

**Nambucca Local Environmental Plan –
Amendment No 24
Planning Proposal**

Re-Zoning of Lot 2 DP 514920, Lot 11
DP 1017408 & Lot 12 DP 1017408
Giinagay Way, Nambucca Heads

STORMWATER MANAGEMENT PLAN

June 2019

de Groot & Benson Pty Ltd

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1 Introduction

Nambucca Shire Council (2018) has a planning proposal for Lots 2 DP 514920, Lot 11 DP 1017408 & Lot 12 DP 1017408 Giinagay Way, Nambucca Heads. As part of the PP, a Stormwater Management plan was prepared in conjunction with the Local Environment Study.

As part of the Gateway Determination dated 19 December 2018, the Department of Planning has requested an updated stormwater management plan. A copy of their full requirement is contained in Annexure C.

2 Original Stormwater Management Plan

The original stormwater management plan formed part of the Lower Nambucca Local Environment Study – Main Report dated July 2004 which was prepared by GHD on behalf of the Council.

The existing situation of the site was described in Section 5.5 of the report and has been copied as Annexure A.

The proposed stormwater and water quality management was described in Section 9.4 of the report and is copied as Annexure B.

3 The Site

For the purposes of this assessment the locality is the area within a square of approximately 10kmx10km centred on the study area (Figure 1).

The study area consists of the properties located at Lot 2 DP 514920, Lot 11 DP 1017408 & Lot 12 DP 1017408 - Giinagay Way, Nambucca Heads. These adjoining lots are bounded to the north by Giinagay Way, to the south by the Nambucca River, to the east and west by an existing motel and a caravan park respectively.

The subject site includes all remnant native vegetation and associated terrestrial fauna habitats on the property. It does not include aquatic habitats associated with the Nambucca River.

The site and locality are shown on Figure 1.

The existing site and zoning is shown on Figure 2

Figure 3 shows site constraint and contours on the land. It is an extract from Map 1. Approximately 1.5ha (approx. 55%) of the proposed residential zoned land drains northwards across the highway. The remaining 1.2ha drains directly to the river.

