquenervia Swamp Open Forest and Casuarina glauca/ Avicennia marina Swamp/ Mangrove Open Forest;
- areas adjacent to high bushfire hazard, particularly Nambucca State Forest; and
- areas of contamination.

It is considered that other environmental attributes can be satisfactorily managed or accounted for in the detailed planning and development control phases.

6.2 Other Constraints

The study area does not lie within a water supply catchment, does not have land with excessive slope, does not comprise part of a National Park and does not comprise any highly productive agricultural land. The major strategic constraints which therefore apply include areas identified as wetlands and areas of high conservation value.

6.3 Development Opportunities

The mapping of land deemed to be significantly constrained results in the establishment of a preliminary development envelope, as shown in Diagram 18.

Although other constraints affect the envelope, including flood levels, potential acid sulfate soils, buffers to protect visual amenity, other existing land uses and the lack of existing infrastructure, it is considered that the uncoloured area identified in Diagram 18 is capable of supporting ecologically sustainable development.

The density of development on those parts of the study area that are located adjacent to the area of significant constraints should be restricted to provide a protective buffer zone between any future urban development and conservation areas.

Similar restrictions might be appropriate for areas adjacent to the Pacific Highway to help maintain the visual amenity of the area and alleviate the perception of 'urban sprawl' of the township of Bellwood.

6.4 Summary

The development constraints which are considered critical in defining the development envelope of the study area include:

- areas of high geotechnical constraints (including current screening activities);
- areas of high water quality sensitivity;
- areas of high ecological significance;

LEGEND

- NOISE IMPACT FROM HIGHWAY
- 50m BUFFER ZONE
- WETLANDS
- SIGNIFICANT VEGETATION COMMUNITIES
- VISUAL AMENITY ISSUES FROM HIGHWAY
- 1% A.E.P. FLOOD LIMIT

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DEVELOPMENT CONSTRAINTS AND OPPORTUNITIES

diagram 18.

- areas of high bushfire hazard; and
- areas of contamination.

This is not to say that all development must be excluded from these areas. Further detailed studies may be carried out in the future which provide a more accurate picture of which areas should be developed. However, for the purposes of this study and the application of the 'precautionary principle' of ecological sustainable development to the study area, it is appropriate to not include these areas in the testing of reasonable strategic planning scenarios.

Other environmental issues and constraints, including flood levels, acid sulfate soils, visual quality, other existing land uses and the lack of existing infrastructure, remain important site development issues to be considered in the future, but are not considered to impose absolute constraints on the development of the study area.

7. Development Demand and Land Use Options

This section provides a picture of the population profile within the Nambucca Shire, documents the existing facilities and services relating to employment lands, reviews the documented aspirations of the Lower Nambucca community for their area and suggests a role which the study area may play in meeting the community's demand for urban development in the Lower Nambucca area.

7.1 Population Profile

7.1.1 Population

Overall the Nambucca LGA has experienced population growth since the early 1970s, particularly in Nambucca Heads. The total population of the Nambucca LGA, as identified by the 2001 ABS Census, was 17,662 persons, whilst the estimated 2002 population was 18,233. The age profile of the Nambucca LGA population is shown in Table 7 below:

Table 7 Nambucca LGA Population 1991 - 2001

Age	1991	1996	2001	Change 1991 - 2001	% Change 1991 - 2001	% Change 1996 - 2001
0-4	1,312	1,132	973	-339	-25.8	-1.10
5-9	1,430	1,402	1,247	-183	-12.8	6.33
10-14	1,195	1,499	1,441	246	20.6	6.84
15-19	980	1,088	1,175	195	19.9	-0.19
20-29	1,614	1,425	1,260	-354	-21.9	-4.28
30-39	2,500	2,341	1,832	-668	-26.7	5.11
40-49	2,058	2,439	2,645	587	28.5	19.98
50-59	1,592	1,868	2,285	693	43.5	39.28
60-64	1,063	933	1,077	14	1.3	5.04
65+	2,955	3,440	3,727	772	26.1	21.62
Total	**16,699**	**17,567**	**17,662**	**963**	**5.8**	**10.10**

(Source: ABS, Census 2001)

7.1.2 Population Projections

PlanningNSW has prepared draft population projections for North Coast local government areas, based on the 2001 census. From this information the following projections and growth rates for the Nambucca LGA have been derived.

The Nambucca LGA is expected to grow at an average growth rate of 0.08% per annum between 2001 and 2006 (18,200 to 19,000 persons) and 0.70% per annum between 2006 and 2026 (19,000 to 21,700 persons) (PlanningNSW 2003).

7.1.3 Employment by Industry

According to the ABS Census, approximately 5,044 Nambucca LGA residents were employed in 2001. Table 8 below shows that the largest employment sectors were Retail and Wholesale Trade, Health and Community Services, Agriculture, Forestry and Fishing. Other notable employment sectors were Education, Construction, Accommodation, Cafes and Restaurants.

Table 8 Employment by Industry

	2001				1996			
Industry	Employees	Change 96 - 01	% Change	% Share	Employees	Change 91 - 96	% Change	% Share
Agriculture, Forestry and Fishing	519	-72		10.3	591	-73		11.5
Mining	16	1		0.3	15	-2		0.3
Manufacturing	354	-244		7	598	-61		11.6
Electricity, Gas and Water Supply	38	5		0.8	33	-28		0.6
Construction	418	108		8.3	310	-72		6
Wholesale/ Retail Trade	1,021	32		20.2	989	117		19.2
Accommodation, Cafes and Restaurants	383	-18		7.6	401	67		7.8
Transport and Storage	198	19		3.9	179	10		3.5
Communication Services	54	-23		1.1	77	-3		1.5
Finance and Insurance	128	2		2.5	126	-17		2.5

	2001			1996		
Property and Business Services	303	24	6	279	43	5.4
Government Administration and Defence	218	27	4.3	191	50	3.7
Education	451	19	8.9	432	77	8.4
Health and Community Services	589	92	11.6	497	97	9.7
Cultural and Recreational Services	77	19	1.5	58	21	1.1
Personal and Other Services	171	-20	3.4	191	59	3.7
Non-classifiable economic units	15	-28	0.3	43	30	0.8
Not stated	103	-23	2	126	-153	2.5
TOTAL	5,056	-80	99.7	5136	162	99.8

Declining Sectors

The Nambucca Economic Revival Plan (2001) outlines that the Nambucca Shire's economy is relatively small in terms of its size, structure and sophistication. Closure and down sizing has occurred in the: timber, beef cattle, banana, dairying and meat processing industries. The closure of the Midco abattoir resulted in the direct loss of over 260 jobs and also lead to secondary job losses. The 260 job losses represented around five per cent of Nambucca's total employment at that time.

Growth Sectors

The Nambucca Shire does have a number of developing and emerging industries. The continued growth of the tourism industry has helped to underpin the Shire's economy. Its growth and importance as a key economic driver is increasing each year. Other emerging industries include: Vehicle body manufacturing, Aquaculture, Agribusiness/processing, Arts and cultural industries, organics and regional cuisine and aged care.

7.1.4 Unemployment

The Nambucca Shire has a total possible labour force participation rate of 13,302. This figure includes all residents over the age of 15 years. This figure does not take into account those residents of Nambucca shire that are not seeking employment either because they do not wish to or are full time students. Of the 13,302 people in the

labour force, 6,177 are either employed or wanting to participate in the workforce but unable to find employment. Of these, 1,132 are unemployed resulting in an unemployment rate of 18% for the Shire (NSC, 2003).

7.1.5 Summary

The following conclusions can be made regarding the population and demographic characteristics and trends relating to the Nambucca Shire:

- The Shire is strongly represented by retirees, with increasing concentrations of persons aged 65 and over being recorded in every census since 1991;
- The growth in retiree residents has been balanced by the declining representation of young people under 30; and
- The Shire has strengthened its role as a retiree and holiday destination, shown by the increasing numbers of people within the retiree age group and the continued growth of the tourism industry.

7.2 Development Demand Issues

7.2.1 Industrial Land Demand and Supply

Given NSC's resolution to prepare a draft LEP to rezone the study area to predominantly industrial uses, a detailed investigation has been undertaken into the current demand and supply for industrial land within the Shire.

Nambucca Commercial and Industrial Land Strategy, 1996

The Commercial and Industrial Strategy prepared by consultants, RDM Pty Ltd in 1996 identified future land requirements for industrial and commercial activities and identified appropriate areas for such uses throughout the Nambucca Shire for long and short term land release.

According to the strategy, the Nambucca Shire currently has 80.9 ha of land zoned for industrial purposes and that industrial land is being utilised at a per capita rate of 1.7ha/1,000 persons. This land is currently located in Nambucca (26.4ha), Macksville (47.5ha) and Bowraville (7ha).

In determining the future industrial land requirements for the Shire, the strategy recognises that a significant portion of the current industrial zoned land is either vacant or unused, particularly at Macksville where approximately 10 hectares is currently unutilised. The strategy advocates a ratio of 3ha/ 1,000 people to accommodate future industrial land for a potential population of 50,100. Table 9 below outlines the requirements for future industrial land as a result of the estimated population projections for the various locations within the Shire.

