

A MASTER PLAN FOR WEST BYRON

DESIGN WITH NATURE



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SUMMARY

This study is to assess the potential of the West Byron site within its overall context. The site is located in the centre of the Belongil Catchment, a registered wetland which is the lifeblood of the marine sanctuary within the Byron embayment. The town centre is also within this catchment and the vast ecological community created is the reason for the existence and uniqueness of Byron Bay.

We look at the value of wetlands worldwide – their monetary and intrinsic values and their purpose in giving life to this planet.

The Ramsar Convention is an international treaty that seeks to preserve all wetlands in recognising their significance and contribution to our way of life. Australia is a signatory to this treaty and has many registered wetlands nationally which are supported by governments and local groups to benefit their community.

The Belongil Catchment has a long history of involvement with the local community and landholders, with many reports on management and rehabilitation which show how nature can be used to resolve the negative impacts on the settled areas and reinstate the ecological balance as an asset to the community.

A close example of a successful and viable rehabilitated wetland is the Hunter Wetlands Centre at Shortland, west of Newcastle, which provides education, research, tourist facilities and discovery tours as well as providing flood storage capacity for the Hunter River and reducing flooding in the city.

We look at the Blue Carbon Initiative where government funds are used to rehabilitate wetlands which sequester carbon at up to five times the rate of forests. This relates directly to our current Zero Emissions Byron program which will offset our carbon emissions to zero within ten years throughout the shire.

This wetland is home to 32 threatened species, 46 migratory species and an endangered ecological community. Byron Bird Buddies share their observations of this unique bird habitat which they actively research as part of their conservation and education programs.

The state government has recently released the West Byron site for urban development by manipulating the planning regulations to circumvent environmental laws made to protect the natural eco-systems. The statutory requirements for this site are discussed with their relationship to a flawed planning system.

The environmental constraints are outlined and analysed to establish the planning principles used as the basis for this Master Plan concept.

The many components working together to present a complete, balanced and viable Master Plan are explained in detail with suggestions on how we can implement this proposal to benefit nature, the community and the local economy.

It is now time for the new paradigm which capitalises on the natural assets we already have to co-create our sustainable future with compatible and empathetic land uses and activities that include all living things.

When we learn to work with nature, not exploit it in the name of progress, we can then reap the returns from what it has to offer and the benefits will permeate our whole lifestyle, our sustainable future and the way we live, work and play in this amazing place we share together.

This study is a catalyst for an alternative positive way forward for West Byron.

We now have a choice and what we consciously choose will be our future.

CONTENTS

SUMMARY	
1. INTRODUCTION.....	2
2. THE VALUE OF NATURE	3
3. WATER IS LIFE	5
4. THE RAMSAR CONVENTION.....	13
5. THE BELONGIL CATCHMENT	18
6. HUNTER WETLANDS CENTRE	32
7. BLUE CARBON	41
8. BYRON BIRD BUDDIES.....	49
9. LEGAL REQUIREMENTS.....	62
10. ENVIRONMENTAL CONSTRAINTS	79
11. CONSTRAINTS ANALYSIS.....	101
12. MASTER PLAN CONCEPT	104
13. MASTER PLAN COMPONENTS	110
Conservation	
Education and Research	
Temple Byron	
Wetlands Discovery Centre	
Hydrology	
Residential	
Zero Carbon	
A Meeting Place – Island Quarry	
Eco Resort	
Environmental Studies Campus	
14. IMPLEMENTATION	121
15. CONCLUSION	125
ACKNOWLEDGEMENTS	128
ABOUT THE AUTHOR	129

1. INTRODUCTION

BACKGROUND

From Tallows to Tyagarah and from the sea to St Helena Hill is a wetland full of life and the rich biodiversity that is a priceless asset far beyond the value of any commercial intrusion which would only destroy the reason we all love this place.

Scientists don't create anything – they only discover what is, and reveal to us the beauty and awe of what nature has provided for us.

To discover and learn from our significant wetland where we live, and the reason visitors come here, is the reason for this study and to show that there is an alternative to destruction in the name of progress.

We are being exploited by external corporate and political interests that want to capitalise on our energy supply, our water supply and drainage, our sewerage, our roads, our shops, schools, childcare and community assets to make money which will be used for outside company and personal profit and political control which does not respect our local community or seek to contribute anything positive to our real needs and local aspirations.

On the coastline south of Kingscliff in the Tweed Shire is Salt Village which is an example of an empty sterile suburb that destroys the natural environment. It follows all the planning rules but dominates its pristine coastal location with stereotyped buildings and roads disconnected from nature.

AIM

The purpose of this study is to assess the true value and potential for the West Byron site and to establish a strategic plan to realise this potential for a sustainable use in its location as an integral part of the Belongil Creek catchment and the Byron Bay township.

Our research will encompass many of the specialist studies that have been used to assess the site and to evaluate the area within its overall context and connection to the bio-region, its natural support for the flora and fauna and the real effect of any adverse development.

Based on these findings we will then compare alternative proposals based on the political, social, economic, environmental, sustainable, ethical and spiritual values and establish preferred strategy which supports the local community and the uniqueness of Byron Bay.

The components of this Master Plan will be outlined for further research, education, enjoyment and use of the facilities provided and the co-operative support they will give to the community and visitors to Byron.

2. THE VALUE OF NATURE

The value of our land at West Byron is much greater as a substantial healthy wetland which provides us with water, air, sustenance, pleasure, recreation, a place to learn, play, enjoy and regenerate.

Planet Ark in their study *Valuing Trees: What is Nature Worth* analyses the monetary value of nature in all aspects of our busy lifestyle and equates mental, physical and emotional wellbeing with our connection to nature.

The 2020 Vision is a collaborative initiative between business, governments and community groups to increase green space in urban areas by 20 percent by 2020. In a new research report from UTS Sydney, Dr Kachenko observes that trees and urban green spaces have the unique ability to improve the environment, save lives, mitigate the risks of climate change, provide significant cost savings across the economy, increase productivity, and reduce ill-health such as obesity and mental illness.

So why does a government planning department based in Sydney want to remove the significant trees and nature that we already have in Byron to build one of their suburbs that don't work?

The 2020 Vision recognises the intrinsic value of nature to our healthy and happy existence and wellbeing.

Land and property market valuations are based on what you can do on a particular area of land as the 'highest and best use' value which measures a maximum future development potential allowed by any or all authorities within the planning system which is governed by politics and influential corporations. This gives a future potential value which is traded on the 'willing buyer-willing seller' principle but is often not realised because it is not sustainable within an economic system based on a finite resource.

The true value of land is its present day contribution to our social, political, economic, environmental, sustainable, ethical and spiritual values within the community we have chosen to live. It is a resource we have now and must be recognised for its priceless intrinsic value and the role it plays in our present day-to-day existence.

Real estate values are measured as a total dollar amount which depreciates over time, but the value of nature is calculated as the dollar amount it contributes every year, it is sustainable and increases over time.

OUR CURRENT PLANNING AND ECONOMICS

Our current state planning system is fundamentally flawed because it is politically motivated, controlled by development-based corporations and relies on regulations enforced by court-based legal decisions. It is not based on a strategic planning system that respects and works with nature for the common good of people and community.

The results are evident in sprawling suburbs, dysfunctional communities, traffic chaos resulting from confused circulation movement demands, disconnection from the natural environment and social problems from the competition between disparate interests instead of co-operation, connection with our natural environment and enjoying all it has

to offer, working to support each other in local communities to fulfil our real needs as people contributing to this amazing world that has been entrusted to us.

A system that allows governments to manipulate their own regulations to favour corporate interests is not sustainable.

We are being continually told by politicians and corporations that we should support their latest project because it will create jobs and is good for the economy, so it is in our interest.

So is the clean energy industry, conserving water, recycling waste, localised food, zero carbon and many other ethical projects – the only difference is that these are sustainable and are beneficial directly to the local community.

The jobs thus created by respecting and preserving nature directly benefit the worker or creator of the enterprise because it is what they choose to do with their visions and abilities making them happier and healthier in a co-operative community.

The economic system relies on continual expansion which cannot be supported by the finite resources available on this planet and is therefore unsustainable.

Reducing our impact on this planet is not only beneficial and sustainable but is also essential to our survival.

Gandhi said 'This planet will provide every person's needs but not one person's greed'.

We have a choice – to destroy nature to make money or to co-create with nature to supply all our needs and live in a co-operative society supporting each other.



3. WATER IS LIFE

THE TRUE VALUE OF WETLANDS

Wetlands are essential for life on this planet. The Australian government Department of the Environment tells us that –

"Wetlands are a critical part of our natural environment. They protect our shores from wave action, reduce the impacts of floods, absorb pollutants and improve water quality. They provide habitat for animals and plants and many contain a wide diversity of life, supporting plants and animals that are found nowhere else.

Wetlands provide an important range of environmental, social and economic services. Many wetlands are areas of great natural beauty and many are important to Aboriginal people.

Wetlands also provide important benefits for industry. For example, they form nurseries for fish and other freshwater and marine life and are critical to Australia's commercial and recreational fishing industries.

Wetlands are the vital link between land and water."

The NSW Government Office of Environment and Heritage tells us that –

"Wetlands provide significant economic, social and cultural benefits. They are important for primary products such as pastures, timber and fish and support recreational and tourist activities. Wetlands also help reduce the impacts from storm damage and flooding, maintain good water quality in rivers, recharge groundwater, store carbon, help stabilise climatic conditions and control pests. They are also important sites for biodiversity."

BIODIVERSITY

Biodiversity is the basis of our natural world. It represents the variety of living organisms, their genetics and the range of habitats they create. Biodiversity and the systems it creates operate at all scales and their interactions are critical to sustaining life. We need biodiversity for our survival.

The NSW Government Office of Environment and Heritage further explains the importance of wetlands and their roles in the following areas –

Carbon sequestration

"Wetlands cover about 9% of the earth's surface and are estimated to contain around 35% of global terrestrial carbon. Wetlands act as sinks for carbon dioxide and other greenhouse gases, especially if their vegetation is protected and their natural processes are maintained.

Coastal wetlands, such as saltmarsh and mangroves, are likely to have the highest rates of greenhouse sequestration, and the drainage of melaleuca and mangrove forest wetlands in Australia would turn them from carbon sinks into carbon sources. Saltmarsh can bury an average 1.51 tonnes of organic carbon per hectare per year and

mangroves an average of 1.39 tonnes. These rates are several times higher than the rate of carbon burial calculated for the Amazonian forests, an important global carbon sink. This highlights the importance of protecting intact wetlands in helping to limit the impacts of climate change.

Aboriginal cultural significance

Wetlands are of high cultural significance to Aboriginal people. Aboriginal people in NSW recognise the cultural values of biodiversity and the environment, and wetlands provide a connection to Country for Aboriginal people.

Aboriginal cultural values of wetlands are related to both the long history of Aboriginal interaction with wetlands and the interests and aspirations of contemporary Aboriginal communities that have a custodial relationship with those areas. Aboriginal people are interested in identifying and protecting the cultural values of wetlands by:

- protecting Country through cultural flows of environmental water and managing Aboriginal cultural heritage sites
- gaining access to Country for cultural activities
- participating in managing wetlands.

The Werai Forests are an example of the contemporary significance of wetlands to Aboriginal people. They are being managed by the Office of Environment and Heritage (OEH) co-operatively with the Wemba Wemba and Barapa Barapa Aboriginal Nations while negotiations are conducted for eventual transfer of the land to the Aboriginal Nations. If the Aboriginal Nations agree, the lands are intended to be managed as an Indigenous Protected Area under Aboriginal ownership.

Science and Education

Wetlands provide important locations for scientific research and play an important role in educating people about biodiversity and natural processes in NSW. OEH and educational institutions conduct research into the ecological responses of river flows, flooding and environmental watering of wetlands, and the response of plants and animals such as colonial nesting waterbirds, to environmental watering.

Wetlands are used by schools, universities and the public to learn about the ecological importance of wetlands and the other benefits and services they provide to the community. Wetland education centres are located in the lower Hunter near Newcastle, Bicentennial Park in Sydney, the Wonga Wetlands on the Murray River in Albury, and on Narrabeen Lakes in Sydney.

Plants and Animals

NSW wetlands are home to many special plants, birds, fish and frogs. Wetlands provide essential habitat for rare or important species such as the endangered southern bell frog and freckled duck, and the Murray cod. They are an important stopover for many migratory birds and feature one of Australia's most iconic trees, the river red gum (*Eucalyptus camaldulensis*).

Many species rely on the regular flooding cycles of wetlands (such as those on inland floodplains) to reproduce. Some plants and animals live only in particular types of

wetlands, for example, in mangroves, saltmarshes, hanging swamps or sphagnum bogs."

The stated goal of Wetlands International is "to promote economic development that is harmonious with conservation and the sustainable use of wetlands".

They explain the problem is that "Wetlands are often viewed as marginal lands that are 'there' for development. Increasingly these types of lands are being targeted for reclamation and conversion into agricultural, industrial and urban areas. While the direct economic benefits of such development are clear and quantifiable, the long-term socio-economic impacts are often significant and detrimental. The inherent and immense values of wetlands tend to be overlooked and undervalued in the decision making process which involves, in most cases, only a certain powerful/interest groups. To solve this issue, there is a need for clear and measurable values and services of wetlands to inform and evaluate options for a proposed development scheme."

ECONOMIC VALUE

A National Geographic Society study values the loss of freshwater wetlands worldwide at \$US 2.7 trillion per year between 1997 and 2011.

Taking into account all marine and terrestrial land types – from coral reefs to wetlands to tropical forests – the value of ecosystem services has dropped by \$US 20.2 trillion per year over this 14-year period.

Still, the contribution of ecosystems to human wellbeing is very large. The research team estimates the total value of global ecosystem services in 2011 at \$US 120 trillion per year, compared with the 2011 global GDP of \$US 75.2 trillion per year.

These estimates are very useful for raising awareness about the value of ecosystems to human welfare and the global economy – and the foolishness of allowing them to be whittled away at such a rapid rate.

All wetlands have a significant intrinsic economic value which is not always quantified, understood or included in planning studies.

The National Geographic Society further explains "The question of whether to drain a wetland to make way for a shopping mall or a cornfield, or to instead leave the wetland intact, often seems like a no-brainer: the 'development' options have a clear dollar value, but the wetlands themselves do not.

But therein lies a big problem.

Wetlands do vital work. They recharge groundwater, keep rivers and lakes clean by filtering out pollutants, and provide habitat for birds and wildlife. About half of North America's bird species depend in some way on wetlands.

Wetlands also mitigate the impacts of droughts and floods, a function increasingly important as the world experiences more weather extremes under a changing climate. They act like a sponge, absorbing and holding heavy rains, and then release that water more gradually to surrounding streams and aquifers. In this way they can lessen damage from both floods and droughts."