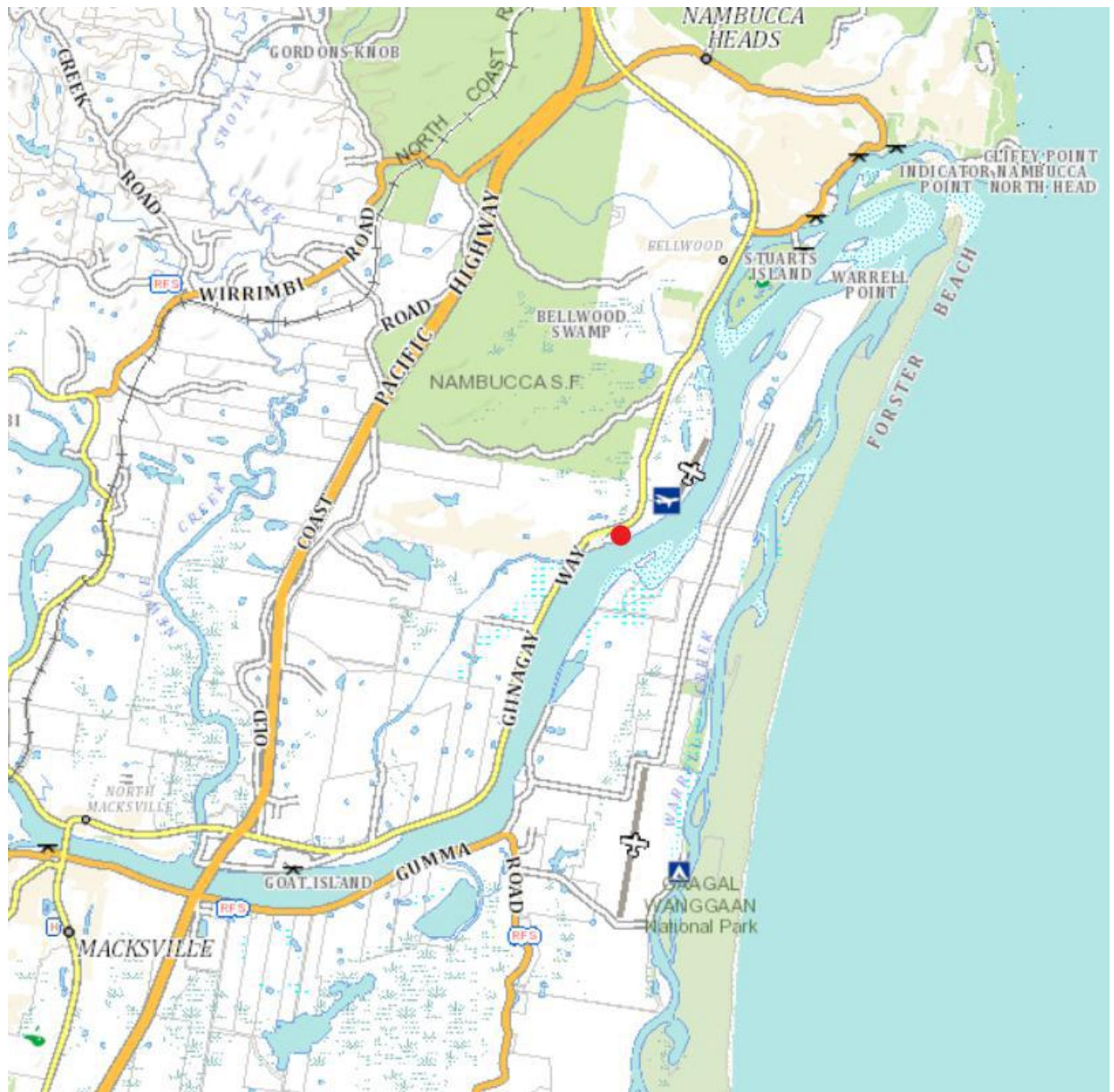


Figure 1. The study area (red dot) and locality

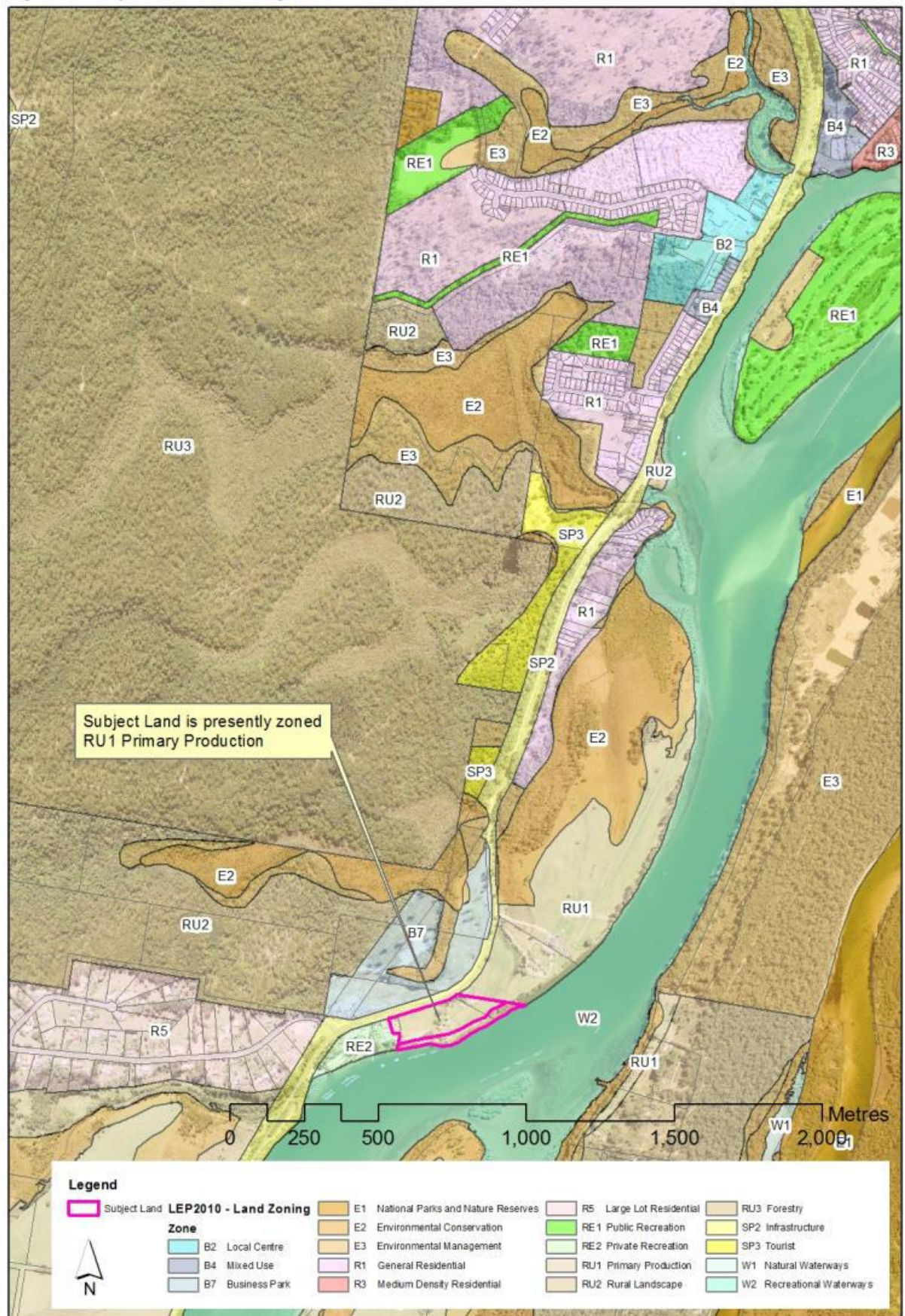


Figure 2. Existing site and Zoning

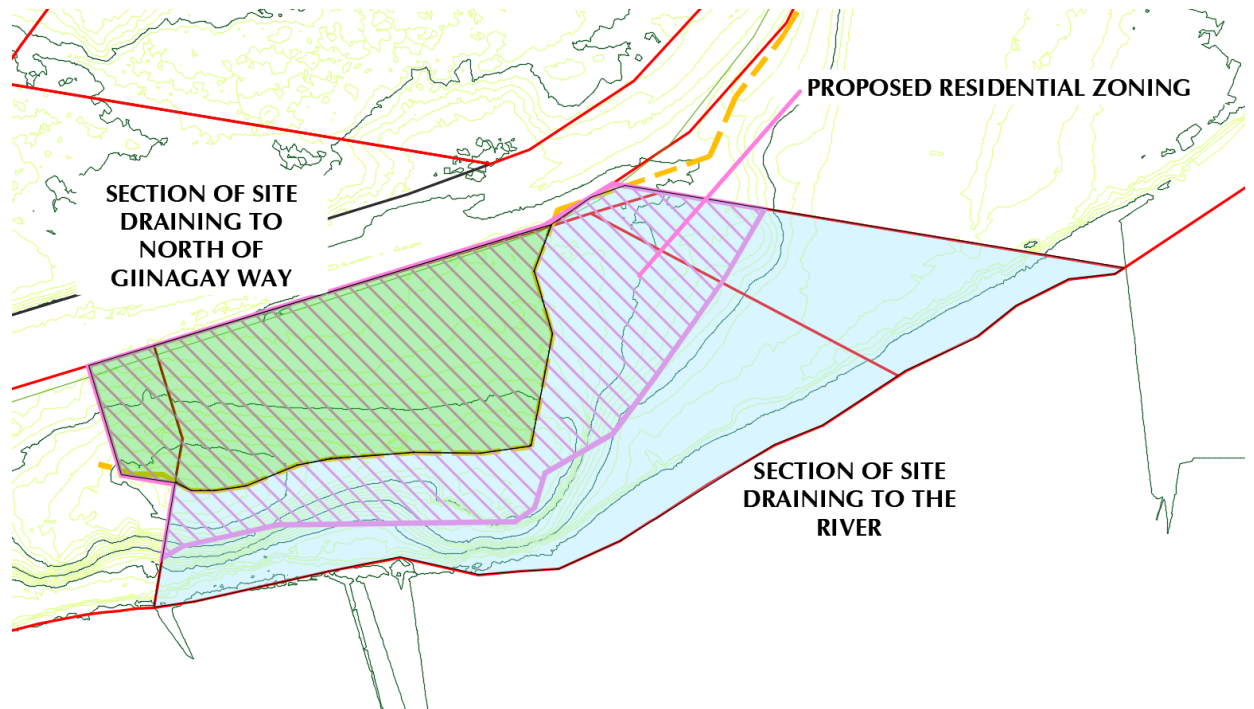


Figure 3. Site Constraints (extract from Map 1)



4 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, burning off, fertiliser application, liming, ploughing, 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.