Table 9 Future Industrial Land Requirements

Location	Estimated Population Capacity	Industrial Land Requirement**	Industrial Land Existing Zone	Additional Industrial Zone
Nambucca	8,000	24	26.4	-2.4
Macksville/ Congarinni	13,800	41.4	47.5	-6.1
Bowraville	1,500	4.5	7	-2.5
Valla Beach	4,000	12	-	12
Scotts Head	2,400	7.2	-	7.2
Boggy/ Cow Creeks	7,300	21.9	-	21.9
Rural and Villages	13,100	39.3	-	39.3
Total	50,100	150.3	80.9	69.4

** Overall allocation at 3.0 ha/ 1,000 persons

Source: Commercial and Industrial Strategy, 1996

The strategy identified a number of strategies in identifying the suitability of land within the Shire for industrial use. The first was a dispersed strategy whereby industrial land is provided as close as possible to population centres to meet the immediate needs of each area. The second was a centralised strategy whereby land is identified within the Nambucca, Macksville, Bowraville triangle. The third strategy involved the identification of land along the entire highway corridor.

The overall strategy adopted for the Shire was as follows:

1. Reinforce the Nambucca Heads industrial area by extending the existing 4(a) zone.
2. Reinforce the Macksville industrial area by extending the existing 4(a) zone.
3. Provide for a substantial new industrial area at Boggy Creek Urban Release Area.
4. Avoid the establishment of industrial zones at Scotts Head and Valla Beach to reinforce their coastal village character.
5. Permit industrial uses on rural land, provided Council is satisfied that the function of other industrial areas would not be compromised.

At the request of NSC, the strategy also included an investigation into the possibility of rezoning parts of the study area for bulky goods retailing.

The investigation revealed that major constraints to development of the study area for bulky goods retailing or industrial development exist as a result of a lack of utility services in the area, flood prone land, SEPP 14 wetlands, bushfire hazard, adjoining rural-residential development, adverse traffic safety and movement implications on Pacific Highway, the fragmented nature of the area and the potential to increase strip

development. Furthermore the investigation found that the study area would be remote from Nambucca Heads residents and that there was a lack of demand for bulky goods retailing in the Nambucca area.

Nambucca Industrial Land Release Strategy

NSC recognised in 2001 that the Nambucca Shire had a shortage of quality zoned industrial land, evidenced by the near capacity of the Nambucca Heads Industrial Estate and the constraints to the further development of the Macksville Industrial Estate.

NSC subsequently engaged consultants, DeGroot and Benson to prepare the Nambucca Industrial Land Release Strategy. The strategy suggests that land zoned for industrial purposes, both developed and undeveloped in the Shire is 90 ha with about 20 ha being zoned but undeveloped and possibly as great as 50% not being suitable for industrial development by virtue of topography or some other constraint.

The strategy involved a series of interviews with relevant stakeholders to identify possible locations for future industrial land in the Shire and similar to the 1996 Strategy, identified a list of criteria for determining suitable industrial land. Amongst other options considered by the strategy were the following locations:

- Lower Nambucca locality;
- Old Coast Road Corridor; and
- Macksville Industrial Estate.

The strategy recommended that the first priority in the short term be the Lower Nambucca area.

GHD Review of Industrial Land Demand

Both the 1996 and 2001 Strategies have tended to forecast land supply requirements, using a standard ratio of 3.2 ha per 1,000 persons, rather than demand, for business and industry activities. This measure does not distinguish between local, district and regional needs or demand for business and industry lands. If land supply requirements are used, then one can merely guess that of the 3.2 ha per 1,000 population, 0.5 to 1.2 ha might be to satisfy local demand, whilst the remaining 2 to 2.7 ha are to satisfy district and regional demand.

Given the current make-up of the industrial sector which includes local, regional, national and international companies within the Nambucca Shire, it is reasonable to assume for estimation purposes that 3.2 ha of land per 1,000 population should be provided for business and industry lands to meet not only local demand but also regional demand. Using this assumption, the Nambucca Shire with a revised projected population of 21,700 in 2026, would require a total of 69.4 hectares of industrial land to facilitate development and employment within the LGA. It is worth noting that current industrial zoned land (developed and undeveloped) totals 90 ha already and whilst 10 ha of this land may not be developable, sufficient zoned land exists within the Shire to satisfy demand until 2026.

Industrial Land Budget Model

Whilst the above estimation gives an indication of likely industrial land requirements, a more accurate method has been developed by the Queensland Department of State Development (DSD). In the absence of any New South Wales model, the DSD model is considered to be a more comprehensive method of estimating industrial land requirements through a process of:

- estimating likely population growth;
- projecting employment demands of the population base;
- determining the percentage of employment required for specific industry sectors;
- using predetermined density benchmarks, calculating employees per unit area; and
- estimating likely spatial demand.

In order to establish a better appreciation of the type of industrial land likely to be required in Nambucca, the above land budgeting model has been applied to the Shire. The findings are described below.

Population Projections

Based on ABS statistics, the current population of Nambucca (2002 estimate) approximates 18,233 persons.

The projected population to the years 2006, 2011, 2016 and 2026 is shown in Table 10.

Table 10 Population Projections for Nambucca Shire

	1996	*2001*	*2006*	*2011*	*2016*	*2026*
Nambucca Shire	17,639	18,171	19,000	19,800	20,600	21,700

(Source: Nambucca Shire Council, 2003)

Participation Rates

The Nambucca Shire is predicted to have 21,700 persons by the year 2026. Given that the total available workforce in any given area is generally accepted to be 45% of the total population, the Kempsey Shire is likely to have a workforce population projection of 9,765 persons by 2026.

However, this assumes full employment and no leakage of employees from the local community. Low and high participation rates can be derived by making the following assumptions:

Low - 20% of the combined workforce is unemployed.

- 10% of the remaining workforce is employed outside the Shire.

This would equate to an overall *low* workforce participation rate of 31.5%.

High - 10% of the combined workforce is unemployed.

- 5% of the remaining workforce is employed outside the Shire.

This would equate to an overall *high* workforce participation rate of 38.25%.

Full Assumes no unemployment and no workforce employed outside the Shire.

This would equate to a *full* workforce participation rate of 45%.

By applying these rates to the projected population, the total workforce at target years can be projected, as shown in Table 11.

Table 11 Projected Workforce Participation

Participation	2006	2011	2016	2026
Low Participation 31.5%	5,985	6,237	6,489	6,836
High Participation 38.25%	7,268	7,574	7,880	8,300
Full Participation 45%	8,550	8,910	9,270	9,765

Employment by Industry

The workforce can then be broken down by sector, based on the proportion of workforce in each industry sector identified in the 2001 Census.

Table 12 Employment by Industry

Industry	Persons	%
Agriculture, Forestry and Fishing	519	10.3
Mining	16	0.3
Manufacturing	354	7
Electricity, Gas and Water Supply	38	0.8
Construction	418	8.3
Wholesale/ Retail Trade	1,021	20.2
Accommodation, Cafes and Restaurants	383	7.6
Transport and Storage	198	3.9
Communication Services	54	1.1
Finance and Insurance	128	2.5
Property and Business Services	303	6

Industry	Persons	%
Government Administration and Defence	218	4.3
Education	451	8.9
Health and Community Services	589	11.6
Cultural and Recreational Services	77	1.5
Personal and Other Services	171	3.4
Non-classifiable economic units	15	0.3
Not stated	103	2
Total	5,056	100

(Source: ABS, Census 2001)

Using Table 12 above, the following industry sectors can be extracted to establish the percentage of the workforce employed in local and district industries and that would require suitably located industrial zoned land. These are:

- Manufacturing 7%

  Further divided into:

  Modern General Industry – (60% of 7%) *(4.2%)*

  Heavy Industry – (40% of 7%) *(2.8%)*
- Transport & Storage 3.9%
- Other Sectors – (30% of 34.2%) 10.26%

  (Principally depot and service facilities for Electricity, Gas and Water, Construction Wholesale and Retail Trade, Recreation, Personal and Other Services and Non Classifiable to account for bulky goods retailing within industrial zones.)
- Total 21.16%

Modern General Industry refers to low to medium impact industrial activities including service industries.

Heavy Industry refers to those activities which, by virtue of the nature of activity or scale of operation, have potential to create higher levels of impacts on surrounding land use.

Projected Workforce

Table 13 depicts the projected workforce by sector.

Table 13 Projected Workforce by Sector

Sector		Sector Workforce			
		2006	2011	2016	2021
Low Participation Rate					
Modern General Industry	4.2%	251	262	273	287
Sector		**Sector Workforce**			
		2006	2011	2016	2021
Heavy Industry	2.8%	168	175	182	191
Transport & Storage	3.9%	233	243	253	266
Miscellaneous	10.26%	614	640	666	701
Total	21.16%	1,266	1,320	1,373	1,446
High Participation Rate					
Modern General Industry	4.2%	305	318	331	349
Heavy Industry	2.8%	203	212	221	232
Transport & Storage	3.9%	283	295	307	324
Miscellaneous	10.26%	745	777	808	852
Total	21.16%	1,538	1,603	1,667	1,756
Full Participation Rate					
Modern General Industry	4.2%	359	374	389	410
Heavy Industry	2.8%	239	246	260	273
Transport & Storage	3.9%	333	347	362	381
Miscellaneous	10.26%	877	914	951	1,002
Total	21.16%	1,809	1,885	1,962	2,066

The above workforce estimates can now be translated into spatial requirements based on benchmarks for employment numbers/hectare provided in the Queensland DSD information paper *"Establishing Future Business and Industry Land Requirements"*. These are as follows:

- Modern General Industry - 30 employees / ha
- Heavy General Industry - 18 employees / ha
- Transport and Storage - 20 employees / ha
- Miscellaneous - 25 employees / ha

By applying the above employment numbers/ hectare, a land area can be determined. Table 14 shows the projected land requirements by sector.