A study on the Economics of Ecosystems and Biodiversity for Water and Wetlands (TEEB) states that the 'nexus' between water, food and energy is one of the most fundamental relationships and challenges for society.

They further explain that –

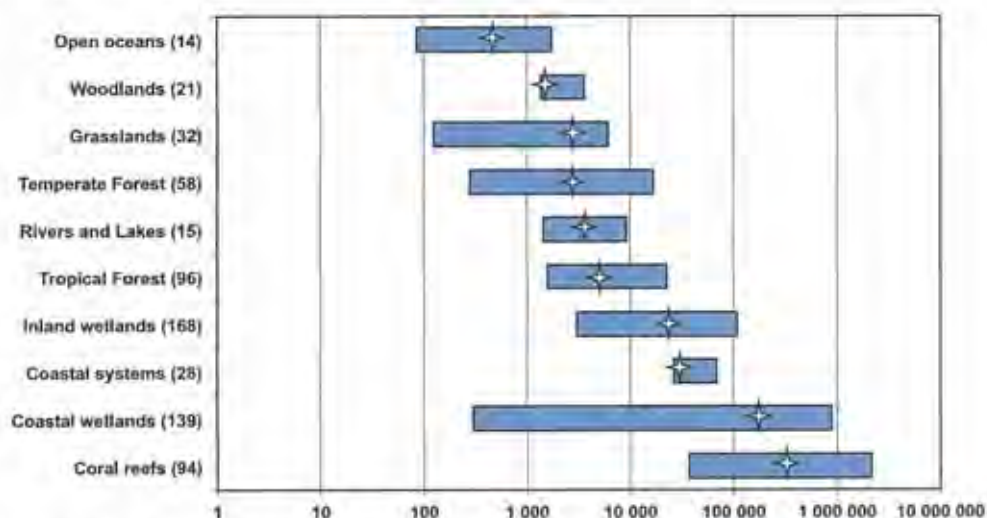
"Wetlands are essential in providing water-related ecosystem services, such as clean water for drinking, water for agriculture, cooling water for the energy sector and regulating water quantity (eg. flood regulation). In conjunction with their role in erosion control and sediment transport, wetlands also contribute to land formation and therefore resilience to storms. Moreover, they provide a wide range of services that are dependent on water, such as agricultural production, fisheries and tourism.

Notwithstanding the high value of the ecosystem services that wetlands provide to humankind, wetlands continue to be degraded or lost due to the effects of intensive agricultural production, irrigation, water extraction for domestic and industrial use, urbanisation, infrastructure and industrial development and pollution. In many cases, policies and decisions do not take into account these interconnections and interdependencies sufficiently. However, the full value of water and wetlands needs to be recognised and integrated into decision-making in order to meet our future social, economic and environmental needs. Using the maintenance and enhancement of the benefits of water and wetlands is, therefore, a key element in a transition to a green economy."

The services provided and monetary value of wetland ecosystems is outlined by TEEB in the following tables 2.1 and 2.2 to demonstrate their economic impact on our way of life.



Figure 2.2 Range of values of all ecosystem services provided by different types of habitat
(Int.\$/ha/yr2007/PPP-corrected)⁶



Note: Figure 2.2 shows range and average of total monetary value of the bundle of ecosystem services per biome. The total number of published value estimates per biome is indicated in brackets; the average value of the value range is indicated as a star sign.
Source: de Groot et al. (2012) building on TEEB (2010).

Table 2.1 Wetland Ecosystem Services and related ecosystem structures and functions

Ecosystem services	Ecosystem structure and function	Examples of Valuation Studies
Coastal protection	Attenuates and/or dissipates waves, buffers winds	Badola and Hussein (2005), Barbier (2007), Costanza et al. (2008), Das and Vincent (2009), Bayas et al. (2011)
Erosion control	Provides sediment stabilisation and soil retention	Sathirathai and Barbier (2001)
Flood protection	Water flow regulation and control	Brouwer and van Elk (2004)
Water supply	Groundwater recharge/discharge	Acharya and Barbier (2000, 2002), Smith and Crowder (2011)
Water purification	Provides nutrient and pollution uptake, as well as retention, particle deposition	Byström (2000), Yang et al. (2008), Jenkins et al. (2010)
Carbon sequestration	Generates biogeochemical activity sedimentation, biological productivity	Jenkins et al. (2010), Sikamäki et al. (2012)
Maintenance of temperature, precipitation	Climate regulation and stabilisation	
Raw materials and food	Generates biological productivity and diversity	Sathirathai and Barbier (2001), Islam and Braden (2006)
Maintains fishing, hunting and foraging activities	Provides suitable reproductive habitat and nursery grounds, sheltered living space	Johnston et al. (2002), Barbier (2007), Smith (2007), Aburto-Oropeza et al. (2008), Sanchirico and Mumby (2009)
Tourism, recreation, education and research	Provides unique and aesthetic landscape, suitable habitat for diverse fauna and flora	Hammitt et al. (2001), Johnston et al. (2002), Carlsson et al. (2003), Othman et al. (2004), Brouwer and Bateman (2005), Birol et al. (2006), Birol and Cox (2007), Do and Bennet (2008), Jenkins et al. (2010).
Culture, spiritual and religious benefits, bequest values	Provides unique and aesthetic landscape of cultural, historic or spiritual meaning	Kwak et al. (2007)

Source: building on Barbier 2011

Table 2.2 Monetary values of services provided by wetlands (Int.\$/ha/year – 2007 values)^{7A}

Category of wetlands	Service category	No. of estimates	min value (Int.\$/ha/y)	max value (Int.\$/ha/y)
Coral reefs	provisioning services	33	6	20,892
	regulating services	17	8	33,640
	habitat services	8	0	56,137
	cultural services	43	0	1,084,809
	Total	101	14	1,195,478
Coastal systems (habitat complexes e.g. shallow seas, rocky shores & estuaries)	provisioning services	19	1	7,549
	regulating services	4	170	30,451
	habitat services	2	77	164
	cultural services	7	0	41,416
	Total	32	248	79,580
Mangroves & tidal marshes	provisioning services	35	44	8,289
	regulating services	26	1,914	135,361
	habitat services	38	27	68,795
	cultural services	13	10	2,904
	Total	112	1,995	215,349
Inland wetlands other than rivers and lakes (floodplains, swamps/marshes and peatlands)	provisioning services	34	2	9,709
	regulating services	30	321	23,018
	habitat services	9	10	3,471
	cultural services	13	648	8,399
	Total	86	981	44,597
Rivers and lakes	provisioning services	5	1,169	5,776
	regulating services	2	305	4,978
	habitat services	0	0	0
	cultural services	5	305	2,733
	Total	12	1,779	13,487

Sources: TEEB (2010); de Groot et al. (2010); See also Brander et al. (2006, 2011), Ghermandi et al. (2011), Barbier 2011 and TEEB (2010) for other overviews of valuation studies and associated meta-analyses.

As regards regulating ecosystem services, peatlands and mangroves act as essential carbon storage areas (Wilson et al., 2012; Siikamäki et al., 2012 – see section 3.5 and Box 5.1) and are important for coastal protection against storms and erosion. Some wetland areas can play important roles in flood mitigation and thereby provide an important regulating ecosystem service, since approximately 2 billion people live in high flood risk zones (MA, 2005b). Not all wetlands offer flood mitigation benefits, because the flood mitigation potential depends on the geographic situation, the

interaction of the wetland area with other flood defences, the potential flood waters, and what the alternative land uses could have been (Posthumus et al., 2010; Rouquette et al., 2011). This role will be increasingly important in the light of increasing sea levels, storms and other extreme events that may arise from climatic change.

Furthermore, wetlands are often characterised by beautiful landscapes and rich biodiversity, thereby providing important aesthetic, educational and

KEY MESSAGES

1. The “nexus” between water, food and energy is one of the most fundamental relationships - and increasing challenges - for society.
2. Water security is a major and increasing concern in many parts of the world, including both the availability (including extreme events) and quality of water.
3. Global and local water cycle are strongly dependent on wetlands.
4. Without wetlands, the water cycle, carbon cycle and nutrient cycle would be significantly altered, mostly detrimentally. Yet policies and decisions do not sufficiently take into account these interconnections and interdependencies.
5. Wetlands are solutions to water security – they provide multiple ecosystem services supporting water security as well as offering many other benefits and values to society and the economy.
6. Values of both coastal and inland wetland ecosystem services are typically higher than for other ecosystem types.
7. Wetlands provide natural infrastructure that can help meet a range of policy objectives. Beyond water availability and quality, they are invaluable in supporting climate change mitigation and adaption, support health as well as livelihoods, local development and poverty eradication.
8. Maintaining and restoring wetlands in many cases also lead to cost savings when compared to man-made infrastructure solutions.
9. Despite their values and despite the potential policy synergies, wetlands have been, and continue to be, lost or degraded. This leads to biodiversity loss - as wetlands are some of the most biodiverse areas in the world, providing essential habitats for many species - and a loss of ecosystem services.
10. Wetland loss can lead to significant losses of human wellbeing, and have negative economic impacts on communities, countries and business, for example through exacerbating water security problems.
11. Wetlands and water-related ecosystem services need to become an integral part of water management in order to make the transition to a resource efficient, sustainable economy.
12. Action at all levels and by all stakeholders is needed if the opportunities and benefits of working with water and wetlands are to be fully realised and the consequences of continuing wetland loss appreciated and acted upon.

OUR UNIQUE AUSTRALIAN WETLAND BIODIVERSITY

WetlandCare Australia is working on protection and restoration of our biodiversity and explains that –

"Many of our plants and animals are found nowhere else on the planet. The loss of biodiversity is Australia's most serious environmental problem. It is happening at an alarming rate due to clearing of habitat for development and production, water extraction, feral animals, increased grazing pressure, altered fire regimes and now the effects of climate change. In the past 200 years Australia has cleared so much land and drained so many wetlands, that we have the world's worst record for fauna extinction and over 100 species are now listed as threatened and endangered – 23% of mammals, 9% of birds, 5% of higher plants, 7% of reptiles, 16% of frogs and 9% of freshwater fish.

The extensive loss of native habitat is having major impacts on ecosystem functioning in many parts of Australia, particularly wetlands. This in turn is threatening the survival of our wetland wildlife. The scientific evidence is suggesting that Australia is on the cusp of another wave of mammal, bird, freshwater fish and frog extinctions.

For wetlands, a reduction in biodiversity means there are fewer components to buffer the blows inflicted by drought, fire, introduced species and climate change. The plants and animals of Australia's wetlands are unique and amazing, from birds that migrate from Russia and China to spend part of their life in the estuaries and coastlines of Australia, to rare plants that survive seemingly unpredictable wetting and drying periods."



4. THE RAMSAR CONVENTION

The Ramsar Convention, or 'Convention on Wetlands of International Importance' aims to promote and protect wetlands throughout the world. To date, wetlands are the only type of habitat in the world to have a dedicated international convention. Ramsar wetlands are wetlands of international importance due to their role in preserving biological diversity or because they are a representative, rare and unique wetland type. Globally there are 1,869 Ramsar wetlands, of which 65 are in Australia covering an area larger than Tasmania.

WetlandCare Australia is working on Ramsar sites around Australia including Moreton Bay, Coorong and lower lakes, Bowling Green Bay, Banrock Station, Hunter Wetlands Centre, Fivebough and Tuckerbil Wetlands, Little Uangothlin lagoon and Myall Lakes.

"The Ramsar Convention has stemmed from a recognition of wetland habitat as key to migratory bird species. One such bird, Latham's Snipe provides an example of how far away countries need to work together to protect the habitat of these migratory species. The Snipe travels from Australia to Japan each year to breed, resting in Papua New Guinea along the way. Without habitats in all of these countries the Snipe could not complete its lifecycle and would perish.

As a signatory to the Ramsar Convention, Australia has a responsibility for the wise use of all wetlands. Further to this, designating specific wetlands to the Ramsar Convention carries responsibility for ongoing sustainable management of their ecological value. This requires maintaining and enhancing the natural and cultural heritage values of each site. Many of Australia's Ramsar wetlands are located within national parks, nature reserves and state forests. Some are also located on privately owned land, proof of the high level of commitment and increasing capacity of the community to protect these iconic areas. Across Australia, WetlandCare Australia is committed to working with governments, private landowners and the community to implement the responsibilities of the Ramsar Convention by increasing the level of knowledge about, and the wise use of all wetlands and assisting with the management of Ramsar sites to ensure that these unique places will remain for the future generations."

The process for identifying and nominating Ramsar sites is set out by the Australian Government Department of Sustainability, Environment, Water, Population and Communities on the following pages.

The selection and administration of Ramsar wetland sites is part of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC)



4. Identify candidate Ramsar sites

4.1. Site identification and initial assessment against Ramsar criteria

As described in section 2.1 Ramsar site nominations may be initiated by the Australian or state governments, NGO, community entities, trusts, Traditional Owners, individuals, private land owners or a company. Before proposing a site for nomination, an initial assessment of whether the site meets any of the Ramsar listing criteria should be undertaken. More detailed assessment will be undertaken during the development of the nomination documents but the listing cannot proceed unless the site meets at least one criterion. Justification against each selected criterion is required (see also section 7.1).

Wetlands should be selected for the Ramsar List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology²⁰. The Ramsar Convention has developed criteria for the designation of Ramsar wetlands which relate to identifying sites that contain representative, rare or unique wetlands, or wetlands that are important for conserving biological diversity. For a wetland to be designated as a Ramsar site it must satisfy one or more of the criteria (Table 1). These criteria are reviewed from time to time.

Table 1 – Current (2005) Ramsar criteria for identifying Wetlands of International Importance²¹

Group A of the criteria: Sites containing representative, rare or unique wetland types	
	Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region*.
Group B of the criteria: Sites of International Importance for conserving biological diversity	
Criteria based on species and ecological communities	Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
	Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region*.
	Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.
Specific criteria based on waterbirds	Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.
	Criterion 6: A wetland should be considered internationally important if it regularly supports 1 per cent of the individuals in a population of one species or subspecies of waterbird.
Specific criteria based on fish	Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.
	Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.
Specific criteria based on other taxa	Criterion 9: A wetland should be considered internationally important if it regularly supports 1 per cent of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

*In Australia, the biogeographic regionalisation scheme for aquatic ecosystems is the Australian Drainage Division system for inland and coastal ecosystems (Commonwealth of Australia 2011), and the Integrated Marine and Coastal Regionalisation of Australia (IMCRA) for marine ecosystems at the Provincial Bioregions scale (Commonwealth of Australia 2006b).