The subject site has been essentially cleared of native vegetation and has been used of agricultural activities.

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 than 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.

4.1 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 silt 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 effects on wetland areas.

5 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 of nonpoint source 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. Council's Development Control Plan 2010 sets out appropriate design principles and standards. In addition, during the development of the site, special attention should be provided to, the Department of Housing (1998) 'Managing Urban Stormwater: Soils and Construction' 3rd edition NSW Government (known as the Blue Book) as it contains a number of techniques for sediment and erosion control. Issues raised by these documents are included in the discussion below.

5.1 Target Water Quality for Residential Development

Council's DCP does not provide any specific targets for water quality for residential development. We have reviewed requirements for adjoining local government areas, and would recommend that Nambucca Shire adopt similar standards as these, in particular Coffs Harbour City standard which are based on those developed for South East Queensland.

All developments to which this Guideline applies must comply with the objectives listed in Set A and Set B.

Objective Set A

- No untreated stormwater is to be discharged from the developed site.
- To implement 'best practice' stormwater management techniques.
- To maintain natural drainage patterns.
- To maintain watercourses in their natural form, ie. watercourses should not be piped or channelled.
- To maintain adequate and intact vegetation buffers around waterways and sensitive areas, as per DCP requirements.



Objective Set B

Construction Phase:

- Apply Landcom (Blue Book) Erosion and Sediment Control Principles and Procedures.

Post Construction Phase:

- 80% reduction in the average annual total suspended solids load
- 60% reduction in the average annual total phosphorus load
- 45% reduction in the average annual total nitrogen load
- 90% reduction in the average annual gross pollutant (size > 5mm) load
- Oils and petrochemicals must not be noticeable as a visible film on the water nor should they be detectable by odour.
- To retain litter greater than 50mm for all non-residential development

The above % targets represent a reduction in average annual load of pollutants leaving the developed unmitigated scenario compared to the developed mitigated scenario. In other words, compare what the site would be like, after development, with and without the proposed stormwater quality treatment.

5.2 Development to which the Targets apply

This Guideline applies to all development of the following types;

- Deemed to Comply – Residential greater than 2 lots/dwellings, Multi Unit developments, Commercial and Industrial

If your proposed development mirrors the development scenarios detailed by the South East Queensland Water By Design Deemed to Comply Solutions – then Council should consider these solutions.

Deemed to comply developments include the following (as per SEQ Deemed to Comply Solutions 2010) are set out in Table 5.1;

Table 5.1: Deemed to Comply development scenarios

Land use	Development scenario	scale
Residential	Residential greater than 2 lots up to 20 lots	N/A
	Residential greater than 2 dwellings (townhouse style up to 2 storeys)	≤ 12,500 m ²
	Residential high density multiple dwelling apartments (flats, high rise)	≤ 12,500 m ²
Commercial and / or Industrial	Commercial and / or industrial	≤ 12,500 m ²

5.3 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 Council.



5.4 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 at Development Application Stage 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.

5.5 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.

Given the small land area involved in the study area, no specific actions are proposed for groundwater.

5.6 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.

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 Council.

5.7 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.

The targets and methodology suggested in Sections 5.1 and 5.2 should be adopted.



5.8 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.

These principles would need to be applied at Development Application stage to develop a cost effective and maintainable system that will ensure on going compliance to targets.