Table 14 Projected Land Requirements (ha)

Sector	Worker Density	Land Budget (ha)			
	(persons/ ha)	2006	2011	2016	2021
Low Participation					
Modern General Industry	30	8.4	8.7	9.1	9.6
Heavy Industry	18	9.3	9.7	10.1	10.6
Transport and Storage	20	11.7	12.2	12.7	13.3
Miscellaneous	25	24.6	25.6	26.6	28.0
Total		**54.0**	**56.2**	**58.5**	**61.5**
High Participation					
Modern General Industry	30	10.1	10.6	11.0	11.6
Heavy Industry	18	11.3	11.7	12.3	12.8
Transport and Storage	20	14.2	14.8	15.4	16.2
Miscellaneous	25	29.8	31.1	32.3	34.1
Total		**65.4**	**68.2**	**71.0**	**74.7**
Full Participation					
Modern General Industry	30	12.0	12.5	13.0	13.7
Heavy Industry	18	13.3	13.7	14.4	15.2
Transport and Storage	20	16.7	17.4	18.1	19.1
Miscellaneous	25	35.1	36.6	38.0	40.1
Total		**77.1**	**80.2**	**83.5**	**88.1**

The resultant industrial land population ratios to 2026 would be as follows:

- Low Participation - 2.834 ha / 1000
- High Participation - 3.442 ha / 1000

- Full Participation - 4.06 ha / 1000

For comparison purposes, the existing utilised industrial land population ratio is currently 3.8 ha/1000 (70 ha/ 18,233).

Based on the above figures, the amount of industrial land required by 2026 by sector would be as follows:

Table 15 Projected Land Requirements for 2026 (ha)

Sector	Low	High	Full
Modern General Industry	9.6	11.6	13.7
Heavy Industry	10.6	12.8	15.2
Warehousing and Storage	13.3	16.2	19.1
Miscellaneous	28.0	34.1	40.1
Total	**61.5**	**74.7**	**88.1**

The amount of land occupied by existing industrial development as at December 2001, was 70 hectares. Vacant unconstrained land suitable for future industrial development is considered to be in the order of 16.7 ha. Assuming full participation of the workforce to 2026 (appropriate given that industrial land will still be required beyond 2026), an additional 1.4 ha of land suitable for industrial purposes will be required to accommodate future industrial development and employment generating industries within the Nambucca Shire.

While it is recognised that the Shire boasts 86.7 ha of developable industrial land, the above analysis indicates that only a negligible shortage of unconstrained land would be available for industrial development in the Shire by the year 2026, if no further land is appropriately rezoned.

Given that the Boggy/ Cow Creek area will provide in the order of 30 ha to supplement that vacant unconstrained land which is currently available for industrial development at Macksville and Nambucca Heads, the provision of additional land for industrial purposes is considered unnecessary especially given the less constrained land identified at Old Coast Road corridor and Macksville.

7.3 Proposed Land Uses

As previously identified, the documented aspirations of the relevant landowners within the Lower Nambucca area are as follows:

- Site 1 - 1(a1) Rural Residential to 4 (b) Industrial (Business),
- Site 2 - Part 1(a2) Rural (Prime Agriculture/ Flooding) and Part 1(a1) Rural to either 2(d) Residential (Tourist) or 1(a1) Rural Residential;
- Site 3 - 10 Tourist (Low Density) to 4(b) Industrial;
- Site 4 - Part 10 Tourist (Low Density) and Part 1(a2) Rural (Prime Agriculture/ Flooding) to 4(b) Industrial (Business).

Diagrams 19 and 20 illustrate the proposed development for Sites 1 and 3/4 respectively.

7.4 Alternative Land Uses

7.4.1 Potential Roles for the Study Area

Based on previous research and discussion of the relative constraints and opportunities associated with the study area and the wider Nambucca locality, the following discussion describes the merits of the various possible land use roles for the study area.

Rural/ Agricultural Uses

The majority of the study area is currently zoned for rural purposes. Although some of the study area has been used for rural purposes in the past, it is considered that agricultural pursuits would not be sustainable in the long term as significant areas of the study area, particularly Sites 1 and 3 contain large areas of native vegetation.

It is likely that the study area's value for this purpose is diminished compared to the opportunities for the land to help satisfy the future tourism needs within the Shire.

Extractive Industry Use

Site 4 has previously been approved for the purposes of a screening plant. That approval extends to gravel screening plant, stockpiling and mobile office on part of the land. NSC have recently advised the landowner that whilst existing use rights exist over the land, it appeared from site inspections that little if any stockpiles of screened material exist and screening plant appeared to be in need of repair.

Despite this and given the NSW Department of Mineral Resources advice regarding the protection of the resource and limited resource available, it is recommended that an analysis of the remaining resource be undertaken to determine the life of the operation prior to any future development of the site.

Residential Use

A number of constraints exist to the development of the study area for residential purposes. These include:

- The majority of the study area is affected by the 1 in 100 year flood event;
- The adjoining Nambucca State Forest has been categorised as having a high bushfire hazard;
- The location of the existing Pacific Highway severely impacts on the study area with regard to noise;
- Residential development is likely to have a significant impact on the native vegetation and fauna habitats within the study area as a result of the introduction of cats and dogs;
- The study area is removed from any existing residential area within the Nambucca;
- No sewer currently services the study area;

LANDSCAPED ENTRY POINT

FLORENCE WILMONT DRIVE

KENNWAL MOTORS

PROPOSED INTERNAL ROAD

LOT 21 3,000 m²

LOT 20 3,500 m²

LOT 22 6,000 m²

LOT 33 2,800 m²

LOT 32 2,000 m²

LOT 31 2,000 m²

LOT 30 2,500 m²

LOT 29 3,200 m²

E.P.P. No. 14
WETLAND No. 370
(APPROXIMATE LOCATION ONLY)

SWAMP

PROPOSED ROAD

LOT 23 3,000 m²

LOT 28 3,500 m²

LOT 19 2,000 m²

LOT 24 2,200 m²

LOT 25 2,800 m²

LOT 26 3,700 m²

LOT 27 3,200 m²

LOT 1 3,000 m²

SSM 33562

LOT 18 2,200 m²

OPEN DRAINAGE RESERVE

PROPOSED ROAD

OPEN DRAINAGE RESERVE

LOT 11 3,000 m²

LOT 12 2,000 m²

LOT 13 2,000 m²

LOT 14 2,000 m²

20 METRES WIDE

FUTURE LINK TO LOTS 4 AN D.P. 749153 AN LOT 301 D.P. 75

LOT 2 3,000 m²

LOT 17 3,200 m²

LOT 3 3,500 m²

LOT 16 4,000 m²

LOT 15 4,000 m²

LOT 10 3,200 m²

PACIFIC HIGHWAY

LOT 4 3,000 m²

PROPOSED INTERNAL ROAD

LOT 9 4,000 m²

LOT 8 4,500 m²

LOT 5 4,500 m²

LOT 6 4,500 m²

LOT 7 4,000 m²

SSM 33564

SSM 33563

SOURCE: TOWNPLANNING CONSULTANTS & DRAFTING SERVICES PTY. LTD.

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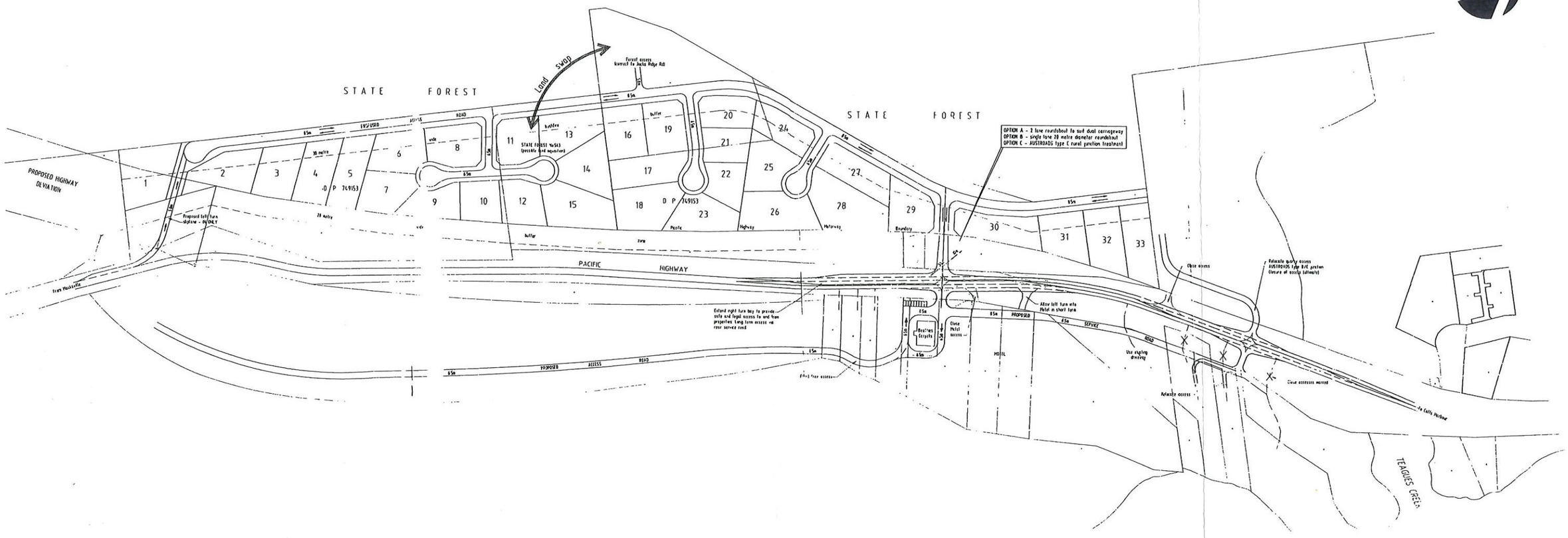
Nambucca Shire Council

NAMBUCCA VALLEY

PROPOSED SUBDIVISION SITE 1

diagram 19.