²⁰ Ramsar Convention 1987, Article 2

²¹ COP 9 (2005) Resolution IX.1 Annex B: Revised Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance

3. The nomination process

Figure 1 provides an overview of the nomination process for Australian Ramsar sites. The steps are described in more detail in subsequent sections. The state governments may have specific additional processes for receiving and undertaking Ramsar site nominations which are not covered in these guidelines.

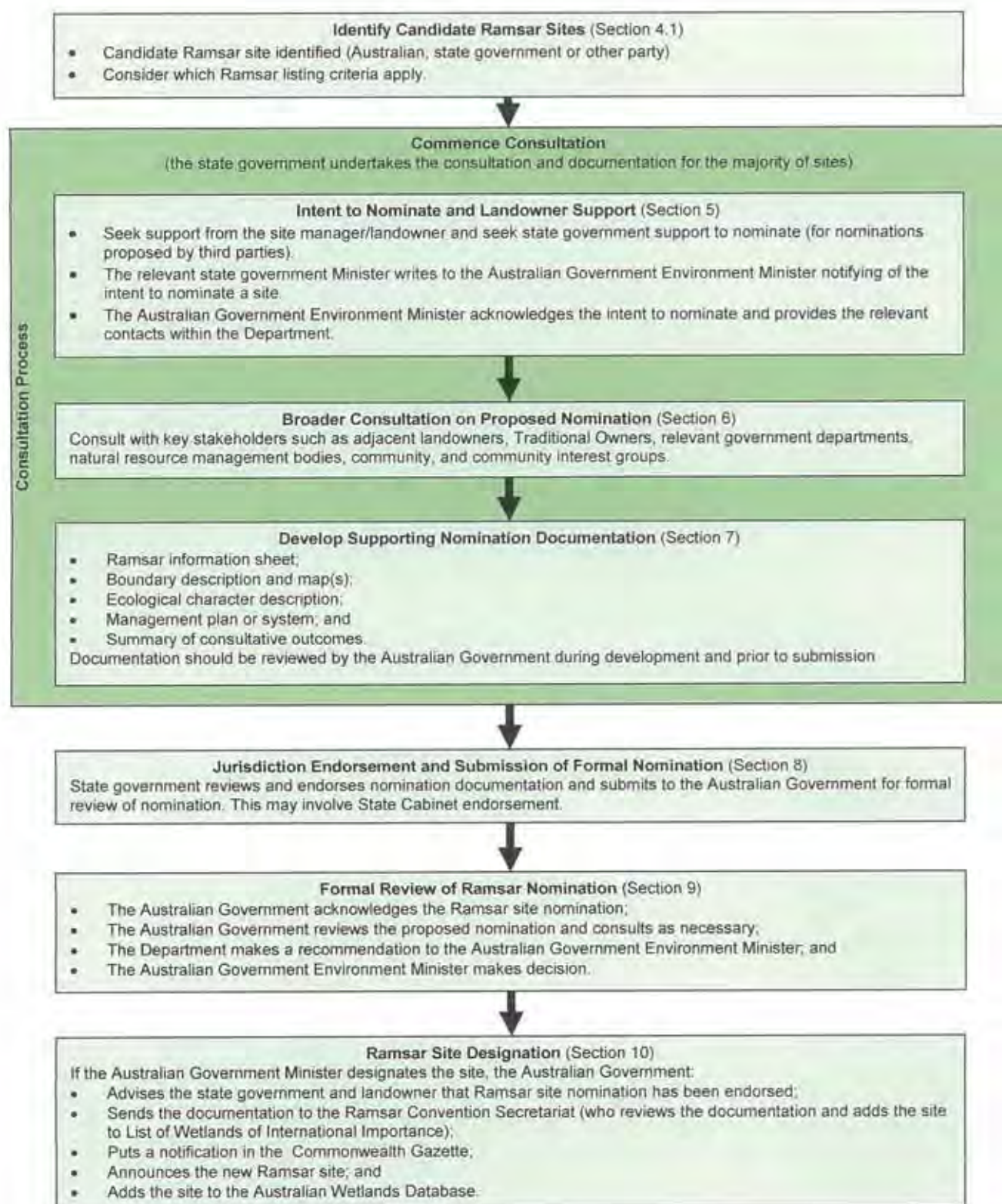


Figure 1: Overview of the nomination process.

DIRECTORY OF IMPORTANT WETLANDS

The Australian Government Department of the Environment also has a Directory of Important Wetlands in Australia and advises that any person may nominate a native species, ecological community or threatening process for listing under the EPBC Act.

"The Directory of Important Wetlands in Australia (the Directory) was first published in 1993. The Directory was compiled with the co-operation of conservation agencies and other resource managers in all jurisdictions.

The Directory not only identifies nationally important wetlands, it provides a substantial knowledge base of what defines wetlands, their variety, and the many Flora and Fauna species that depend on them. In addition, it contains information about their social and cultural values and some of the ecosystem services and benefits they provide. It is a valuable tool for managers and others interested in Australia's important wetlands."

CRITERIA FOR DETERMINING NATIONALLY IMPORTANT WETLANDS

"The criteria for determining nationally important wetlands in Australia, and hence their eligibility for inclusion in the Directory, are those agreed to by the ANZECC Wetlands Network in 1994.

A wetland may be considered nationally important if it meets at least one of the following criteria:

1. It is a good example of a wetland type occurring within a biogeographic region in Australia.
2. It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex.
3. It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge when adverse conditions such as drought prevail.
4. The wetland supports 1% or more of the national populations of any native plant or animal taxa.
5. The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level.
6. The wetland is of outstanding historical or cultural significance."

MARINE AND COASTAL ZONE WETLANDS

1. Marine waters – permanent shallow waters less than six metres deep at low tide; includes sea bays, straits.
2. Subtidal aquatic beds; includes kelp beds, seagrasses, tropical marine meadows.
3. Coral reefs.
4. Rocky marine shores; includes rocky offshore islands, sea cliffs.
5. Sand, shingle or pebble beaches; includes sand bars, spits, sandy islets.
5. Estuarine waters; permanent waters of estuaries and estuarine systems of deltas.
6. Intertidal mud, sand or salt flats.
7. Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes, tidal brackish and freshwater marshes.
8. Intertidal forested wetlands; includes mangrove swamps, nipa swamps, tidal freshwater swamp forests.
9. Brackish to saline lagoons and marshes with one or more relatively narrow connections with the sea.
10. Freshwater lagoons and marshes in the coastal zone.
11. Non-tidal freshwater forested wetlands."



5. THE BELONGIL CATCHMENT

Belongil Creek is approximately 3 kilometres long and has a catchment of around 30 square kilometres. The Byron Bay township drains into Belongil Creek and is susceptible to flooding from both intense rainfall over the town catchment and elevated ocean levels. The full extent of the catchment is shown on the following pages in the locality plan and area base map.

HISTORY

Mary Gardner, a local ecology writer and researcher outlines the history as follows:

"Back in 1841, Clement Hodgkinson described the coast of the northern rivers as 'extensive swamps of many thousand acres in extent, whose verdant sea, of high waving reeds and sedge, stretches away to the base of the distant forest ranges. There are several lagoons in these swamps, and the stagnant water is very generally diffused over their surface'.

R King, who was born in Ballina in 1869 and at eleven years of age 'came across to Tyagarah', says near this backswamp were 'big camps' of Aboriginal people. They 'always camped where pipi and oyster could be obtained' as well as 'fish, possum, native bear' and the 'eggs of bush turkeys'.

'Wild horses and cattle were plentiful then.' They roamed the wetlands up 'to Cudgen'.

Even in those days the opening of the Belongil was always troublesome.

In 2011, Mitchell Tulau completed an environmental history of the backswamps of NSW. He traced their social and legal history. In the late 1880s, local government encouraged 'drainage unions' to make farms of floodplains and backswamps. In the early 1900s, the state government set Public Works Departments (PWD) to manage drainage trusts. Most of the trusts failed financially because 'the land could not repay' the investments.

During a long dry period, the floodplains were 'alienated, subdivided and settled'.

Then the weather changed and floods at Byron (1945), Kempsey (1949) and Maitland (1955) led to more state-wide 'flood mitigation'. This meant more drainage works. Belongil would eventually have eight kilometres of major drains and forty secondary ones.

By 1964, these works dried up almost every wetland, supposedly to help farming and housing. Not everyone agreed but dissenters were ignored. There were other 'causes' for floods, pollution and diminished fish stocks.

Our coasts are 'young', underwater as recently as a thousand years ago. The land and sea are old partners and backswamps are the gift of that relationship. Koalas and possums snoozing over large nurseries of fat fish.

In NSW, some backswamps are now rezoned as national parks and reserves. When people restore such key land/sea links, birds and fish populations grow again, enhancing the adjacent coast.

Of all the catchments in northern rivers, there may be one of a significant size and location with the community interest necessary for such a transformation. It's on the west of the town of Byron Bay."

Figure 7 Constructed and Natural Drainage

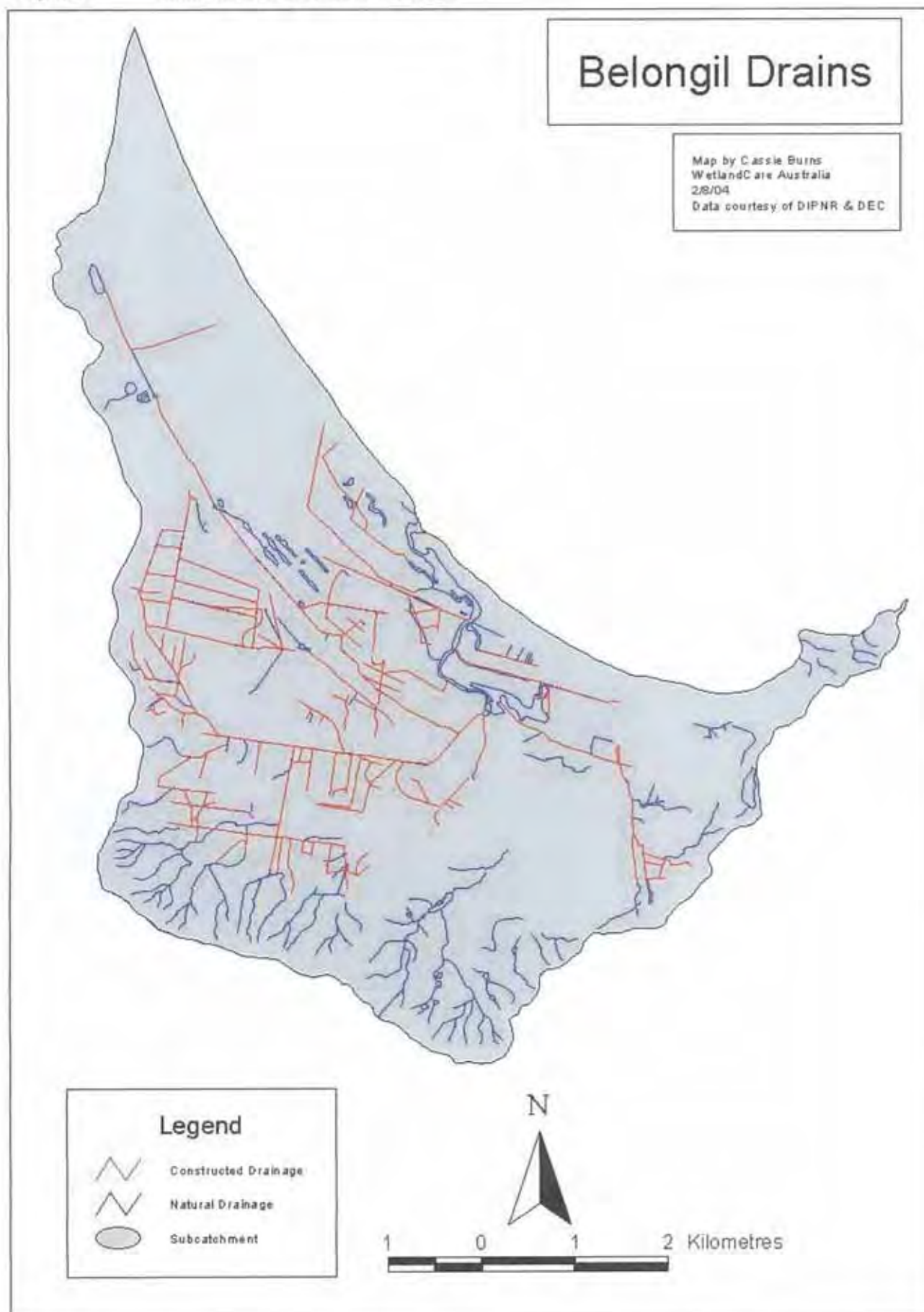
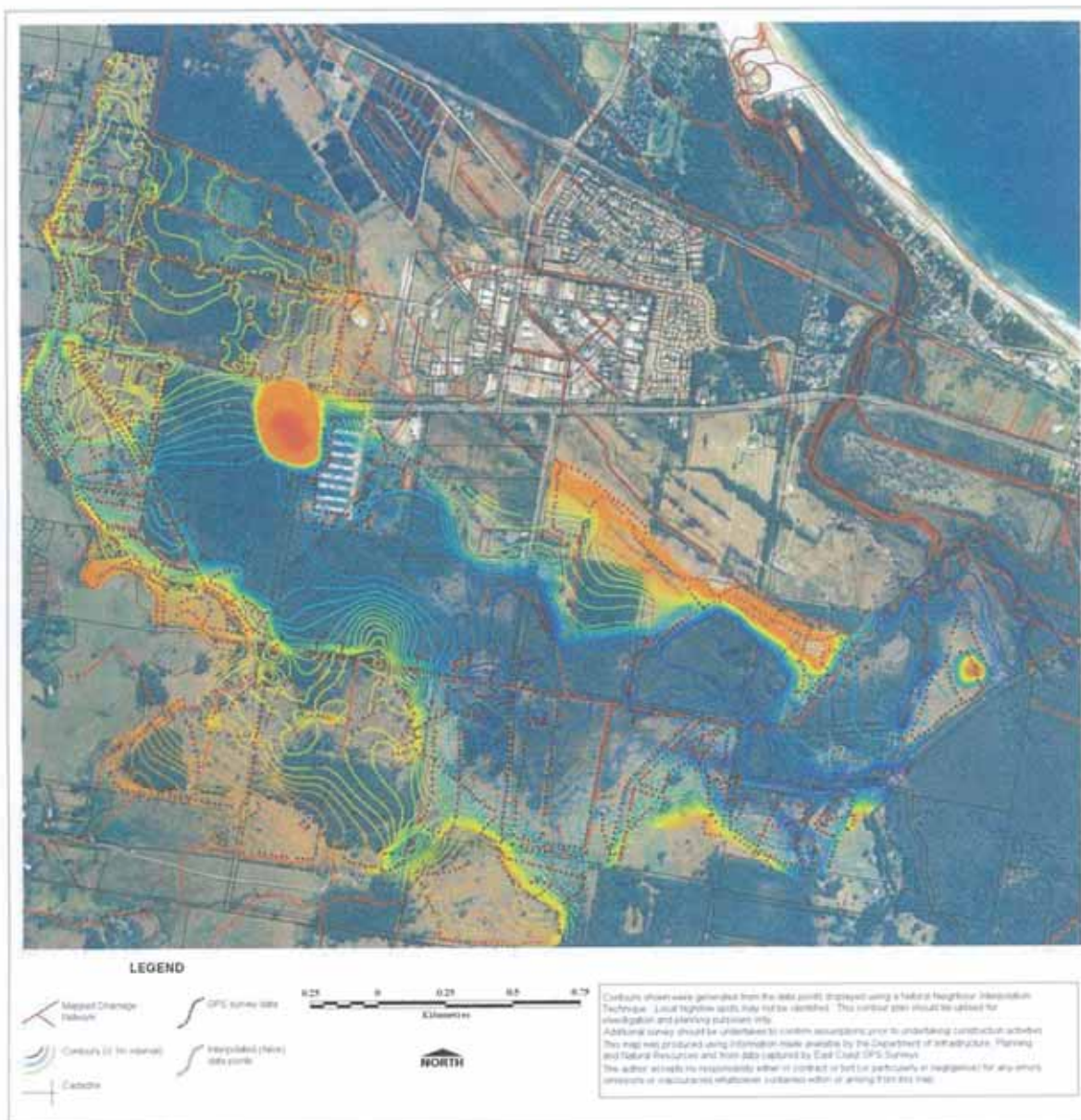
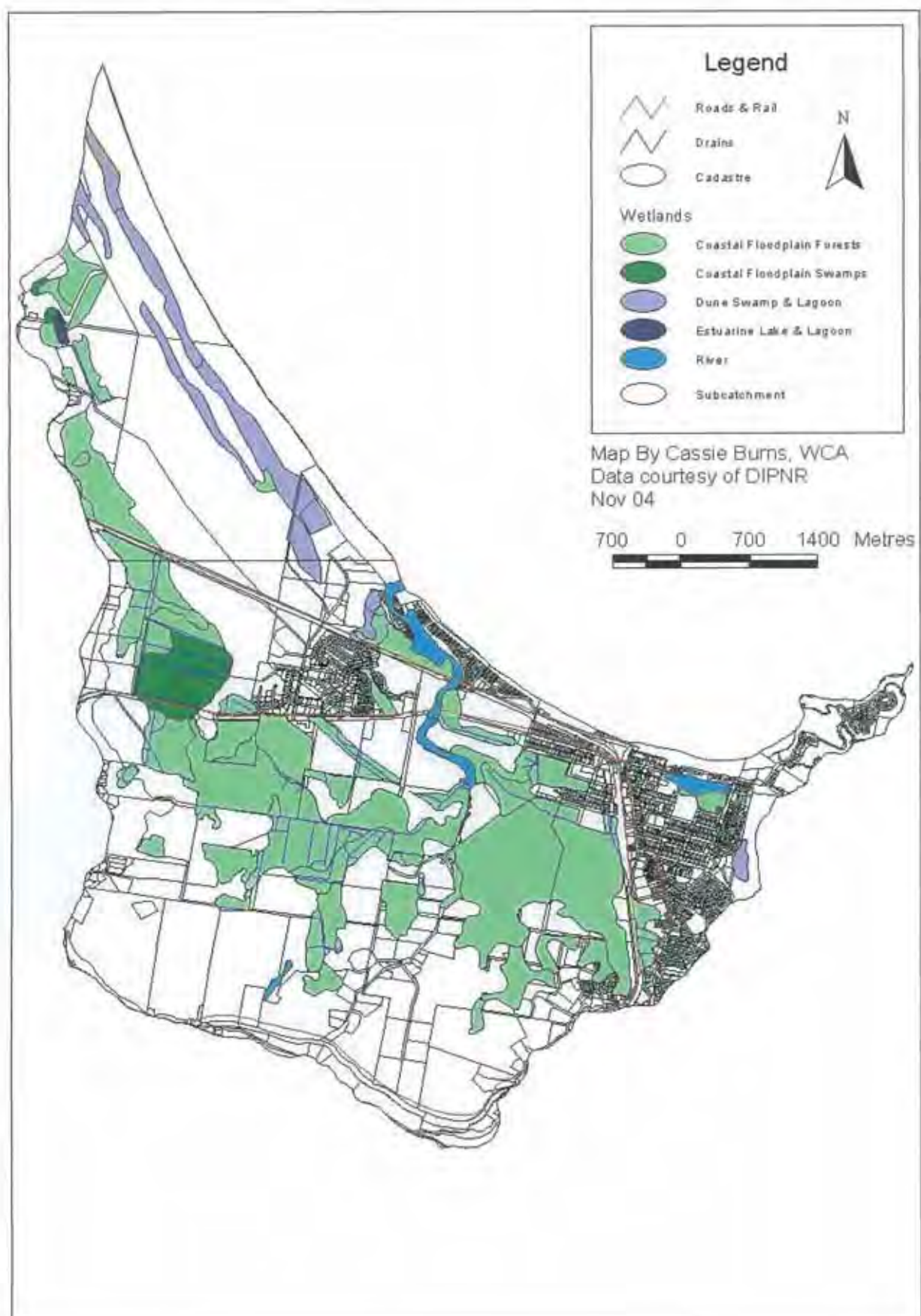