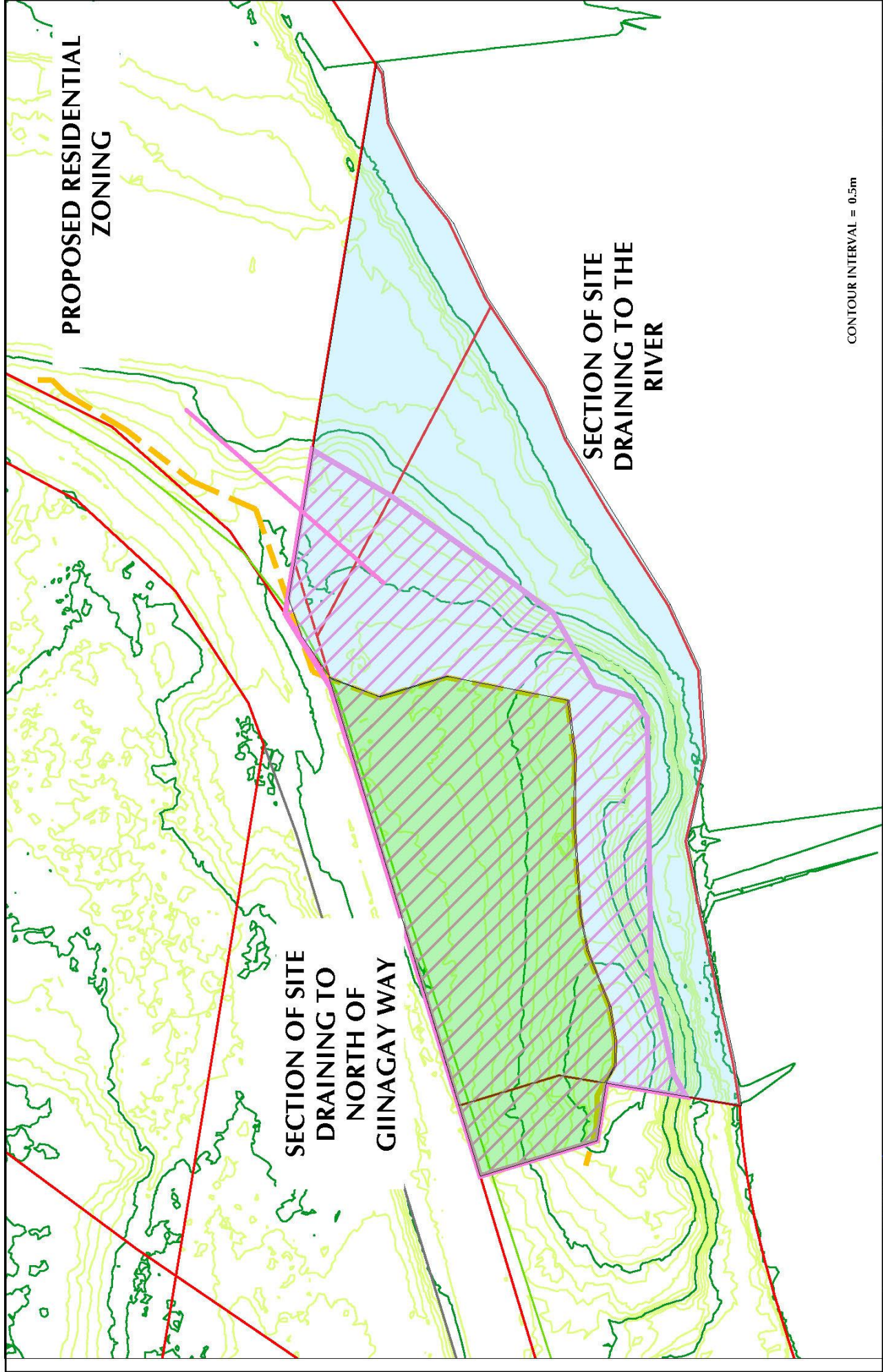
Roof water could be collected for use on landscaping and potentially toilet flushing. However to meet the river flow objectives for Nambucca River not all the stormwater could be collected into tanks as some water would have to be diverted to maintaining the flow within the stormwater drainage system.

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.



Maps





Annexure A – Extract from LES

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 than 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.



Annexure B – Extract from LES

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 nonsource 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



Temperature'	Yes	No
Turbidity'	Yes	No
pH'	Yes	No
Conductivity'	Yes	No
Groundwater level ²	Yes	No

¹Total Nitrogen is calculated as the sum of TKN and NOx

²These 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:

1 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.



Annexure C – Gateway Determination

2. Prior to public authority consultation, the proposal is to be amended to include:
- (a) Lot 1 DP 1113153 within the written text confirming the land is to be rezoned by the proposal;
 - (b) amended objectives and intended outcomes clarifying that proposal is seeking to enable residential development on part of the site, identify part of the site for environmental management, and amend associated development standards;
 - (c) a revised timeframe;
 - (d) an updated flood assessment;
 - (e) an updated stormwater management study that considers the potential impacts the proposal will have on the Nambucca River and nearby environmentally sensitive areas including priority oyster aquaculture areas. The study is to identify mitigation measures that will reduce or eliminate any impacts on these sensitive receptors where necessary; and
 - (f) an updated flora and fauna assessment that considers the existing potential high environmental value mapping identified under the North Coast Regional Plan 2036 affecting the site and whether the proposed E3 Environmental Management Zone boundary is located appropriately.