SOURCE: ROADNET PTY. LTD.

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Nambucca Shire Council

NAMBUCCA VALLEY

PROPOSED SUBDIVISION SITE 3

diagram 20.

Rural residential allotments could be acceptable within the study area, particularly within Site 2, consistent with those allotments that exist within the Kingsworth Estate. Activities conducted on these allotments would need to be closely managed to maintain the integrity of adjacent sensitive areas.

Tourism/Recreation/Open Space Uses

Nambucca Heads is an established tourist destination, evidenced by the number of vacant dwellings used as holiday houses and the number of accommodation beds and sites.

The expansion potential of the local tourism and recreation market, such as accommodation resorts, 'eco-tourism' lodges and golf courses, is difficult to quantify. These types of developments require a developer willing to test the market by investing significant funds in a largely untested local market. Clearly, those parts of the study area which are in close proximity to SEPP 14 wetlands which remain close to their natural state, have the greatest potential in attracting tourism development. The obvious challenge is whether such developments could be both financially viable and protect and maintain the significant environmental assets which also exist in these areas.

It is our preliminary conclusion that appropriately sited tourism and recreation development, in conjunction with open space, if sensitively planned and managed, has the potential to be compatible with the environmental attributes of the study area.

Industrial/ Commercial Land Uses

Whilst the study area has excellent accessibility from the Pacific Highway and has previously been identified for future industrial land development, a number of constraints have been identified which affect the ability of the study area to sustain industrial/ commercial land development including:

1. The study area is not currently serviced by a sewer;
2. Large parts of the study area are flood prone, requiring substantial areas of fill with possible impacts on downstream water sensitive receptors (SEPP 14 wetlands);
3. The study area is located some distance from established retail and industrial locations. Establishment of the area for employment land development has the potential to adversely affect the viability of existing and proposed commercial and industrial areas in Nambucca Heads and Macksville.
4. Industrial/ commercial land needs appear to be adequately met within the existing industrial/ commercial zones within the Shire. While the existing industrial area at Nambucca is for the most part fully developed, the additional 4.4 hectares of land should adequately meet industrial land needs in the short term.
5. The land is well located for the purposes of highway passing traffic but is remote for those Nambucca Head residents who could be expected to provide the majority of workforce/ patronage for industrial/ commercial development in this area.

6. The development of the area for industrial/ commercial land development would increase the appearance of strip development that is noticeable along the highway south of Nambucca.
7. Apart from the study area proposed for rezoning, there is little evidence of demand for industrial land development at present in the Nambucca area.
8. Environmental constraints such as bushfires would require the establishment of buffers that would severely limit the development potential of the land. Land on the east of the highway adjoins a State Environmental Planning Policy 14 Wetland.
9. The study area is fragmented by way of the highway, State Forest, Crown reserve land making establishment of a functional industrial area difficult. Higher servicing costs might act as a significant constraint to development.
10. Land at the northern and southern end of the study area west of the highway contains land uses that may be in conflict with any industrial/ commercial development within the study area. An industrial area would require an extensive buffer to avoid adverse effects on the amenity of adjoining rural- residential land.

The industrial/ commercial development of the study area would also jeopardise the centralised strategy adopted by the 1996 Commercial and Industrial Strategy. Whilst the land has been earmarked for industrial development by the 2001 Industrial Land Release Strategy, the Strategy notes that:

> *"future development of the Lower Nambucca site for urban purposes, specifically industrial purposes, would require significant drainage and flooding strategies to address the potential impacts on the hydrology, flooding, and wetland values of this site, and on its immediate environs. The site's proximity to State Forest and to other forested areas on private property, and the flora and fauna values these areas represent would require further study. In view of these factors, a LES would be required to establish the ability of the proposed site to accommodate future urban development, and a suite of studies would accompany the preparation of the LES."*

Given the cumulative effect of the environmental constraints affecting the study area, that land suitable for rezoning to industrial/ commercial appears negligible.

7.5 Development Options

In order to establish the most appropriate land uses within the study area, two development options have been considered for evaluation.

7.5.1 Option 1

For assessment purposes the first development option examined correlates to the proposed intentions of the current land owners, reflected in the preliminary subdivision plans which have been prepared for Sites 1 and 3/4 respectively. This option comprises:

- The development of Sites 1, 3 and 4 for industrial purposes including development in and adjacent to SEPP 14 wetlands and other wetlands;

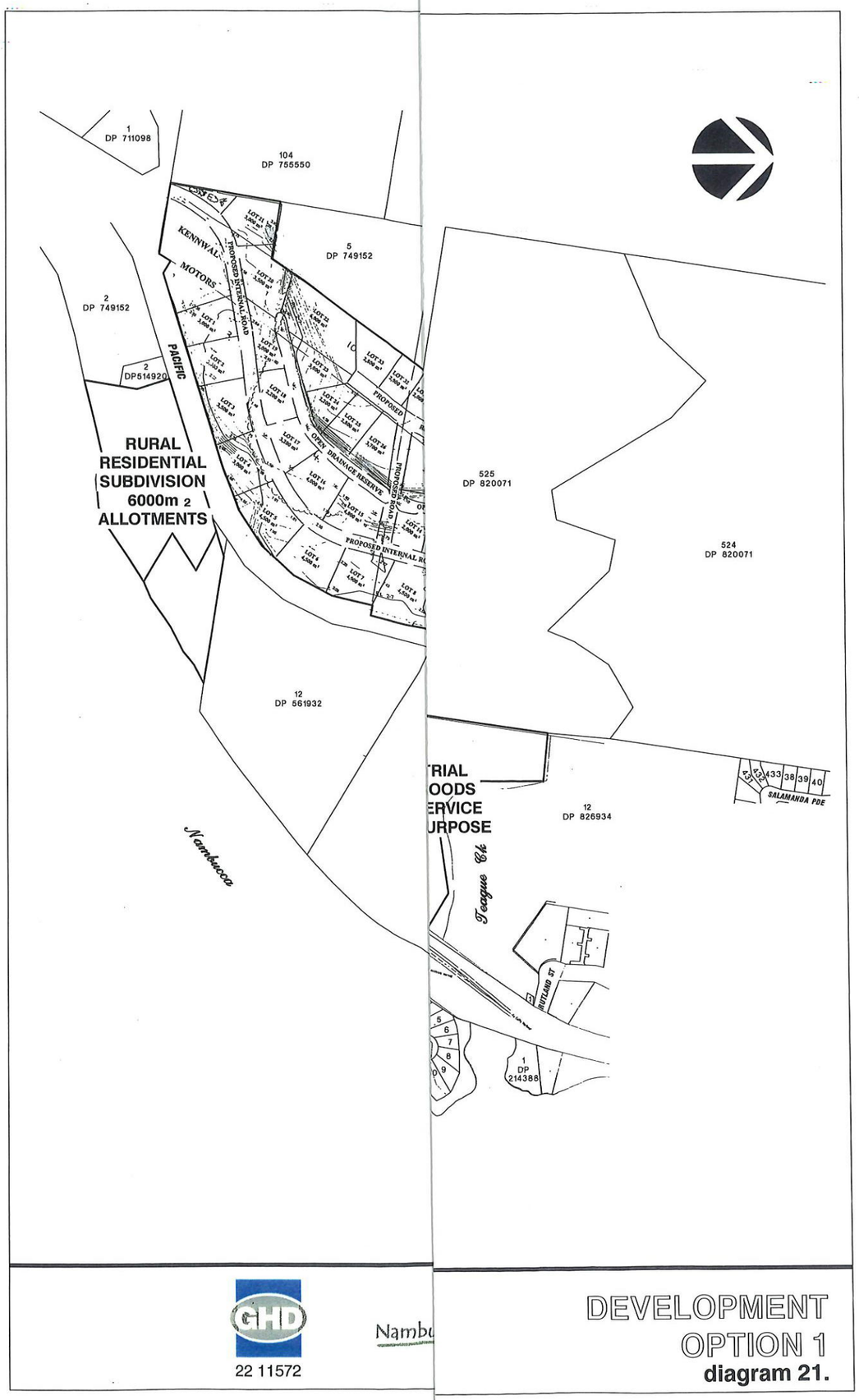
- The development of Site 2 for residential purposes.

7.5.2 Option 2

The second development option has been prepared following investigation of the environmental constraints discussed in Section 5 and 6. The option has been prepared taking account of ecologically sustainable development principles. This option comprises:

- no development in the gazetted SEPP 14 wetlands and other identified wetlands;
- limited development (for example, eco-tourism development) within unconstrained areas (if demonstrated to be ecologically sustainable);
- limited industrial development over the existing motor showroom on Site 1; and
- rural-residential development of Site 2.