Figure 2 **Belongil Wetland Boundary Based on Contour Plan**



Source: Map generated by Tulau, Currie and Sayer (2004).

Figure 1 **Belongil-Cumbebin Wetlands as Defined by DIPNR Multi-Attribute Mapping**



TEN YEAR PLAN

The history continues: "In 2004 when a lot of scientific, Council and community work finally developed a plan to live with all this water. The ten-year plan, based on the ecology of local wetlands, would treat stormwater pollution, ease flooding and treat sewage and wastewater without any outfall pipes into the ocean. The feeling was construction in West Byron had to wait and see. By 2014, this plan is still incomplete, but that construction is approved.

Standard calculations estimate 240 litres are needed per person per day. Water leaves each sink and toilet to enter sewerage pipes to be pumped by 40 different stations to the sewage treatment plant (STP) behind the sports centre. The STP is designed to accept an inflow of seven megalitres a day. Based on figures since 2012, it's accepting 73 per cent of that total capacity. This daily flow is constant, rain or shine. Where there is inflow, there must be an outflow.

The STP is a prize-winner, combining engineering and ecology in a custom-tailored design to fit the catchment. Right now it is still a work in progress. Two of three stages have been created.

Network incomplete

The first stage is the constructed plant which accepts all the sewage and does the treatment to a high standard. The second stage is the redistribution of the effluent, the outflow. The redistribution is to happen in three ways. Only part of that redistribution network has ever been completed.

The first part is a system that uses effluent to water golf courses and sports fields. The second is effluent available for use by nearby farms. The third is the construction and regeneration of wetlands, starting with less than fifty hectares near the STP. These also grow paperbark trees while supporting birds and other wildlife. So what is the delay?

The 2004 plan linked the treatment of stormwater and flood protection with the regeneration of the same wetlands. Rooftops, driveways and roads hurry rainfall down pipes to drains that all lead to the Belongil Estuary. As it travels it washes exhaust and other pollutants into the estuary and sea. Through town, it gets backed up around the Clock Tower, the lowest point. Eventually, it gets through the Butler Street drain.

Slowing water

The western industrial area has similar problems. To slow the water, rain tanks were planned for every roof. To slow and clean water, tiny wetlands and other water-sensitive designs were planned for Sandhills and other places in town and the industrial estate.

The West Byron drains, having been transformed into wetlands, would be great sponges, as well as wildlife havens. They could better accommodate not only stormwater but also great surges of stormy seawater. These go up the estuary, compounding flooding.

But the drains remain grassy channels. They crisscross paddocks of acid sulfate soils, carrying more effluent than was originally planned to the estuary. A new flood plan, brought to Council in November, wants levees and pumps installed along Butler Street. Slowing the rain with tanks is not a priority. Only one water-sensitive-design parklet, at Sandhills, is suggested.

Behind schedule

The regeneration of wetlands and other water-sensitive designs remain critical to handling all three types of water flow. Without them the 2004 plan to reuse the STP effluent is way behind schedule. The inflow capacity is growing, but the redistribution of outflow is not. How is it that our vital community infrastructure is left incomplete for a decade while private mega-development is fast-tracked?"

Within the catchment area an integrated approach to water is needed because all "The water issues are connected: effluent discharge, stormwater treatment and management flood controls, pollution, wetland regeneration, fisheries repair, future growth for populations of koalas and other wildlife. We talked about investigating water sensitive designs for Byron Bay: ecology and engineering hybrids that slow down and clean up effluent and stormwater through a network of eco-wise filtration parklets and regenerated wetlands. These places can also become points of interest for walking and cycling pathways, for public art that celebrates our waterways."

THE THREE WATER FLOWS

"There are three types of surface water flows and cycles in the Belongil catchment. Although important, we are leaving aside groundwater for now. One is rain, another is the sea, with its tides and storms and the third is the tap water and sewerage infrastructure that we built. These three types of water flows are in various stages of care and disrepair.

Water flow number 1: Rain comes down, and should soak up. Some does but a lot of it doesn't, it hits roofs and streets and is quickly shunted into stormwater pipes directed into drains and into the Belongil Estuary and the sea. This is a major source of distress and pollution in the catchment. The water should move very slowly. It should be collected in rain tanks and used in gardens, it should rest in small ponds and tiny wetlands all through town where plants and microbes would polish the water and free it of pollutants.

This is infrastructure, water sensitive design infrastructure that was planned in 2004 and has not been built. These are also places where koala food trees can grow. The koalas depend on the moisture in the leaves of trees that have their roots wet. Without this infrastructure we have pollution in the estuary and we also guarantee the flooding of the centre of town. Too much water too fast.

Water flow number 2: The sea is an active part of the Belongil Estuary and its fertility, in the worst of storms and the highest of tides. It can come up against the usual flow helping to create floods and backwash. Right now the Belongil mouth is opened mechanically whenever the water reaches the height of one metre as measured at the railway bridge at the start of the Butler Street drain. This happens a lot more than it did 100 or more years ago and the reason? It's all because of water flow number 3.

Water flow number 3: This is the water flow that we rely on now that we have given up on the natural springs and wells in the Belongil catchment. This is our tap water and sewerage. There's a tank at the top of Paterson Street Hill and another tank on the lighthouse road. On paper this water flow is based on 240L per person per day. That's how much leaves each sink and toilet, each house and building, enters the sewerage pipes, is pumped at 40 different stations all to the sewage treatment plant opposite the

IGA in the back of the sports centre. The STP is designed to accept an inflow of seven megalitres a day. Right now, since 2012 to 2014, it's accepting 73% of that total capacity. This flow happens, whether it's wet or dry. And where there is an inflow there must be an outflow.

The STP is fantastic because it uses engineering and ecology in a way that avoids having a sewage outfall into the ocean. Its design is custom tailored to the catchment. Right now it is still a work in progress. Two of three stages have been created. The first stage is the constructed plant which accepts all the sewage and does the treatment. The second stage is the redistribution of the cleaned up water. The redistribution happens in three ways. And it's here that we are stuck. In 2004, a 10-year plan was set out to develop a redistribution network, which involves the entire catchment. Only part of that redistribution network has ever been completed. And it's time to reassess the workings of the whole hybrid, the ecology and engineering system.

Our catchment knowledge and decisions about West Byron & Ewingsdale

The redistribution network was to be done before any decision about the development at West Byron or at the worst in very tight conjunction with any planning. That's because the redistribution is our golden opportunity for the catchment, its wildlife and people. It also can remedy stormwater pollution and flooding. Ecology is the trump card. Ecology determines the engineering. Here's how it works.

Some of the redistribution is piped to golf courses to water the greens. Some into farm projects around Tyagarah. The rest of it was to go into regeneration projects. What were we going to regenerate? We were going to regenerate the backswamp and wetlands which are now drained by the union drain and all the drains that go into it. These are the lands with the worst and most active acid sulfate soils. The drains made these soils active. They are still active. These lands include the West Byron development. If you follow the money, you'll see all the attention is on the West Byron development. But if you follow the water, you'll see that attention has lapsed. And ignoring the water can be our undoing as a catchment and as a community."



ENGINEERING REPORTS

There have been many engineering reports on the Belongil Creek catchment including the following:

- Belongil Creek Flood Study (PWD 1986)
- Belongil Creek Data Compilation Study (Willing & Partners, July 1996)
- Belongil Estuary Study and Management Plan (Parker & Pont, November 2001)
- Byron Shire Council Draft Belongil Entrance Opening Strategy and REF on the Belongil Creek Entrance Opening Strategy (IERM 2005)
- Belongil Creek Flood Study – final report (SMEC November 2009)

All these reports are engineering based with some discussing the effects and impacts with flora and fauna observations and vegetation monitoring as a result of development and engineering works in the wetlands.

The NSW Office of Environment and Heritage profiles the Coastal Floodplain Forest of the NSW north coast bio-region as an endangered Ecological Community and lists the threats to the communities as follows –

- Further clearing for urban and rural development, and the subsequent impacts from fragmentation
- Flood mitigation and drainage works
- Management of water and tidal flows
- Landfilling and earthworks associated with urban and industrial development
- Grazing and trampling by stock and feral animals (eg. pigs)
- Changes in water quality, particularly increased nutrients and sedimentation
- Weed invasion
- Climate change
- Activation of acid sulfate soils
- Removal of dead wood
- Rubbish dumping
- Frequent burning which reduces the diversity of woody plant species"

They have in place Recovery Strategies and the Saving our Species Program to protect habitat and promote regeneration.

In May 2004 a Restoration Strategy for the Belongil–Cumbeim Wetland was prepared by WetlandCare Australia as part of the North Coast Catchment Management Authority Strategy to provide better management of our natural resources.

This strategy is included in the following pages and emphasises what can be achieved through sensitive community consultation and working with nature to rehabilitate a priceless asset.

Technical Bulletin #1

May 2004

Restoration Strategy Belongil-Cumbebin Wetland

Background

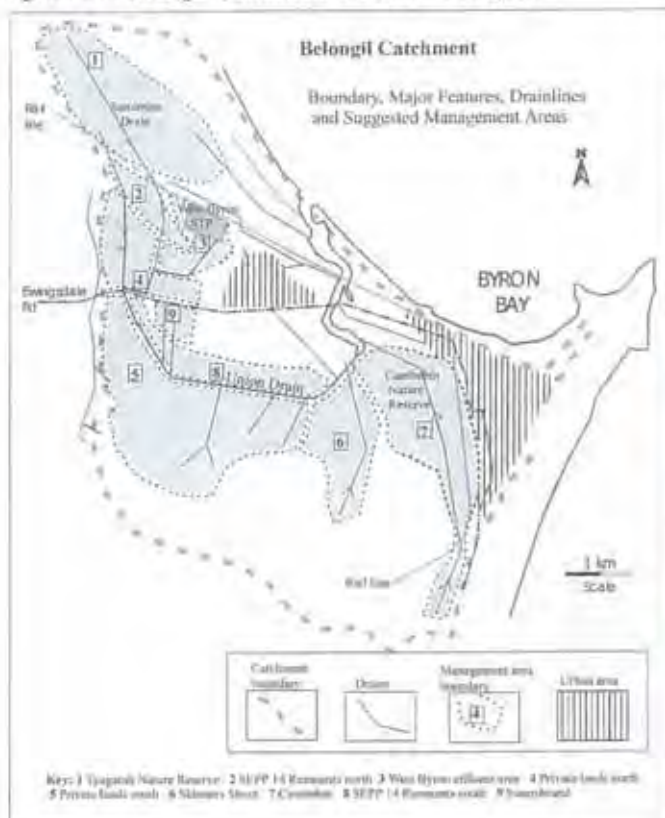
The Wetland Restoration Strategy (WRS) for the Belongil-Cumbebin Wetland Complex (B-CWC) is part of the North Coast Catchment Management Authority strategy to provide better management of the natural resources.

The WRS builds on previous work conducted by a number of organisations and stakeholder groups working on issues such as acid sulfate soils, estuary management, stormwater management and weed control.

Location

Wetlands have moving boundaries and therefore, only an approximate boundary for the study area is provided in Figure 1.

Figure 1: Belongil-Cumbebin Wetland Complex



Project Outcomes

During the course of the project WetlandCare Australia seeks to work with the community to produce a clearly stated vision for the future of the Belongil-Cumbebin Wetland.

This vision must be based on a balance of the best science available, respect for the rights of individual landholders, the needs of the wetlands and the Belongil estuary, and what is practically achievable in restoration.

The primary objectives for the WRS of the Belongil-Cumbebin Wetland Complex are to produce:

- An Environmental Management Plan for the Belongil-Cumbebin wetland complex addressing all Natural Resource Management issues relevant to the area.
- A priority list of NRM issues and sites for strategic on-ground works.
- A strategy for the brokerage of funding to implement the WRS recommendations, including the provision of technical/professional assistance to landowners where necessary.
- Stakeholder ownership and acceptance of the WRS to achieve comprehensive adoption of recommendations as well as implementation.

The implications of any further encroachment of development into the Belongil-Cumbebin Wetland Complex also requires consideration.

Mouth of Belongil estuary



Land Uses

Grazing

Landholders cleared their holdings, including the wetlands, to provide grass for livestock. Clear felling of Melaleuca was carried out in the 1950s-70s to provide fuel for the boilers at the Byron Bay abattoirs, piggery, butter factory and whaling station, as well as providing the cordwood which Council used as a stabiliser to construct roads across the wetlands.

Much of the present Melaleuca is predominantly spindly and is not representative of the original old growth vegetation, which is still evident in several remnants (Draper, 2002).

Constructed drain and acid water



NSW Government incentives encouraged drainage of wetlands to promote agricultural production. By 1913, over 6 kilometres of major drains had been constructed west of the Belongil estuary. Individual landholders have subsequently constructed connecting drains (see Figure 1).

The Belongil Drainage Board now administers 8 km of agricultural drains and there is another 40 km of secondary drains constructed within the catchment, including Council and private works. The area of impact of the drains extends beyond the wetland area and includes grazing, industrial and urban land.

Table 1: Belongil-Cumbebin Land Uses

Land Use	Within Wetland (ha)
Grazing	322.75
Mining and Quarrying	0
Recreation	2.7
Timbered	598
Urban	0
Utilities	0
Waterbodies	33.6
Total	957.05

Source: Cassie Burns, WetlandCare Australia

The Belongil-Cumbebin wetland (Figure 1) has marginal grazing productivity because much is heavily timbered and soils remain wet for long periods.

What's wrong with draining wetlands?

Excessive drainage of coastal wetlands can cause sudden and large increases in acidity transported to the estuaries. It is now recognised that water quality problems associated with acid sulfate soils is largely due to the drainage of marginal agricultural land.

Such drainage works have significant detrimental impacts on the health of waterways, including a reduction in the number and area of freshwater wetlands, reduction in habitat for fish and other estuarine species, fish diseases and death due to acid discharge, and alienation of agricultural land due to acid scalding (Tulau, 1999).

Other impacts of draining wetlands include the loss of flood buffering, interruption of the food chain of the estuary, degradation of wildlife habitat, and altered nutrient cycling functions.

Effluent Management

The West Byron Sewage Treatment Plant (WBSTP) occupies 105ha near the edge of the Belongil-Cumbebin Wetland Complex. A majority of the tertiary treated effluent from the site, after passage through a large constructed wetland system, is currently reused on a 24ha Melaleuca restoration site.

Any unused treated effluent from the constructed wetlands is released into the drainage network, ultimately entering Belongil estuary via the Union Drain. Council's new strategy embraces demand management, centralisation of sewage treatment and management at West Byron, the maximum practical percentage of effluent reuse, and the use of large constructed wetlands as an integral component of the effluent management system.

Constructed wetland at WBWWTP



Water quality monitoring indicates that while the waterway is not pristine, the current effluent discharge from West Byron STP has little effect on overall water quality. Belongil Creek is periodically affected by runoff of low pH derived from acid sulfate soil groundwater present within the catchment (ERM 2001).

STOPPING ACID

Actions to reduce acid flows from the drainage network include:

- placement of in-drain water control structures at strategic points, which would keep the water table relatively high and/or
- redesign of drains through shallowing and widening

Options for management of constructed drains in the Belongil catchment have been examined at several workshops, meetings, and most recently at the 2002 Belongil Wetland Think-Tank Symposium (Tulau, 2001).

These options include interim drain management using in-drain devices such as dropboards or gates, and drain network re-design.

Technical Explanation

Soils

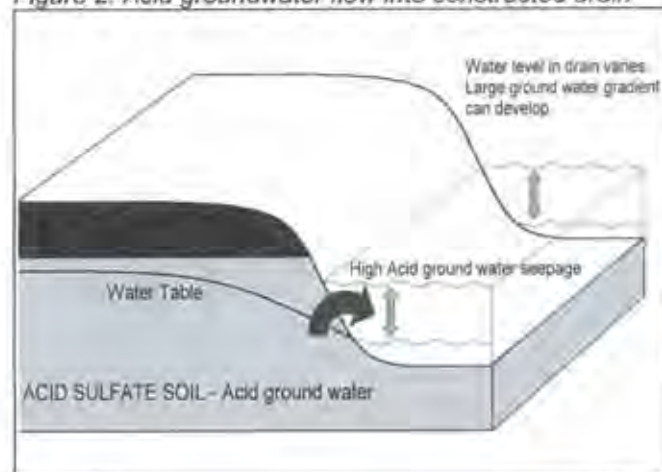
The Belongil-Cumbebin Wetland Complex is underlain by sulfidic marine sediments. The greatest potential for impact on water quality comes from the lowest-lying land that has been artificially drained.

Laboratory analysis indicates that soil sulfides in the low-lying areas increase markedly in concentration at depths below approximately 1m AHD (i.e. ~1m above mean sea level).

Acid Movement

Seepage of acidic groundwater directly into the deep constructed drains is the main pathway for acid transport to the Belongil drainage system (see Figure 2).

Figure 2: Acid groundwater flow into constructed drain



Acid Impacts

Artificial drainage of coastal wetlands results in more frequent drying of the soil profile enhancing the release of acid. These have the potential to significantly impact on fauna and flora residing in receiving waters (see *Flora and Fauna*).

Humic acid produced from peat and other organic material is a natural feature of coastal wetlands and is

generally not associated with adverse environmental impacts.

Peat Fires and Land Subsidence

The Belongil wetland has a history of peat fires with hundreds of hectares having been burnt; some burning underground for many months. As a result, ground levels have fallen and often there has been a subsequent proliferation of *Melaleuca* seedling regrowth (Draper, 2002).

Subsidence has major implications for the efficacy of constructed drainage schemes, making the land more difficult to drain.

Peat fires are a major cause of acid mobilisation by releasing acid products bound to the peat. This loss of peat also allows soils to further dry and acidify.

Wetland Flora

Several flora and fauna studies have been completed for the Belongil area in recent years, including Parker (1996), Landmark *et al.* (1999), WBM (2000) and Davis (2001).

The main wetland vegetation associations of the Belongil catchment include:

- Mangrove Forest and Woodland
- Sedgeland/Fernland/Grassland
- Swamp Sclerophyll Forest and Woodland

Five plant species that occur within the Belongil-Cumbebin catchment are listed as threatened under the *Threatened Species Conservation (TSC) Act*. These are the Red Lilly-Pilly (*Syzygium hodgkinsoniae*), Durroby (*Syzygium moorei*), Stinking Cryptocarya (*Cryptocarya foetida*), Swamp Orchid (*Phaius tankervilleae*) and the Arrowhead Vine (*Tinospora tinctoria*).

Wetland Health

Since drainage, the area of wetlands has been reduced by about two-thirds due to clearing for agriculture. There has been a loss of connectivity, altered hydrology, as well as barriers (e.g. constructed drains and roads) to the movements of non-flying terrestrial animals. Much of the area has been invaded by weeds, reducing the ability of the wetlands to perform their ecological functions.

Overall condition of paperbark trees in the catchment is poor, and this is attributed to the stresses placed on them by human activities. Fragmentation of the wetland ecosystem explains why the vegetation in the study area compares so unfavourably with the 'ideal'.

High edge to area ratios of the remnant stands of native vegetation equate to increased opportunities for weed invasion.

Overall wetland health is poor in the Belongil system, due mainly to human disturbance through clearing, drainage and encroachment of other land uses. The remaining wetland areas are mainly in relatively small units that are isolated from others by roads, railway lines, drains, and inhospitable agricultural land.

The main threats to a sustainable ecosystem fall into the three categories of disturbed hydrology, competing land uses and biological invasion.

Paperbark swamp forest



Wetland Fauna

Coastal wetlands generally provide habitat for birds, frogs, invertebrates and fish species, as well as having a close ecological connection with estuaries. Most are dependent on good water quality traditionally associated with healthy wetlands.

Two-thirds of the fish stocks harvested in NSW coastal waters spend part of their life cycle in wetlands and estuaries

Thirty two (32) vulnerable fauna species listed under the *Threatened Species Conservation Act* (1995), have been recorded within the Belongil-Cumbegin basin. Three of these are threatened, including Little Tern, Beach Thick-Knee and the Mitchell's Rainforest Snail.

Despite the high level of disturbance, the Belongil-Cumbegin wetland system is most remarkable for its avifauna. Over 195 species have been recorded in the area. This rich bird life is seen as resulting from the very high biological productivity of the remnant Belongil-Cumbegin area.

Other functions of wetlands include large populations of producer-plants that act as nutrient traps, and allow various aquatic organisms in early growth stages to take advantage of the favourable food and shelter conditions.

Estuary Opening to the Ocean

The Belongil Estuary is artificially opened using an excavator 3-5 times per year to supplement natural openings. This is done to reduce the risk of flood damage to the Byron Bay Town Centre and other land in and adjacent to the Belongil-Cumbegin Wetland Complex.

The opening process involves an excavator being used to dig a channel to allow the build up of water to rush out. This creates a channel allowing tidal water exchange for several weeks to several months, before sand builds up again and blocks the entrance.

Other reasons for estuary opening is to:

- Minimise fish kills in the closed estuary;
- Enhance and protect ecological communities in the catchment and estuary that have developed in response to the historical opening regime; and
- Assist in managing polluting processes, particularly acid sulfate drainage waters, until more refined remediation strategies are further implemented.

Estuary opening encourages the release of fish to the ocean as well as yabby and fish recruitment into the estuary. It also allows saline intrusion along the estuary and drainage network.

The main disadvantage of tidal intrusion is the potential medium to long-term ecological impacts on the upper estuary environment. The main advantage is in the avoidance of short-term catastrophic pollution events associated with natural and artificial openings, by buffering and reducing concentrations of pollutants such as the products of acid sulfate ground water.

Artificial opening of estuary



Water Quality

Monthly monitoring from 1996 to 2003 has established

- pH levels grade from 2.9 - 4.0, in the Upper Union Drain at Ewingsdale Road to pH 5.0 - 7.0 in the area

of the Road bridge. pH levels reach 8.3 when the entrance is open, and about 6.0 - 7.0 when closed.

- Nitrogen concentrations in the drain network and estuary are not excessively high.
- Chlorophyll-a concentrations are often zero, with an occasional "spike" associated with effluent flows in the Upper Main Drain and urban stormwater impacts at the Road bridge associated with Byron town centre stormwater nutrients.
- Butler Street stormwater from the Byron Bay town centre remains the major source of faecal coliform bacteria entering the estuary.
- DO is generally lower in the wet season, with concentrations reflecting poor water quality from the catchment
- Turbidity is much higher in the wet season, as a result of the oxidation of iron-laden ground water flowing in constructed drains

Adaptive Management

The Belongil-Cumbebin Wetland Complex continues to come under considerable pressure from past and present land use practices. Table 3 summarises some of the actions already underway to reduce adverse impacts.

Table 3: Steps to overcome pressures on the Belongil-Cumbebin Wetland Complex

Issue	Action
Clearing, drainage and burning associated with grazing	Appropriate strategic planning and development controls to halt further degrading activities
Associated weed invasion	Responding to local resident initiatives by securing funding
Acidification of soils and the ongoing release of acid ground water especially via the Drainage Union Main Drain	Negotiations with landholders to initially build a water retention structure in the Main Drain capable of releasing flows during heavy rainfall events
Changes in water quality and quantity associated with urban runoff and effluent	(i) Implementation and design of an urban stormwater management plan for Byron Bay, and (ii) maximum possible reuse of treated effluent
Artificial opening of the estuary to manage flooding and water quality	Strategic opening based on scientific evidence and the Entrance Opening Strategy (in draft)

Where to From Here?