The development options are shown in Diagrams 21 and 22 respectively. The following section assesses the merits of these development options for the study area.



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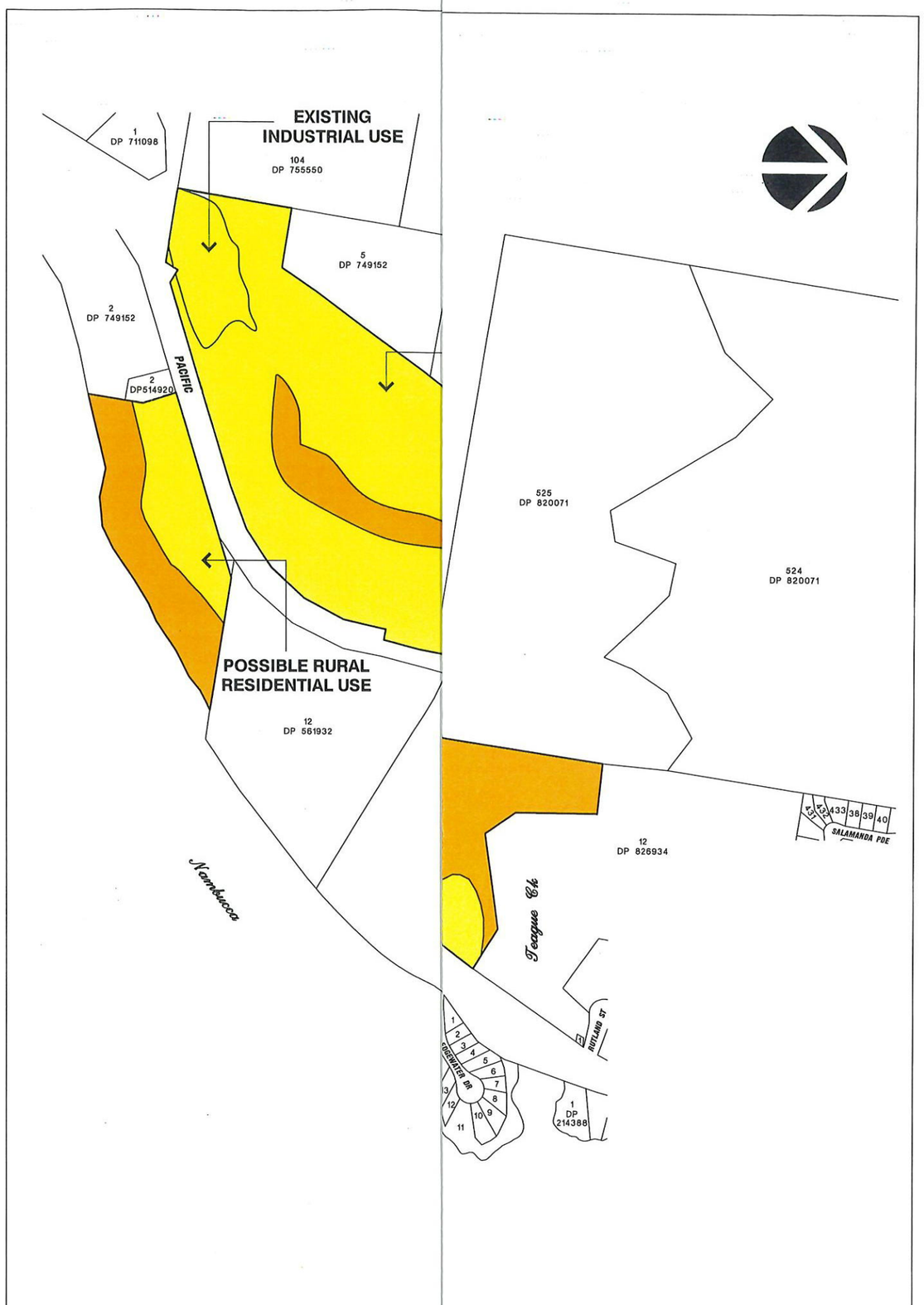
DEVELOPMENT OPTION 1

diagram 21.



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DEVELOPMENT OPTION 2

diagram 22.

8. Evaluation of Land Use Options

This section evaluates the development options for the study area, as presented in Section 7. In evaluating each of the options, consideration has been given to controlling future development within environmental limits, protecting and preserving conservation values and managing future land development.

8.1 Development Option 1

Development Option 1 involves either the industrial or residential use of the study area in line with the documented aspirations of the current landowners. The industrial development of Site 1 would be consistent with the recommendations of the Nambucca Industrial Land Release Strategy.

A significant portion of the study area would be developed under this option including those areas identified as having wetland attributes. This option maximises the development within the study area at the expense of identified environmental constraints.

8.2 Development Option 2

Development Option 2 comprises a mix of limited industrial, rural-residential and eco-tourism uses. In this regard, this option proposes a more balanced land use scenario for the study area.

This option results in more land being designated for conservation purposes and recognises the value of the land for tourism uses.

This option ensures that the urban area of the Nambucca Heads/ Bellwood area is contained and limits the impact of strip development along the Pacific Highway.

8.3 Evaluation of Development Options

An assessment of each development option has been made in relation to the inherent environmental characteristics of the study area.

Table 16 Evaluation of Development Options

Development Scenario	Likely Impacts						
	Identified Wetlands	Flooding	Significant Vegetation	Visual Amenity	Acid Sulfate Soils	Geotechnical Constraints	Noise from Highway
Industrial Development	H	H	H	H	M	H	L
Residential Development (Site 2 only)	M	L	L	H	M	M	H
Rural-Residential Development	L	L	L	M	L	L	M
Tourism Development	L	L	L	L	L	L	M

n.b H = High impact, M = Medium impact, L = Low impact, N/A = Negligible impact

8.4 Preliminary Development Cost Estimates

Given Development Option 1 represents the greatest level of development over the study area, consideration was given to the likely costs of development under Development Option 1 for each site.

Site 1

The detailed investigations and conceptual design required to prepare accurate estimates of cost for services and infrastructure to service development of the study area is outside the scope of this study. However, based on previous estimates of cost prepared by consultants, DeGroot and Benson Pty Ltd as part of the Nambucca Industrial Land Release Strategy in 2001, indicative development costs based on similar development sites, we have prepared preliminary budget estimates for each site.

A review was undertaken of an estimate of costs for servicing of Site 1, prepared by DeGroot and Benson Pty Ltd in September 2001.

Based on the schedule of quotations prepared by DeGroot and Benson Pty Ltd we have updated the estimate of cost for Site 1 as follows.

Description	Estimated Cost
Bulk Earthworks based on 50% "cut to fill" and 50% "imported fill" (see note below)	$2,390,000
Roadworks	$704,000

Water Supply	$240,000
Sewerage Reticulation: – Pumping Station – Rising Main	 $125,000 $195,000
Stormwater Drainage	$490,300
Sub-Total	$4,144,300
Contingency 30%	$1,243,290
Total (excluding Council fees, contributions, Country Energy, Telephone Services, survey and design costs)	$5,587,590
Development Cost per lot (based on 34 lots)	$158,458/lot

In the absence of geotechnical investigation estimates of costs for bulk earthworks can be indicative only. Should unstable subgrade be encountered, requiring removal of significant depth of unstable weak alluvium, followed by installation of geotextile filter fabric and possibly rock ballast prior to placing imported fill or reworking excavated material after drying to suitable moisture content, bulk earthworks cost could exceed estimated cost by a significant amount.

Electrical power infrastructure and servicing costs by County Energy have not been investigated to date.

Adopting estimates prepared by DeGroot and Benson Pty Ltd for electricity reticulation, town planning fees, and survey/engineering design costs the total estimated cost is $5,642,590.

Development cost per lot based on 34 lots is $165,958.

Site 2

Detailed development proposals have not been prepared, nor engineering investigation and design undertaken for Site 2.

It is likely that a dedicated sewerage pumping station would be required to service this site.

Considering the relatively small size of this site, along with the fact that possibly only 2 – 3 rural-residential allotments or 14 residential allotments would be created, it would be expected that development costs, per allotment, would be approximately 15 to 20% greater than for Site 1.

Until more detailed investigation and design are undertaken it is considered reasonable to adopt a preliminary estimated cost of $199,000 per lot within Site 2, for preliminary economic analysis purposes.

The total preliminary budget estimate for servicing of this site (dependent upon its use for rural residential or residential purposes) would be between $398,00 and $2,786,000.

Site 3

Detailed development proposals have not been prepared, nor engineering investigation and conceptual designs prepared for Site 3. It is possible that up to 24 industrial allotments could be created on this site.

It is likely that two dedicated sewerage pumping stations and rising mains would be required to service this site.

Considering the relative size and configuration of this development site, and consequential inefficiency in servicing such sites, it would be expected that development cost per allotment would be 25 to 30% greater than Site 1.

Until more detailed investigation and design is undertaken it is considered reasonable to adopt preliminary estimated development costs of $215,700 per lot within Site 3 for preliminary economic analysis purposes.

The total preliminary budget estimate for services of this site is $5,876,800.

Site 4

Detailed development proposals have not been prepared, nor detailed engineering investigation and design undertaken for Site 4. It is likely however that only one industrial allotment would be created on this site.

It is likely that a dedicated sewerage pumping station and rising main would be required to service this site.

Considering the relative size and configuration of this site, and consequential inefficiency in servicing such a site, it would be expected that development costs, per allotment, would be approximately 20 to 25% greater than for Site 1.

Until more detailed investigation and design are undertaken it is considered reasonable to adopt a preliminary estimated cost of $207,500 to service this site, for preliminary economic analysis purposes.

Summary

Given the cost estimates identified above and the current industrial land prices within the Shire, the development of each site for either industrial, rural-residential or residential land purposes appears uneconomical at this time.

8.5 Preferred Land Use Strategy

Based on an assessment of Development Options 1 and 2 against the relevant environmental characteristics of the study area and the principles of ecologically sustainable development, Development Option 2 is considered to be the preferred land use option for the study area.

9. Sustainable Management Principles

In order to ensure that any future development of the study area occurs in a sustainable manner, a number of management principles have been established and should be used to guide the future development of the study area.

9.1 Environmentally Sustainable Development

This section outlines recommended principles to ensure that any future development of the study area conforms with the principles of Ecologically Sustainable Development (ESD).

The key principles of ESD are:

- The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.
- Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.
- Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services.

Table 17 indicates the matters that would need to be considered in the future development of the study area to comply with the basic principles of ESD.

Table 17 ESD Principles

ESD Element	Comment
Implementation of the Precautionary Principle	The precautionary principle is the need to avoid serious or irreversible damage after careful consideration of environmental issues. In keeping with this principle, an approach of 'avoid, minimise, mitigate' should be employed. As a first priority, the avoidance of impacts on areas or issues of environmental sensitivity should be employed where practical. In circumstances were avoidance cannot be achieved, the second priority is to minimise impacts with mitigation of impacts being the third priority. While information on specific matters addressed in this LES is in some instances incomplete due to lack of scientific certainty, the proposed management strategies account for, as far as practicable, information gaps including additional research.

ESD Element	Comment
Inter-generation equity	Issues of inter-generational and intra-generational equity should be integral to any future development of the study area. In particular, management measures are aimed at protecting environmental and cultural heritage for the benefit of future generations.
Conservation of biological diversity	The conservation of biological diversity and ecological integrity is a fundamental consideration for future development of the study area. Avoidance of impacts on wetlands and significant natural areas will be an important influence in the selection of future development.
Valuation of environmental resources	As a preferred option has not been selected, an economic analysis of the rezoning cannot be carried out at this stage. However, partial quantification of some development costs has been outlined in this report.

9.2 Statutory Planning Considerations

To ensure that any future development of the study area achieve the principles set out in the *EPA Act* as well as ESD principles, a range of environmental planning instruments and supporting documents should be prepared. These will include a Local Environmental Plan, Masterplan and Development Control Plan and Contributions Plan.

Considerations relating to these documents are outlined in the following sections. Subsequent sections outline the specific matters that would be contained within these documents (eg stormwater, water quality management).

The investigations undertaken as part of this as part of this LES, and the creation of appropriate statutory documents which embody the principles outlined above will ensure that future development complies with all relevant regional and local planning instruments, including the North Coast Regional Environmental Plan 1988 and Nambucca Local Environmental Plan 1995.

9.2.1 Local Environmental Plan

Given the significance of the study area in terms of natural, social and cultural values, a specific Local Environmental Plan is required. This would set out aims and objectives based on the principles nominated in this Section and the LES generally.

9.3 Acid Sulfate Soil Management

Any future development within the study area should be subject to the provisions of an ASS Management Plan. Appropriate measures to be incorporated within the plan would include:

- If any ASS is found during construction then all activities would cease pending an immediate risk assessment.

- Alternate methods of construction would be canvassed if ASS is found. If ASS needs to be excavated then serious consideration would be given to its proper management such as neutralisation with lime, burying the spoil beneath the groundwater table or transport to a secure landfill.

9.4 Stormwater and Water Quality Management

It is a fundamental ESD principle that water quality impacts from any future development be considered in a total catchment management context. The change from rural to residential land use has potential for increases in the export on non-source point pollutants. Particular attention needs to be placed on stormwater quantity and quality controls for the site. This section outlines a number of measures to address potential water quality impacts.

It will also be necessary that stormwater treatment, sediment and erosion control and water quality monitoring be implemented and monitored. The *'Australian Guidelines for Urban Stormwater Management'* 2000 investigates a number of stormwater management techniques, the Department of Housing (1998) '*Managing Urban Stormwater: Soils and Construction'* 3rd edition NSW Government (known as the Blue Book) contains a number of techniques for sediment and erosion control. Issues raised by these documents are included in the discussion below.

9.4.1 Target Water Quality for Residential Development

The target water quality for stormwater runoff leaving the development areas and rural areas is to be of a quality fit for primary contact, recreation and aquatic ecosystem protection. Table 17 contains the parameters and associated target water quality.

The targeted water quality parameters for stormwater leaving any proposed development will require large areas for structural stormwater treatment measures such as wetlands and Water Pollution Control Ponds (WPCP). A variety of stormwater treatment measures that are discussed below will be required to reduce the size of any structural measures used to meet targeted water quality.

Table 18 Water Quality Monitoring Parameters

Parameter	Baseline Monitoring	Event Monitoring
Suspended Solids	Yes	Yes
Total Phosphorus (TP)	Yes	Yes
Total Kjeldahl Nitrogen (TKN)	Yes	Yes
Oxidised Nitrogen (NO_x)	Yes	Yes
Total Nitrogen (TN)[1]	Yes	Yes
Faecal Coliforms (FC)	Yes	Yes
Dissolved Oxygen (DO^2)	Yes	No

Parameter	Baseline Monitoring	Event Monitoring
Temperature[2]	Yes	No
Turbidity[2]	Yes	No
pH[2]	Yes	No
Conductivity[2]	Yes	No
Groundwater level [2]	Yes	No

[1] Total Nitrogen is calculated as the sum of TKN and NO_x

[2] These parameters can be measured in the field using a portable probe

9.4.2 Strategy for Ongoing Collection of Water Quality Data

Due to the lack of data available for the immediate receiving waters of the study area (ie. SEPP 14 Wetlands, Teagues Creek and Nambucca River), it is recommended that a program be implemented to establish baseline water quality data.

The length of the water quality testing program should cover the duration of existing, construction and post-development phases. The costs of these investigations should be the responsibility of the developer.

9.4.3 Surface Water Quality Management

The following measures are recommended to control surface water quality:

- Identify sources or 'hotspots' of land subject to erosion, in particular areas of land that may contain excess nutrients particularly phosphorous.
- Revegetate land where erosion has been identified or disturbed.
- Prepare a specific Stormwater Management Plan to include structural and non-structural control measures.
- Implement water quality monitoring program implemented by the NSC or other recognised water quality monitoring program.
- Water quality monitoring site at each wetland in order to establish baseline water quality information for flows from the study area.
- The program should involve intensive monitoring (weekly to fortnightly) during summer when algae levels are more prominent and monthly during winter.
- The program is designed to provide baseline data for the watershed from the study area and flowing into the various wetlands and therefore provide an understanding of how this may be affecting both Teagues Creek and the Nambucca River.
- The program should identify ways of reducing pollutant inputs to downstream waters as a priority strategy.

9.4.4 Groundwater Quality

There is insufficient groundwater quality data over the study area to assess existing pollutant levels. A groundwater quality-monitoring program is required to establish the existing groundwater quality conditions and the potential impact of development on groundwater.

Prior to development of any future urban area, groundwater testing locations should be installed to establish the existing groundwater conditions. Ongoing testing on a monthly basis will be required to determine the impact of development on groundwater quality and quantity. The costs of these investigations should be the responsibility of the developer.

9.4.5 Water Quality Parameters for Ongoing Monitoring

Water quality testing is an expensive exercise, so it is important to test for parameters that are relevant to the purpose of the testing program. Table 18 contains the water quality monitoring parameters to be tested for future sampling programs. All water quality testing and reporting should be undertaken in accordance with the *"ANZECC Guidelines for Water Quality Monitoring and Reporting"* 2000. The costs of these investigations should be the responsibility of the developer.

9.4.6 Stormwater Management

Development within a catchment increases the frequency of runoff due to increasing the impervious area within the catchment. Non-urban aquatic ecosystems are generally not subject to frequent storm events. Reducing run-off volumes from frequent stormwater events will greatly assist in reducing the pollutant load. In an urban catchment, 90 – 95% of the average annual runoff volume will be generated from stormwater events with less than a three month ARI. It is for this fact that stormwater quality controls target peak flow rates that are far less than control measures used to reduce peak flow rates.

9.4.7 Integrated Water Cycle Management

An Integrated Water Cycle Management (IWCM) approach is designed to use water sensitive urban design elements and contribute to achieving the water quality and river flow objectives of the Nambucca River catchment, as the principles of IWCM are highly applicable to urban development.

The principles of water sensitive urban design could be assigned to the stormwater channels by providing rock edges, pools and ripples and not conventional hard concrete lined channels. Wetlands and GPT's could be used to control gross pollutants and address water quality. Drainage swales could be provided along roads rather than traditional concrete kerb and gutter. However this would not be applicable at the intersections due to the heavy truck turning movements. Culverts under roads would provide suitable access for fish and other animals to move along the riparian waterways.

Roof water could be collected for use on landscaping and potentially toilet flushing. However to meet the river flow objectives for Nambucca River not all the stormwater could be collected into tanks as some water would have to be diverted to maintaining the flow within the stormwater drainage system.