Over the next 6 months, the project partners will:

- Hold a Community Think-Tank to further develop the Belongil-Cumbebin Wetland Complex
- Continue to liaise with landholders and attempt to address their concerns
- Seek ongoing guidance from the Belongil Community Working Groups
- Monitor progress and report to the community
- Display the Draft WRS
- Incorporate public comments
- Make recommendations to NRCMB and BSC
- Develop funding strategies

Consultation

Throughout the development of the WRS, special emphasis has been placed on the community consultation process, to ensure the highest level of ownership. The resulting strategy will pave the way for the implementation of a comprehensive WRS.

Further Reading:

Belongil 'Think Tank' Belongil Wetland – where to from here? Background Papers to Current Management Issues. Ewingsdale Hall, 4th November 2002. WetlandCare Australia.

WetlandCare Australia and Australian Wetlands (2004) Restoration Strategy Belongil-Cumbebin Wetland Complex Part 1 - Technical Review (30 March 2004).

Tulau, M.J. (2003) Belongil Swamp Acid Sulfate Soils Remediation Concept Plan (Draft). Report prepared for Belongil Acid Sulfate Soils Working Group, Byron Shire Council.

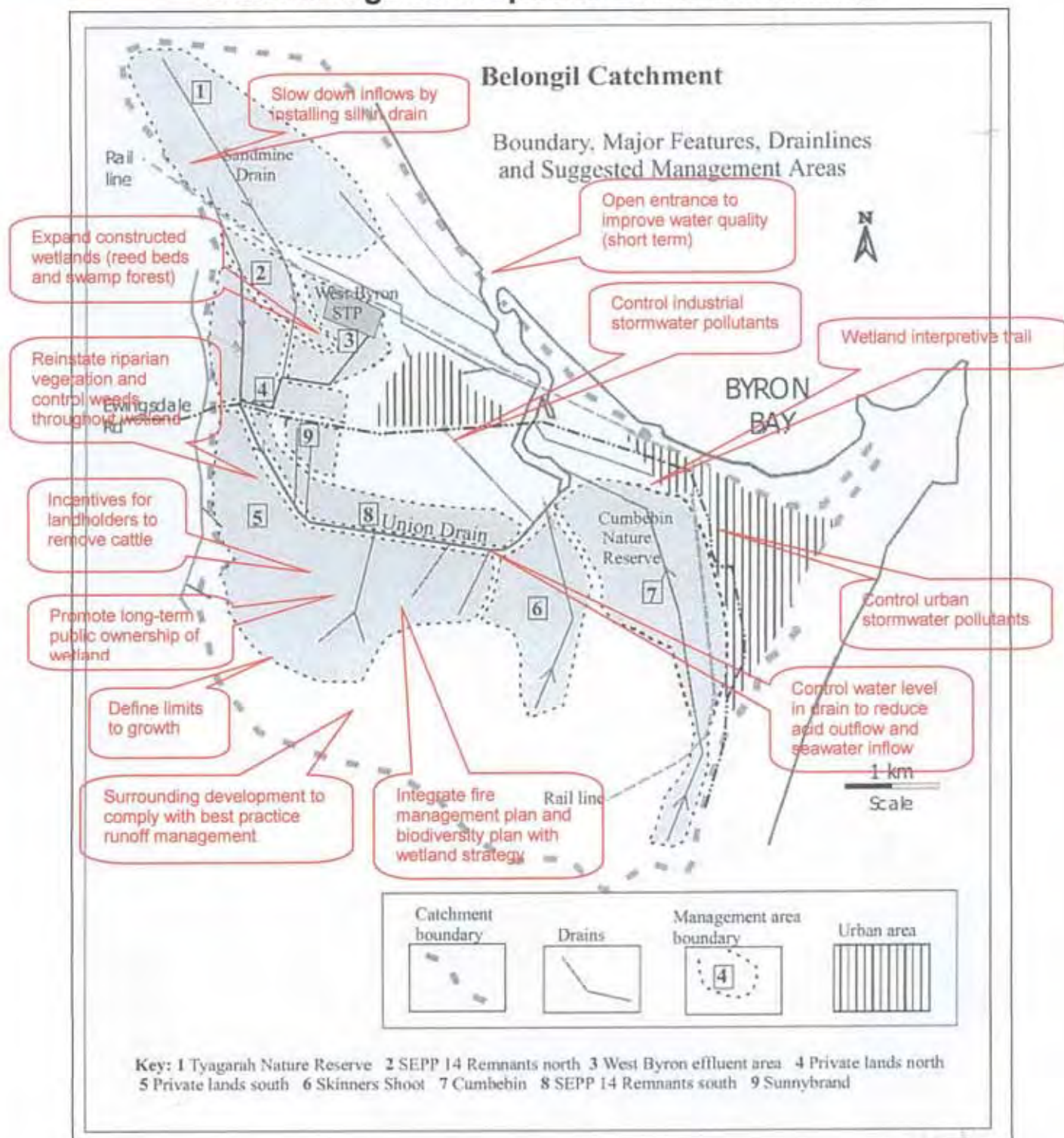


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Draft Management Options Under Discussion



6. HUNTER WETLANDS CENTRE

BACKGROUND

"Shortland Wetlands Centre Limited was formed in 1986 with two overriding objectives: to rehabilitate a degraded wetland and to foster an understanding and appreciation for wetlands through communication, education and public awareness. It was to become the Lower Hunter's first successful wetland rehabilitation project, paving the way for three other significant wetland projects in the ensuing years. It was Australia's first dedicated wetlands centre, modelled on and assisted by the famous Slimbridge in the UK. Today trading as Hunter Wetlands Centre Australia, it remains Australia's only dedicated Wetlands Centre managed by a community organisation.

The current Site Management Plan (SMP) builds on the 2002-2009 SMP, compiled as part of the 2002 successful Ramsar Convention listing process by the then Chairman Christine Prietto and her team of dedicated assistants. This SMP also reflects the Australian Ramsar Management Principles as described in the Commonwealth's *Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act)* and the Ramsar Convention's *Frameworks for managing wetlands of international importance and other wetlands (2000)*. It builds on years of progress on the site rehabilitation process, changes to the surrounding estuary as a result of the Hexham Swamp Rehabilitation Project and changes necessary to ensure the financial survival and the changing composition of the staff and volunteer base over time.

Today Hunter Wetlands Centre Australia, represents a mature wetland rehabilitation project involving a complex of restored wetlands and artificial wetlands. The environmental, social and economic values of Hunter Wetlands Centre Australia complement values delivered by other wetlands in the Hunter Estuary. Visitor facilities and services offered by the centre, including a new involvement of the community in the rehabilitation and on-going management of the wetlands has become an important facet of the centre's operations as, has the need to promote an active tourism and education face to ensure financial viability.

The Hunter Wetlands Centre Australia is dedicated to maintaining its central role in the conservation of the Hunter Estuary as:

- a demonstration site for community involvement and wise-use of wetlands;
- a public access gateway to wetlands in the Lower Hunter; and
- a national non-government focal point for wetland communication, education and public awareness.

MANAGEMENT AIMS

The Management aims as set out in their Wetlands Site Management Plan are –

- To maximise the values for biodiversity and sustainable ecological function
- To maximise the opportunities for education and communication without diminishing ecological function

- To involve the indigenous and non-indigenous community in the effective management of the wetlands
- To actively demonstrate 'wise sustainable use' of wetlands
- To improve the opportunities for recreation and eco-tourism without diminishing ecological function
- To ensure a safe workplace for staff, volunteers and visitors.

THE WETLANDS CENTRE TODAY

"The Shortland Wetlands Centre Limited now trades as Hunter Wetlands Centre Australia, which remains a not-for-profit community-based company. It is managed by an honorary Board of Directors and has over 600 members. The Board of Directors employs the equivalent of six full-time and nine part-time staff. These staff are responsible for visitor services including Spoonbill Café and facilities, ground maintenance, fund-raising, financial management and funded projects. Recently the Ecotourism focus of the site has leaned toward a more active tourism focus including the introduction of Segway tours and more recently an approval to build an education/tourism focused adventure ropes course has been obtained.

Outdoor visitor facilities include interpretive trails, boardwalks, canoe trail, an observation tower, picnic pavilions, rainforest shelter and barbecues. Indoors, the Visitors Centre has a gift shop, café, interpretive displays, and research library. Two seminar rooms and a theatre are in strong demand by special interest groups and government agencies. The Wetlands Centre hosts the Wetlands Environmental Education Centre (WEEC) operated by the NSW Department of Education and Communities. It is operated under a 20-year Partnership agreement between HWCA and NSW DEC. In 2010 a \$2.5m federal grant was provided under a Local Schools Working Together Grant. The grant was facilitated by a partnership between HWCA, WEEC, NSW DEC and Catholic Schools Office (CSO). In February 2011 a new three classroom facility was completed and opened for students providing the potential to increase the annual student capacity (subject to teaching staff availability) above 8000 students.

Visitor services include a comprehensive program of enjoyable education activities. Volunteer guides lead canoe safaris, twilight treks, breakfasts with the birds, beginner bird watching, Segway tours, corporate training facilities and a Wild! Kids club during school holidays. The Wetlands Centre attracts around 100,000 visitors each year, of which approximately 25 percent are of school age. The centre has a national and international reputation in wetland rehabilitation."

EDUCATION

The contribution to education, community involvement and research is included in the following pages from the Shortland Wetlands Site Management Plan 2013-2023 to further outline the value of wetlands to the community.

5.2 Education

Hunter Wetlands Centre, Australia has been dedicated to wetland education since its inception and has made a substantial contribution to wetland conservation at the local, state, national and international levels. There is no doubt that the leadership through wetland education delivered by Hunter Wetlands Centre has played a key role in the development of a greater understanding and appreciation of wetlands in the Hunter Region and further afield.

Education programs and services aim to promote wetland values, conservation and sustainable ecosystem management. Education values offered by Hunter Wetlands Centre include:

- promoting wetland values through communication, education and public awareness;
- demonstrating sustainable wetland restoration and management;
- community capacity-building in wise use of wetlands;
- demonstrating sustainable wetland based recreation; and
- Providing a venue for wetland-related community organisations.

The Education Programs have evolved into an excellent demonstration of the Ramsar Convention's Outreach Program (Resolution 7.9). This promotes the role education can play to encourage understanding of wetland values, conservation and wise use management. Communication, education and public awareness are all employed in a variety of programs delivered informally and formally.

Visitors can directly experience wetlands and wildlife:

- through static and live displays within the visitors centre;
- through the use of tracks, platforms and hides; and
- by canoe.
- by Segway
- by bicycle

The School Education Program is underpinned by a valuable partnership with the NSW Department of Education and Communities (DEC). The Wetlands Environmental Education Centre, a NSW DEC facility, has been located at Hunter Wetlands Centre since its inception. This partnership has supported the development of a highly regarded and well-used wetlands education program accessed by over 7,000 students, representing 200 schools, annually.

The school program caters for students from Kindergarten through to Year 12 and offers a series of topics to cater for students across a range of age and ability levels, the program reflect topics in the NSW School Curriculum. The ability to deliver the program in a managed wetland ecosystem

adds a critical dimension to the program. Programs focused on wetland animals, wetland habitats, ecosystem values and functions, and management are greatly enhanced.

The ability of these programs to be delivered was greatly enhanced in 2011, with the opening of the new specialty built education building. A national Local Schools Working Together grant was awarded in 2010 and provided the funding for the design and construction of the new classroom, theatre, outdoor learning area and administration offices. The new facility is featured below.



Community education programs include static displays, guided walks and programs such as canoe tours, twilight walks and Breakfast with the Birds, wetland-related education classes and annual events such as World Wetlands Day. Wetland education is also achieved through hands-on involvement of community volunteers in all aspects of the Hunter Wetlands Centre's operations, especially site management.

This community education provides a range of social benefits. Visitors are provided with life long learning opportunities, stimulating intellectual development and personal growth. Many activities are suitable for all ages. The opportunity for grandparents, parents and children to learn together fosters social cohesion. The focus on learning about and experiencing the site builds a sense of place, helping people identify with their region and feeling they belong. Responsible environmental behaviour is encouraged and supported.

Since 2012 Hunter Wetlands Centre Ecotourism Manager, has been conducting a research project on behalf of the Office of Environment and Heritage called the 'Our Places' project. The program began with a number of focus groups that engaged sustainability educators throughout Newcastle, Lake Macquarie and the Hunter Region. The focus of the sessions was to identify successes and challenges with engaging community with environmental education. Following on from the focus groups are larger Community Forums to be held through 2013 that aim to link community members with established groups and educators to identify projects and ways to improve 'place'. Both the forums and the focus groups aim not only to serve as information for the research paper but endeavour to link and build networks between the various groups and individuals throughout the

Hunter Region whose goal it is to engage the community with taking care of the environment. The Our Places project is also taking place in Western Sydney and in the Albury regions and is ongoing.

5.3 Community Involvement

Since the inception of the Hunter Wetlands Trust in 1984, Shortland Wetlands has been a focal point for community involvement in wetland rehabilitation and education. Community involvement today is evident in the volunteer program and the partnerships with other community conservation groups who share the site.

The Wetlands Centre's volunteer program demonstrates the principles recommended by the Ramsar Convention to involve local communities in the management of wetlands (Resolution VII.8). Volunteers are involved in many facets of the Centre's operations. Community participation develops a greater understanding of wetland functions and values. In many instances involvement offers significant retraining opportunities for unemployed volunteers and meaningful work for the disabled and elderly. Long-term volunteers are particularly important as they help fulfil the Centre's mission to provide opportunities to connect with and learn about wetlands. Volunteers include:

- two long-standing groups directly involved in site management and bush regeneration
- a long-term group that delivers visitor services and guiding services
- a volunteer Board of Directors
- a broadly based volunteer Site Management Committee
- numerous volunteers involved in administrative duties, school holiday programs and special events
- Volunteers involved with grounds and Centre maintenance
- Volunteers involved in fundraising
- Volunteers establishing and managing our on site Nursery operations.

5.4 Research

The Wetlands Centre has produced 37 scientific publications, 4 reports, poster papers at international conferences and contributions to three books. In 2012 we self published a book compiled by Ken Bayliss on Bush Tucker found at the HWCA site and in our Bush Tucker Garden. Results of the Wetlands Centre's research activities are archived in the Library collection held at the Centre. They include studies on frogs, dunal swamp forests, wetland rehabilitation, artificial wetlands and educational values of Hunter Valley Wetlands in a heritage context. University higher degree research studies (8 Honours and 2 Doctoral theses) and several other projects have been carried out in conjunction with the Centre's research programs.