The following control measures are suggested as a minimum for any development that may occur in the study area (refer also 'Managing Urban Stormwater: Soils and Construction', DOH):

- Undertake specific stormwater investigation for preferred scenario and ensure structural and non-structural measures are implemented to limit stormwater discharge to existing levels.
- Prepare Erosion and Sedimentation Management Plan to include construction stage issues.
- Develop Erosion and Sediment Control Policy, a code of practice and standard conditions to minimise construction stage impacts.

9.5 Air Quality Management

Management of air quality will involve two streams: protection from construction impacts (airborne dust) as well as ensuring the design of the development minimises the potential for use of private vehicles as far as practicable. Management actions in this regard include:

- Implement an Erosion and Sedimentation Control Plan to minimise air pollution from construction activities.
- Incorporate dedicated pedestrian and cycle networks within development areas.
- Encourage bus operators to provide enhanced bus services.

9.6 Natural Resource Management

9.6.1 Vegetation Management

Management of the natural resources of the site will largely involve protection and enhancement of remnant vegetation and vegetation that has historic value. The following measures are recommended:

- Ensure all identified threatened fauna habitats are protected from adverse impacts through the creation of reserves, rehabilitation, provision of buffer zones and maintaining lower density development in these areas.
- Protect and enhance all residual native vegetation and reduce impact on vegetation links by minimising fragmentation through inappropriate development and vegetation clearing.
- Provide information to residents on locally threatened flora/fauna species and means of protection.
- Retain historic tree plantings.

9.6.2 Environmental Remediation

Environmental remediation includes rectification of previous contamination as well as areas of erosion. The following measures are recommended:

- Rectify areas of erosion and environmental degradation.
- Provide information to local residents on catchment management measures such as vegetation retention, soil and water management actions and minimising fertiliser use.

9.6.3 Bushfire Protection

As the majority of the study area has been categorised as being bushfire prone, it is appropriate for bushfire protection and mitigation measures be incorporated into any future land use planning strategies for the future development of the study area. The following strategies should be considered to reduce impacts from potential bushfires on land within the study area:

- Minimise perimeters of urban development to bushfire hazards and design roads to provide direct egress at the shortest distances.
- Provide accessible refuge areas.
- Develop in "blocks" rather than as scattered development, minimising internal fuel networks and presenting a line of development to the hazard interface.
- Avoid a subdivision pattern which results in narrow streets and battle axe blocks, which create access difficulties during bushfires.
- Provide for creation of asset protection (buffer) zones.
- Prevent inappropriate development in hazardous areas such as bushland.
- Provide for static water supplies to allow for bushfire fighting purposes.

9.7 Land Use and Landscape Design Principles

The following development principles are recommended to guide land use planning in the study area:

Development Generally

- Ecologically Sensitive Design Principles must be implemented for all future development including implementation of all recommended environmental controls as well as consideration of sustainable building techniques including the provision of insulation, orientation, open space design, incorporation of materials that do not unnecessarily increase demands on scarce resources and water cycle management measures.
- All costs associated with future urban development should be borne by landholders that benefit from any rezoning in accordance with standard 'users pays' principles.

Built Form

- New development should maximise energy efficiency through the orientation of the building, layout of rooms and location of openings for control of ventilation.
- Building materials derived from non-polluting, renewable and recyclable resources and which provide for more efficient thermal performance should be used to the greatest extent possible.
- Landscape areas should be designed to assist in microclimate management and in the conservation of energy and water.
- Ensure dwellings are designed to be adaptable for a number of family types.
- Ensure equity of access and mobility to all members of the community.
- Housing stock should reflect the style of that existing.
- Any built form should generally be of a small scale (eg two storeys or less) and similar to existing development.

Access

- Roads should be provided with adequate capacity and be of a design that reflects the low key road layout of existing roads.
- Verges should be grassed without a pedestrian path where large or medium holdings are proposed. Where smaller holdings are required and a higher density achieved pathways may be required.
- Flood evacuation needs must be met through road upgrading.

9.8 Heritage and Cultural Environment

9.8.1 Aboriginal Cultural Heritage

The following management measures are recommended:

- Undertake archaeological sub-surface testing in areas identified as having greater than 'low' archaeological potential.
- Ensure all Aboriginal cultural heritage work is conducted by suitably qualified archaeologist and should be consistent with the (current) Guidelines specified by the NSW National Parks Service including appropriate levels of consultation with, and the participation of local Aboriginal community representatives.
- Incorporate recommended impact mitigation strategies for sites detected during archaeological survey or sub-surface testing work.
- Adopt management strategies for the previously recorded Aboriginal sites adjacent to the study area.

9.8.2 Historic Cultural Heritage

The following management measures are recommended:

- Any development applications that involve significant ground surface or sub-surface impact within Site 1 should include an assessment of potential impact to the old weatherboard dwelling and grave site within the north-eastern corner of the site. All significant non-Aboriginal archaeological deposits which are greater than 50 years old are protected under Section 139 of the Heritage Act (1977).

9.9 Traffic and Transport Management

The following management actions are recommended to address traffic and transport issues:

- Provide high standard and safe bicycle/pedestrian paths connecting residential streets and facilities such as shopping centres.
- Encouragement of an integrated public transport system depending on the levels of future development.
- Finalisation of a flood evacuation strategy to cater to the worst case scenario (viz the flood evacuation occurring during summer peak holiday periods).
- A detailed traffic impact assessment should be prepared to assess the capacity of the existing road network and demand generated by a preferred strategy. This should set out the requirements for local and regional road upgrading as well as detailing costs for such works.
- Safety along residential streets be improved by implementing local area traffic management measures to reduce speeding and accidents, and improve residential amenity.

9.10 Utilities and Infrastructure

The following management actions are recommended:

- Ensure future utilities and infrastructure upgrading is undertaken in the most efficient and effective manner possible and in keeping with the sustainable environmental development principles.
- Provision of all infrastructure should be undertaken on a 'user pays' principle.
- Provision of all utility and infrastructure services should be subject to environmental assessments to ensure that impacts of their provision are minimised.

10. Recommended Land Use Strategy

Consistent with the constraints and opportunities identified in the previous sections of this LES, it is considered appropriate that the following aims and objectives for the future use of the study area be incorporated into the draft Local Environmental Plan prepared for the study area.

10.1 Aims and Objectives

The principal aim for the future land use of the study area is to maximise the development opportunities on the study area whilst minimising the impact of such development on the existing environmental character and maintaining the ecological integrity of the natural areas of the study area.

The following objectives are relevant:

- To prevent the degradation of natural water resources by ensuring that any future development does not adversely affect the operation of natural water courses or degrade water quality.
- To protect and enhance areas of environmental significance by ensuring that future development does not occur which may have a detrimental effect on such areas.
- To preserve and protect areas of significant landscape value and seek to enable development to occur in a manner which is complimentary to the long term amenity of the landscape.
- To preserve, protect and where possible enhance those sections of the study area which are significant in terms of existing vegetation or habitat areas.
- To ensure that a range of service infrastructure is available and is provided in an orderly and economical manner to the study area.

10.2 Appropriate Zoning Controls and Strategies

Consistent with the stated aims and objectives and the detailed assessment carried out with respect to the study area, it is recommended that the following land use zoning controls and strategies be adopted:

Zoning Control No. 1 –Environmental Protection

It is recommended that the areas of high conservation value including vegetation communities, Eucalyptus pilularis – Corymbia intermedia Moist Open Forest, Lophostemon suaveolens – E. robusta Swamp Open Forest, Melaleuca quinquenervia Swamp Open Forest and Casuarina glauca/ Avicennia marina Swamp/ Mangrove Open Forest be retained and withheld from future development due to their ecological qualities and habitat value for fauna. In this regard, the adoption of a specific environmental protection zone should be applied to these parts of the study area within the draft LEP to provide the necessary statutory protection they deserve.

It is essential that potential impacts to these areas be minimised. Any urban stormwater runoff should be directed to suitably constructed filters and traps to ensure that nutrients, toxins, bacteria, sediment and litter is intercepted before these enter the wetlands.

It is recommended that the wetland areas within the study area be zoned 7(a) Environmental Protection (Wetlands) whilst the identified significant vegetation not affected by previous clearing, development or weed infestation be zoned 7(b) Environmental Protection (Vegetation Conservation) pursuant to Nambucca LEP 1995.

Zoning Control Policy No. 2 – Rural-Residential Development

It is recommended that a portion of Site 2, not constrained by the riparian buffer zone or flooding, be zoned 1(a1) Rural Residential to permit rural-residential development. This zoning is considered appropriate on the basis that the site given its size could not sustain a viable agricultural enterprise in the long term and recognises the existing defacto rural-residential use of the land.

Zoning Control Policy No. 3 – Rural Development

It is recommended that the portion of Site 4 which is currently being used for the purposes of a screening plant be withheld within the 1(a2) Rural (Prime/ Flooding) zone pursuant to Nambucca LEP 1995 in recognition of the remaining resource yet to be extracted from the site, the identification of contamination as a result of its use as a screening plant and the constraint imposed by flooding.

Zoning Control Policy No. 4 – Industrial Development

It is recommended that the portion of Site 1 directly adjacent to the highway and which currently accommodates the existing car dealership be zoned 4(b) Industrial (Business) pursuant to Nambucca LEP 1995. This zoning is considered appropriate on the basis that the site has already been developed for such a purpose and the development meets the objectives of the 4(b) zone.