One particular study, Project Egret Watch brought together more than 200 volunteer field workers

throughout Australia and New Zealand to study the biology of heron species, particularly egrets, since 1985. The major contribution to the understanding of egret breeding biology, ecology and migration has received international recognition. Project Egret Watch was conducted as a cooperative research venture with the Ornithological Society of New Zealand's Cattle Egret project team. Egret and Ibis nest counts are still an annual feature of ???

In recent years because of changes in staff composition and success in attracting major grants the focus of the Centre has shifted away from research to on ground works with some spectacular improvements being achieved as the revegetation process has been ramped up. Scope still exists to re-establish the research effort and discussions are underway with Newcastle University in relation to a number of joint projects.

5.5 Partnerships

In addition to projects at the Shortland site, the Centre has supported numerous activities at other wetlands in the Hunter Region and has actively supported all the major wetland conservation proposals in the Hunter. The Wetlands Centre cooperates with the Hunter Central Rivers Catchment Management Authority and is represented on a number of their committees, NSW National Parks and Wildlife Service and local councils to support Landcare groups in wetland areas. The Ironbark Creek Catchment Management Committee and more recently the Hexham Swamp Rehabilitation Committee both operate out of The Wetlands Centre.

The Centre provides meeting facilities for a number of special interest groups, including:

- The Australian Plant Society (APS)(Newcastle Group)
- Hunter Bird Observers (HBOC)
- Hunter Native Fish
- Native Animal Trust Fund (NATF)
- Lions and Rotary Clubs

Close links have also been forged with The University of Newcastle, Hunter Tafe's through research students and volunteering programs. We also receive significant support from those organisations mentioned above, Additionally Hunter Councils, Hunter Water, Newcastle University, National Parks and Wildlife Service (NPWS), NSW Department of Education and Communities, APS and HBOC have representation on the HWCA Board

HBOC, APS, Awabakal Local area Land Council, NPWS, Hunter Landcare and HWCA Volunteers are also represented on the Site Management Committee. This committee is active in matters pertaining to on - ground works.

PROFESSIONAL DEVELOPMENT AND CAPACITY BUILDING

"Although the number of paid positions offered through the Wetlands Centre is small, they offer significant opportunities in the fields of administration, conservation, ecotourism and natural resource management in a non-government setting. The involvement of volunteers in the operations of the Wetlands Centre and ongoing management of Shortland Wetlands offers training opportunities to many more individuals. Together these represent valuable training opportunities in a region which has unusually high retraining needs due to industrial changes. The hands-on involvement of community volunteers in site management and landscaping is especially significant. The local community has developed good capacity levels in this area due to the number of wetland projects which have followed. As on-going maintenance of wetlands will always be an area of need in the Hunter Estuary, this capacity is of significant value.

As part of our Indigenous Engagement Policy we will also focus on helping build the capacity of our Indigenous community to facilitate their involvement in managing our natural resources by creating employment and training opportunities through grant based projects."

WETLAND VALUES

"Appreciating and understanding wetlands and their value is fundamental to our wellbeing. Wetlands are among the most important ecosystems on Earth and play a vital role in maintaining biological diversity (Mitch and Gosselink 1986; Environment Australia 2001). Wetlands are often referred to as the 'kidneys of the landscape' for the functions they perform in hydrologic and chemical cycles and as downstream receivers of wastes from both natural and human sources (Mitch and Gosselink 1986). They perform vital functions such as water purification, nutrient retention, maintenance of water tables, storm protection, flood mitigation, shoreline stabilisation, erosion control, and groundwater recharge (Environment Australia 2001). Freshwater wetlands and their associated vegetation communities have long been recognised as important to the health and productivity of estuaries (eg. Odum 1961, 1980; Montague et al. 1981; Pomeroy et al. 1981).

Unfortunately, wetlands are amongst the most threatened ecosystems worldwide due largely to destructive practices such as draining, infilling, pollution, and overexploitation of their resources (Environment Australia 2001). Over 80% of saltmarsh in the Sydney Basin biogeographic region, including the Lower Hunter Estuary, has been lost since European settlement (Stricker and Adam 1989). In 1985, there was only an estimated 57km² of saltmarsh in New South Wales, giving the remaining remnants a high conservation value (Clarke 1993). These communities are an important 'stepping stone' to the remaining coastal vegetation and they form an integral part of the coastal corridor of New South Wales (OCA 1996)."

The Hunter Wetlands are an example of what is possible through community cooperation, looking outside site and zoning boundaries and designing with nature to create a viable and sustainable environment that contributes long-lasting benefits in tourism, social involvement, education, management, flood control and the other benefits outlined.

A copy of a map and zoning plan for the Shortland Wetlands is included for reference.



Figure 4: Map of Shortland Wetlands showing some key features, including the location of ponds, buildings, walking trails and hydrological flows (indicated by blue arrows).

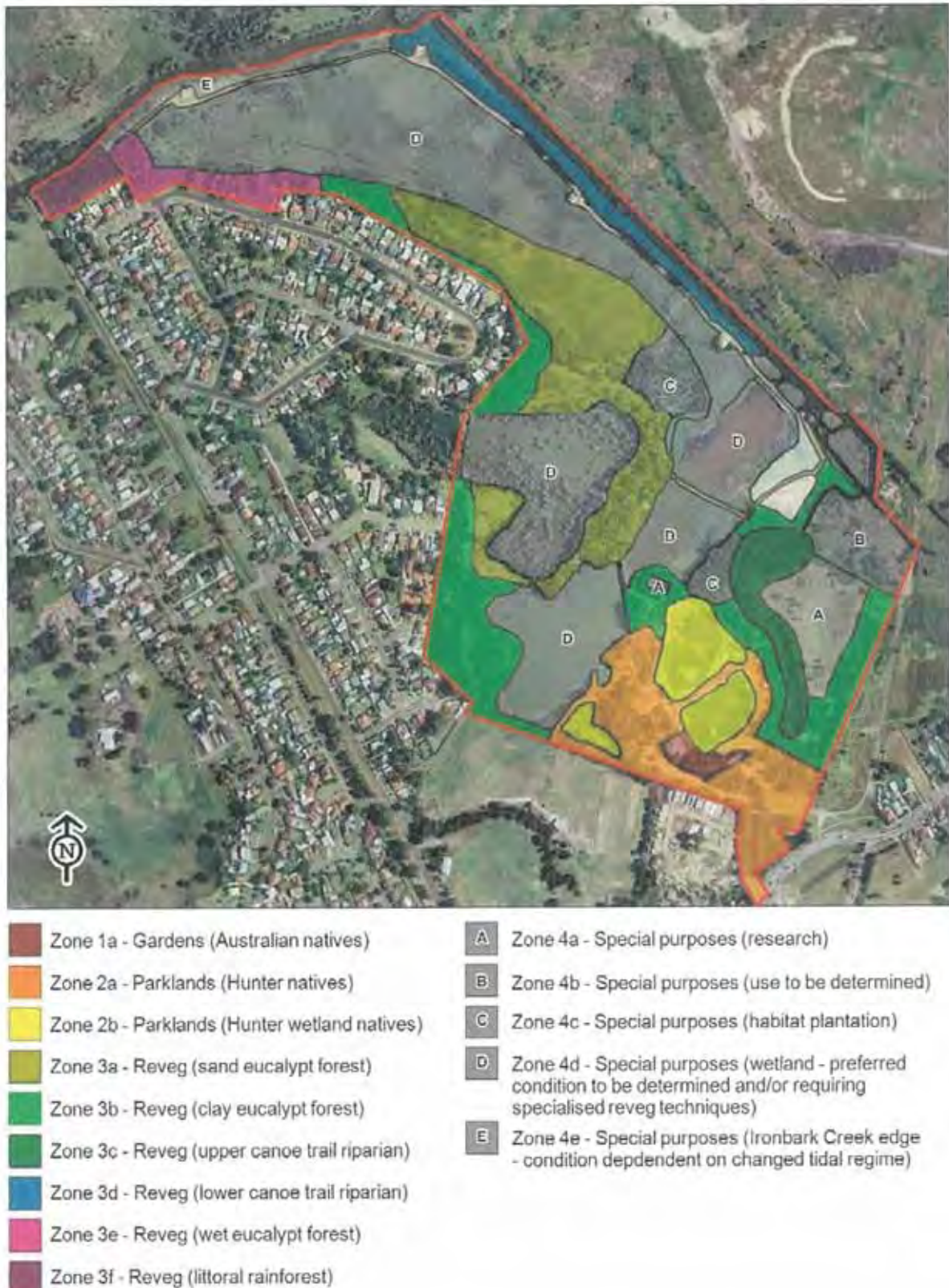


Figure 1.2. Vegetation landscape zones. The boundaries between zones are not intended to be precise delineations but, rather, a general indication of the extent of the zones and some overlap of plantings is not only acceptable but desirable

Source HWCA Planting List 2009 G. Winning

7. BLUE CARBON

BACKGROUND

"While emissions reductions from energy and transport sectors and the role of forests and soils as terrestrial carbon sinks have been at the centre of climate change discussions, the critical role of the oceans, and its wetland ecosystems in carbon capture and storage has been largely overlooked.

Our oceans play a significant role in the global carbon cycle. They are not only the world's largest long-term carbon sinks, but our oceans store and cycle 93% of the earth's CO². The world's most crucial climate-combating wetland ecosystems, mangroves, saltmarshes, seagrasses, known collectively as Blue Carbon sinks, and estuaries capture and store the equivalent of up to half of the carbon emissions from the entire global transport sector every year, estimated at around 1 billion metric tons of carbon each year. Yet we are degrading these wetland ecosystems at a rapid pace from urban expansion, coastal development and through inappropriate catchment management practices.

Over the next 20 years, protecting, conserving and rehabilitating these precious Blue Carbon sinks globally would equate to 10% of the reductions needed to keep the amount of CO² in the atmosphere at safe levels below 450ppm and would offset 3-7% of current fossil fuel emissions¹ – over half of that projected for reducing rainforest deforestation. As for forests, maintaining or improving the ability of the oceans and its wetland ecosystems to absorb and bury CO² is a crucial aspect of climate change mitigation for Australia."

Achim Steiner, UN Under-Secretary General and Executive Director for the United Nations Environment Program (UNEP) 2009 explains –

"Science is now also telling us that we need to urgently address the question of 'blue' carbon. An estimated 50% of the carbon in the atmosphere that becomes bound or 'sequestered' in natural systems is cycled into the seas and oceans – another example of nature's ingenuity for 'carbon capture and storage'. However, as with forests we are rapidly turning that blue carbon into brown carbon by clearing and damaging the very marine ecosystems that are absorbing and storing greenhouse gases in the first place. This in turn will accelerate climate change, putting at risk communities including coastal ones along with other economically important assets such as coral reefs, freshwater systems and marine biodiversity as well as 'hard' infrastructure from ports to power stations. Targeted investments in the sustainable management of coastal and marine ecosystems – the natural infrastructure – alongside the rehabilitation and restoration of damaged and degraded ones, could prove a very wise transaction with inordinate returns."

WETLANDCARE AUSTRALIA

Mainstreaming a Blue Carbon agenda

"Globally, functioning coastal ecosystems are ranked among the most economically viable of all ecosystems and are estimated to be worth over \$US 25,000 billion annually. These Blue Carbon sinks play a crucial role in maintaining climate, health, food security and economic development across coastal Australia. They also provide food, shelter and nursery areas for around 70% of the fish species we eat, amazing animals like seahorses and our native wildlife including the Orange-Bellied Parrot and the Water Mouse. WetlandCare Australia is working with our partners to improve the integrated management and connectivity of our coastal and marine environments, including the protection, conservation and rehabilitation of our Blue Carbon sinks. Together we are working to have these wetland ecosystems recognised in voluntary carbon and compliance schemes and to ensure a holistic ecosystem approach is adopted by governments that will not only reduce and mitigate the effects of climate change, but increase Australia's food security, benefit health and productivity and help protect fragile coastal areas – a win-win mitigation strategy!

WetlandCare Australia's 2015 conservation goals for Blue Carbon in Australia:

- Development of a national policy and framework for conserving, managing and rehabilitating Australia's Blue Carbon sinks for carbon storage
- Rehabilitation of 20,000 ha of priority Blue Carbon sinks across coastal catchments of Australia
- Establishment of at least three interdisciplinary research projects to improve our understanding of the role of Australian Blue Carbon sinks in carbon storage across tropical, sub-tropical and temperate climates, including a series of pilot projects that build carbon storage measurements associated with ecosystem rehabilitation at priority locations
- Inclusion of coastal wetlands in the Voluntary Carbon Market and any national compliance scheme, as well as development of a national Blue Carbon Fund for the protection and management of coastal wetland carbon storage
- Completion of a feasibility study and pilot project to explore opportunities arising from Blue Carbon sinks and Voluntary Carbon Markets for Indigenous and remote communities.
- A national approach to measuring and managing cumulative risk associated with urban and industry expansion pressures on Blue Carbon sink carbon storage

Outcome: As a mainstream component of Australia's climate change mitigation and adaptation strategies Blue Carbon is an important factor in improving the health of critical coastal ecosystems that sustain ocean biodiversity (mangroves, saltmarsh and seagrass)."

The International Union for Conservation of Nature (IUCN) explains that –

"Conserving and restoring terrestrial forests, and more recently peatlands, has been recognised as an important component of climate change mitigation. These approaches

are now being broadened to manage other natural systems that contain rich carbon reservoirs and show significant emissions due to conversion and degradation – such as mangroves, tidal marshes and seagrasses.

Key facts about coastal Blue Carbon ecosystems

Mangroves, tidal marshes and seagrasses sequester and store large quantities of blue carbon in the plants, but mainly in the soils beneath them. About 95% to 99% of total carbon stocks of saltmarshes and seagrasses are stored in the soils beneath them.

These systems are being degraded and destroyed at a rapid pace along the world's coastlines: global annual loss rate is 1–2% for tidal marshes; 0.7–3% for mangroves; and 0.4–2.6% for seagrasses.

The loss of these systems releases significant emissions of carbon dioxide into the atmosphere and the ocean, contributing to climate change. Emissions from drained coastal wetlands result in about 3–19% of emissions from REDD (Reducing Emissions from Deforestation and Forest Degradation). Coastal ecosystems provide other significant benefits for climate change adaptation, local livelihoods, tourism and culture such as protection from storms and prevention of shoreline erosion, regulation of coastal water quality, habitat for important fish species and other important and vulnerable species.

What needs to be done?

Reduce the pressure on coastal ecosystems from human activities and diminish global rate of loss.

Fast-track national implementation of conservation and restoration measures in developing countries for example through REDD+ or NAMAs (Nationally Appropriate Mitigation Actions).

Ensure that the full scope of nature-based activities for climate change mitigation and adaptation, including from coastal activities, are included into any new global climate regime, related mechanisms and financing streams.