Zoning Control Policy No. 5 – Tourism Development

It is recommended that the remaining portions of the study area which have been disturbed as a result of previous clearing, development or weed infestation be zoned 10 Low Density Tourist pursuant to Nambucca LEP 1995 in recognition of their potential for ecologically sensitive tourist development within the Nambucca Shire.

This zoning is considered to be appropriate on the basis that the objectives of the zone only permits low density tourist development and uses associated with, ancillary to, or supportive of, such development that is environmentally acceptable, unlikely to place demands on water and sewerage services beyond the level reasonably required for tourist use and does not prejudice the functions of the Pacific Highway.

Zoning Control Policy No. 6 – Zone Map Overlay Provision (Wetland Buffer)

It is recognised that DIPNR require a buffer of 50 metres around the wetlands within the study area. Given the imposition of the 10 Low Density Tourist over the majority of the land, adjacent to the identified wetlands, and the objectives of the zone which

enforce environmentally acceptable development, it is recommended that any development proposed within 50 metres of the wetlands only be permissible if it can be justified that it is unlikely to adversely affect the water quality or water levels of the wetlands. This way, water sensitive urban design can be built into the development proposal rather than hoping that a 50 metre buffer would suffice.

The recommended land use strategy considered appropriate for the study area is shown in Diagram 23.

LEGEND

- 1(a1) RURAL
- 1(a2) RURAL (PRIME/FLOODING)
- 4(a) INDUSTRIAL
- 7(a) ENVIRONMENTAL PROTECTION (WETLANDS)
- 7(b) ENVIRONMENTAL PROTECTION (VEGETATION CONSERVATION)
- 10 LOW DENSITY TOURIST

STATE FOREST

1 DP 711098
104 DP 755550
PT.3 DP 842158
9 DP 749152
4(a)
10
5 DP 749152
1 DP 749153
2 DP 749152
PT.3 DP 842158
10 DP 749152
PACIFIC
2 DP51420
1 DP 842158
1(a1)
7(a)
4 DP 749152
7(a)
6 DP 749153
8 DP 749153
7(a)
DP 749153
2 DP 749153
10 DP 749153
7(b)
10
10
5 DP 749153
7(b)
11 DP 749153
301 DP 755550
4 DP 749153
10
12 DP 561932
HIGHWAY
7(a)
1(a2)
2 DP 541448
7(a)
10
12 DP 826934
Teague Ck
525 DP 820071
524 DP 820071
SALAMANDA PDE
Nambucca
3 DP 749153
7
6
5
4
3 DP400863
14
13
11 DP129437
12 DP 129437
10 DP 129437
16
2
RUTLAND ST
1 DP 214388
River

GHD
22 11572

ZONING STRATEGY
diagram 23.

11. Conclusions and Recommendations

11.1 Conclusions

The comprehensive assessment and investigation of the study area with respect to the applicability and appropriateness of rezoning the land from a rural/ tourism purpose to an industrial/ rural residential purpose draws the following conclusions:

- The study area contains areas of high geotechnical constraints;
- The study area contains areas of high water quality sensitivity including SEPP 14 wetlands, other identified wetlands and their buffers;
- The study area contains areas of high ecological significance, particularly those areas identified as containing Eucalyptus pilularis – Corymbia intermedia Moist Open Forest, Lophostemon suaveolens – E. robusta Swamp Open Forest, Melaleuca quinquenervia Swamp Open Forest and Casuarina glauca/ Avicennia marina Swamp/ Mangrove Open Forest; and
- The study area contains areas adjacent to high bushfire hazard, particularly Nambucca State Forest.
- These environmental constraints limit the capability of the study area to accommodate intensive industrial or residential development.
- Limited ecologically sustainable tourism development is achievable within the unconstrained portions of the study area, generally in accordance with the provisions set out in Zone 10 of Nambucca LEP 1995.
- That portion of Site 1 on the corner of the Pacific Highway and Florence Wilmont Drive be rezoned to 4(b) industrial in recognition of its existing use as a car dealership.
- Limited rural-residential development is achievable within the unconstrained portion of Site 2.

11.2 Recommendations

The primary recommendations arising from this report are as follows:

- NSC and DIPNR utilise this LES as the justification for the proposed amendments to Nambucca LEP 1995.
- NSC proceed to prepare a draft LEP for the study area in accordance with the policies and strategies identified in this LES.
- Once the draft LEP has been prepared for the study area, formally exhibit the LES and draft LEP to allow the community to comment.
- NSC, in consultation with DIPNR, remap the SEPP 14 wetland boundaries as documented in this LES.

12. Glossary

TERM	DEFINITION
AIMS	Aboriginal Information Management System
ANZECC	Australian and New Zealand Environment and Conservation Council
ASS	Acid Sulfate Soil
BOD	Biochemical oxygen demand, which refers to the decrease in oxygen content brought about by bacterial breakdown of organic matter. Analysis typically involves incubation of the sample for 5 days.
DLWC	Department of Land and Water Conservation
D.O.	Dissolved Oxygen - measured in biological zones / reactors.
DG	Director General
DIPNR	Department of Infrastructure, Planning and Natural Resources
EIS	Environmental Impact Statement
EPA	Environment Protection Authority of NSW
ESD	Environmentally Sustainable Development
ha	Hectares
LES	Local Environmental Study
LEP	Local Environmental Plan
LoS	Level of Service
LPSS	Lower Pressure Sewerage System
NCREP	North Coast Regional Environmental Plan 1988
NSC	Nambucca Shire Council
NPWS	National Parks and Wildlife Service
N	Nitrogen
NH4	Ammonia nitrogen
NOx	Oxidised nitrogen (nitrates or nitrites)
NPWS	National Parks and Wildlife Service of NSW
P	Phosphorus

TERM	DEFINITION
pH	Measure of acidity
RCBC	Reinforced Concrete Box Culverts
RTA	Roads and Traffic Authority
ss	Suspended solids
STP	Sewage treatment plant
STW	Sewage treatment works (same as above)
TDS	Total dissolved solids
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total phosphorus

13. References

- Baker Mounser and Lowe, 1983. *Nambucca Shire Environmental Study prepared for Nambucca Shire Council.*
- Department of Agriculture NSW, 1983. *Nambucca Shire Agricultural Land Suitability Study.*
- Department of Conservation and Land Management, 1992. *Urban and Rural Residential Capability Survey of the Nambucca Shire*
- DeGroot and Benson, 2001. *Nambucca Industrial Land Release Strategy prepared for Nambucca Shire Council.*
- GHD, 1991. *Pacific Highway Deviation – Watt Creek to Teagues Creek Environmental Impact Statement prepared for Roads and Traffic Authority.*
- Holmes and Holmes Pty Ltd, 2002. *Initial Assessment for Acid Sulphate Soils, Proposed Subdivision for K Dugdale.*
- JTCW Planning, et.al, 1985. *Lower Nambucca Local Environmental Study prepared for Nambucca Shire Council.*
- Nambucca Shire Council, 2003. *State of the Environment Report – A Report on the State of the Environment within the Nambucca Shire Local Government Area 2002-2003.*
- Nambucca Shire Council, 2003. *Nambucca Shire Economic Profile 2003.*
- Nambucca Shire Council, 2003. *Nambucca Shire Community Profile.*
- Nambucca Shire Council, 2003. *Nambucca Economic Revival Plan.*
- Nambucca Shire Council, 2003. *Nambucca Shire Business Survey.*
- Nambucca Shire Council, 2000. *Nambucca Shire Council Stormwater Management Plan.*
- Nambucca River Flood Management Plan (Lower Nambucca).
- Nambucca Shire Council, 2003. *Nambucca Shire Council Policy for the Discharge of Liquid Trade Waste into Council's Sewerage System.*
- Resource, Design and Management, 1996. *Nambucca Commercial and Industrial Strategy prepared for Nambucca Shire Council.*
- Resource, Design and Management, 1999. *Lower Nambucca River - Floodplain Management Study prepared for Nambucca Shire Council.*
- Resource, Design and Management, 1996. *Nambucca Urban Land Release Strategy prepared for Nambucca Shire Council.*
- Roads and Traffic Authority, 2002. *Guide to Traffic Generating Developments 2002.*
- RoadNet, 1997. *Traffic Study - Lower Nambucca (Access to Properties) for Nambucca Council.*

- S. McIntyre-Tamwoy, 2003. *Nambucca Aboriginal Cultural Heritage Management Plan prepared for Nambucca Shire Council.*
- Townplanning Consultants & Drafting Services Pty Ltd, 2002. *Rezoning Application for Lot 3, DP 842158, Lots 4, 9 & 10, DP 749152 & Lots 2, 6, 8, 9 & 10, DP 749153, Pacific Highway, Lower Nambucca.*

Appendix A

Government Authority Consultation

Appendix B

Flora Assessment prepared by Idyll Spaces Consultants

Appendix C

Fauna Assessment prepared by Kendall and Kendall Ecological Services Pty Ltd

Appendix D

NPWS Aboriginal Heritage Information Management System Search

Appendix E

Preliminary and Detailed Contamination Assessments

GHD Pty Ltd ABN 39 008 488 373

2/115 West High Street
Coffs Harbour NSW 2450
T: (02) 6650 5600 F: (02) 6652 6021 E: cfsmail@ghd.com.au

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