Conduct national scientific carbon, ecological and socio-economic assessments of coastal marine ecosystems.

What is IUCN doing?

International policy

IUCN championed this issue at a global scale bringing it to the attention of policy makers for the first time. IUCN is now working with governments and other stakeholders to identify, develop and implement international policy measures to support coastal planning and management activities that promote conservation, restoration and sustainable use of coastal blue carbon systems through the UNFCCC and other relevant international agreements.

National activities

IUCN is working with countries to design appropriate climate change mitigation and adaptation strategies related for example to REDD and NAMAs, and natural resource

management policies and practices, consistent with implementing the provisions of UNFCCC and other international commitments.

IUCN supports the development and implementation of effective strategies for ocean, coastal and fisheries management, to improve the resilience of coastal ecosystems and dependent livelihoods, giving them a better change to respond and adapt to the impacts of climate change."

THE BLUE CARBON INITIATIVE

A copy of the IUCN Blue Carbon initiative is included in the following pages





CONSERVATION
INTERNATIONAL

THE BLUE CARBON INITIATIVE:

The Importance of Coastal Ecosystems
for Mitigating Climate Change

Human-caused carbon in the atmosphere and oceans is the most significant cause of global climate change. Curbing climate change means both removing carbon from the atmosphere and oceans and avoiding new carbon emissions. An important piece of this solution is preserving and restoring coastal ecosystems.

What is "Blue Carbon"?

Blue Carbon is the carbon stored by coastal and ocean ecosystems. In particular, coastal ecosystems such as tidal marshes, mangroves, and seagrasses remove carbon from the atmosphere and ocean, storing it in plants and depositing it in the sediment below them by natural processes. These coastal ecosystems are very efficient at sequestering and storing carbon - each square mile of these systems can remove carbon from the atmosphere and oceans at rates higher than each square mile of mature tropical forests. Furthermore, coastal ecosystems have been found to store huge quantities of carbon in organic rich sediments - up to 5 times more carbon than many temperate and tropical forests. These ecosystems are found in all continents, except Antarctica.



Why is Blue Carbon Important?

Preventing degradation and destruction and promoting restoration of coastal ecosystems is a significant tool we can use to mitigate climate change. The coastal ecosystems of mangroves, tidal marshes, and seagrasses are some of the most rapidly disappearing natural systems on Earth. When lost they not only stop sequestering carbon but also release their stores of carbon and become new sources of climate change causing carbon emissions which can last for centuries.

The Blue Carbon Initiative

The Blue Carbon Initiative is the first integrated program with a comprehensive and coordinated global agenda focused on mitigating climate change through the conservation and restoration of coastal marine ecosystems.

International Cooperation

Conservation International (CI), the International Union for Conservation of Nature (IUCN), and the Intergovernmental Oceanic Commission (IOC) of UNESCO is collaborating with governments, research institutions, non-governmental and international organizations, and communities around the world to...

- Develop management approaches, financial incentives and policy mechanisms for ensuring conservation and restoration of coastal Blue Carbon ecosystems;
- Engage local, national, and international governments to ensure policies and regulations support coastal Blue Carbon conservation, management and financing;
- Develop comprehensive methods for coastal carbon accounting;
- Develop incentive mechanisms such as carbon payment schemes for Blue Carbon projects; and
- Implement projects around the world that demonstrate the feasibility of coastal Blue Carbon accounting, management, and incentive agreements;
- Support scientific research into the role and importance of coastal Blue Carbon ecosystems for climate change mitigation.

For more information, please visit www.conservation.org and www.iucn.org



In the last 25 years, roughly 20 percent of Earth's mangroves have been lost. Salt marshes are being lost at an estimated rate of 1-2 percent each year. In the last two decades, about 50 percent of Earth's seagrass ecosystems have been lost. Draining or clearing for aquaculture and agriculture, coastal pollution, and inappropriate coastal development are some of the main drivers of this loss.



BYRON CREEK HEADWATER RESTORATION

"WetlandCare Australia has been working with farmers in the Byron Bay hinterland to undertake the restoration works of riparian vegetation along Byron Creek since 2012.

Through funding from Next Generation Trust, WetlandCare Australia has assisted a farmer to undertake weed control and revegetation along creek lines on a property in the headwaters of Byron Creek. These works will improve biodiversity, improve water quality, and reduce soil loss from the property and also re-establish an area of Lowland Rainforest which is an Endangered Ecological Community (EEC).

Over one kilometre of Byron Creek has now been successfully revegetated with over 3,000 native riparian species being planted and an area of one hectare of native vegetation being re-established. These works have linked with previous restoration works at the property and there is now over 8.5 hectares of continuous native vegetation along the creek lines at the property. Follow up weed control and maintenance at the site has now commenced, with the landholder engaging a bush regenerator to undertake these works to suppress any reoccurrence of weed species throughout the revegetated areas."

HELPING HANDS FOR LOCAL WETLANDS

"WetlandCare Australia and Campbell Page Employment Services are co-ordinating a Green Army works team to undertake much-needed wetland restoration works across the Richmond and Brunswick River catchments. The team, funded by the Australian Government Department of Environment's Green Army Program, will be helping to rehabilitate local environments, including Ballina Shire Council Reserve lands in East Ballina.

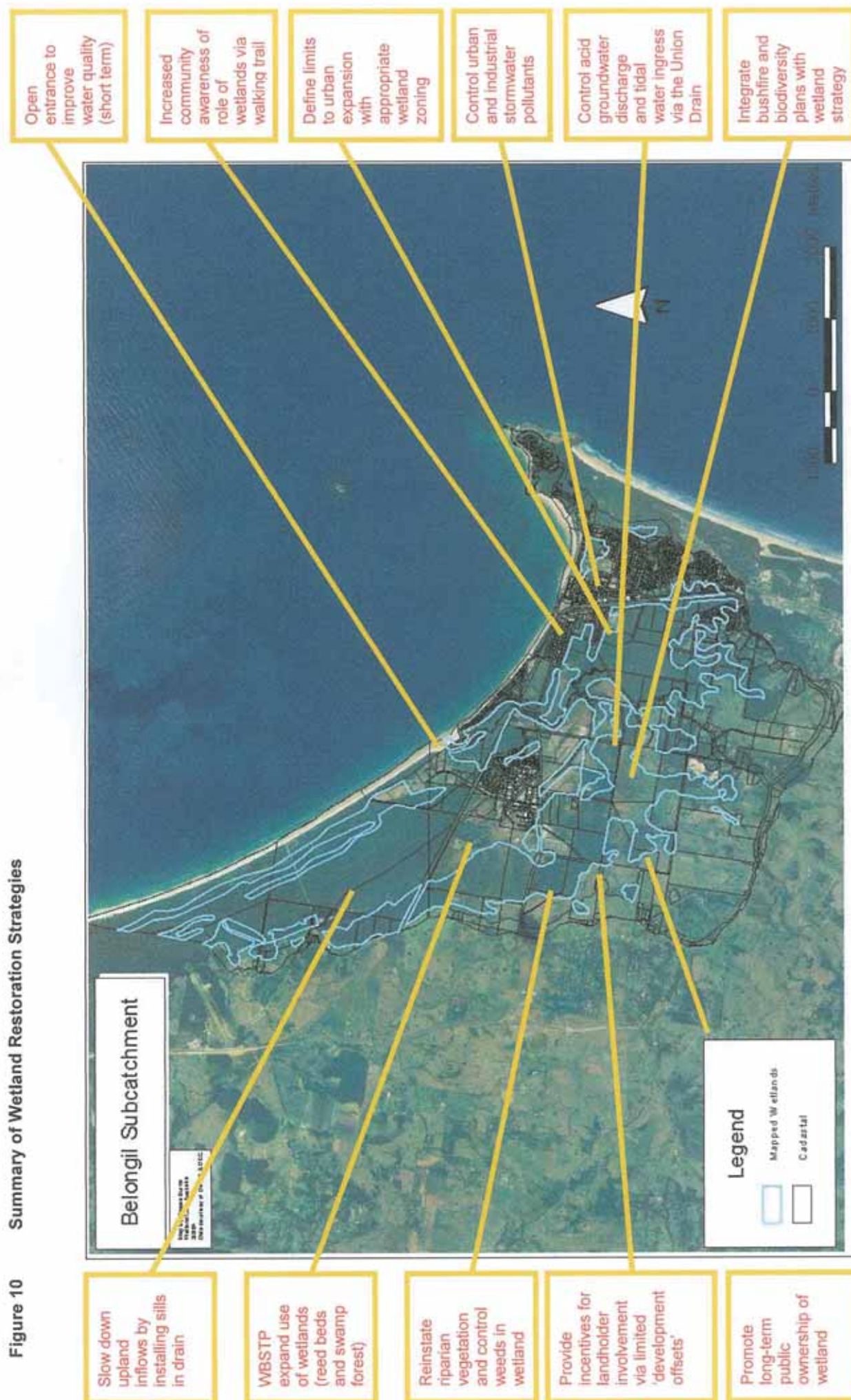
The Australian Government's Green Army program provides opportunities for young Australians aged 17 to 24 years to gain training and experience in environmental and heritage conservation fields and explore careers in conservation management, while participating in projects that generate real benefits for the environment. The local Green Army team of nine young participants, delivered by service provider Campbell Page, will be on the ground for the next six months, learning and working under close supervision of team leader Lorinda Wood, an experienced local bush regenerator. Their hands-on work will make a valuable contribution to the environmental goals of project sponsor WetlandCare Australia.

"We are very excited to have the Green Army team on board to lend us a helping hand on some local priority wetland sites", said Cassie Price, WetlandCare Australia's Regional Manager. "Their hard work will really assist us with following up on previous weed control actions and keeping our local wetlands in great condition, and we hope that the young team members will become inspired to share our passion for wetland restoration in the process."

The local Green Army team will be focusing on rehabilitating coastal wetland habitats through a range of techniques including manual and chemical weed control, strategic revegetation and debris removal. This project is one of 250 Green Army teams across Australia which will be engaging young people in environmental conservation works in 2014-2015."

The Belongil-Cumbebin Wetland Restoration Strategy 2005 from the WetlandCare Australia report shows how we can rehabilitate our West Byron wetland and is outlined on the following pages.

Figure 10 Summary of Wetland Restoration Strategies



8. BYRON BIRD BUDDIES

In their conservation work Byron Bird Buddies is involved with the National Parks & Wildlife Service, Byron Council, and the Marine Parks Authority with the protection and monitoring of shorebird breeding areas along the Belongil Estuary, the management of dogs into breeding areas, protection of breeding areas on a volunteer warden rostered basis, protecting threatened species and monitoring wetland sites.

Their community education program includes events such as International National Parks Day, Big Scrub Day, Brunswick Expo, Byron Community Centre Volunteer Expo, public talks and free presentations at WetlandCare seminars, WetlandCare Australia's Rocky Shoreline Walks and Federal Park Landcare as well as visitor education, guided walks, open days and school programs.

They also assist Byron Shire Council staff with school excursions to wetlands, provide education materials, t-shirts, CDs and promote a range of environmental events through their website.

Wetlands are a dynamic eco-system as well as being an important human community amenity providing a 'quiet place' and an opportunity for birdwatching and education for both the local population and tourism.

The effect of development on the wetlands is not fully realised and negative impacts on avifauna and other species arise from bright lighting, loud noise and illegal or insensitive entry. Predation by both introduced and natural species would increase with urban expansion apart from disturbance by cats and dogs and other domestic pets.

Urban area environments are also more suitable for top predator avifauna such as crows and currawongs and these have impacts on wetlands.

"The Belongil Estuary is home to so many beautiful birds such as the Osprey, Brahminy Kite, Tern, Striated Bittern, Pied Oystercatcher, Sacred Kingfisher, Rainbow Bee Eater, Egrets, Cormorants and Striated Pardalote to name a few.

Estuaries are partly enclosed water bodies near the coast where seawater enters and mixes with fresh water runoff carrying materials from the land as it flows to the sea. Estuaries are places of rich biodiversity and productivity because of this mixing. Birds and fish thrive on the invertebrates and insects of the food chain of the estuary.

The Belongil is a relatively small estuarine water body where runoff from the surrounding catchment of 3,000 hectares area meets the sea.

The estuary is the type known as an 'ICOLL' – Intermittently Closed and Open Lake or Lagoon. In its natural state the estuary would have been closed for sometimes lengthy periods during dry weather and sand build-up on the beach bar at the entrance, then breaking open when heavy rainfall and runoff filled the catchment. The local area receives the highest average rainfall in NSW at 1,850 mm per year."

The estuary water area is about 13 hectares. There is no seagrass, but there are about 5 hectares of saltmarsh and a similar area of mangroves.

"An extensive artificial drain network connects the catchment to the estuary, allowing runoff to drain much faster than in natural conditions. A large proportion of the

catchment (about a third to a half) was once wetland, mainly melaleuca wetlands, and this fact has a large bearing on how the estuary functions today.

Many of the wetlands were cleared and drained for agriculture early in the 20th century, with resulting heavy acid sulfate runoff from the soils down through the artificial drains. When wetland soils are drained and dried out, severe chemical reactions take place. This process continues today. However, the once-regular fish kills have been stopped in recent years through targeted management of the entrance opening by Council under a licence.

Urban development in Byron Bay and surrounds has also extended down into the wetlands in places, with stormwater and other pollutants adding to the acid soils impacts. High bacterial counts, mainly from stormwater, make the estuary unsuitable for swimming. The large West Byron Sewage Treatment Plant also impacts on the estuary, although some 40 hectares of effluent 'polishing' wetlands have been added and water quality is closer to 'natural waters' standard.

Industrial effluent and rural runoff is added to all these pressures, but the largest impacts have been shown in many studies and reports over the years to be acid sulfate runoff.

In spite of the many problems, the estuary has partly recovered in recent times from massive pollution events before 2000 when large fish kills occurred and the entire estuary was often devoid of life. Fish, prawn and crab populations are slowly recovering and can be seen by walking on the mudflats or along the channels. In the last three years a sustained effort led by Belongil Bird Buddies has succeeded in returning good populations of shorebirds to the estuary mudflats and entrance area.

Much more remediation work is needed, and the present estuary opening approach is seen as only a short-term strategy. 'De-coupling' of the estuary from the upstream wetland areas by reducing or eliminating artificial drains is a major management goal. A holistic stormwater management system based on the Water Sensitive Urban Design approach, expansion of effluent reuse and wetlands, and the large-scale reinstatement of natural wetlands will restore the estuary to virtually full health."

A report prepared by Jan Olley from Byron Bird Buddies on the following pages outlines the importance of West Byron to the health and retention of the Belongil catchment and details the threatened, migratory and other species that would be seriously impacted by any infrastructure or urban development.



Birds of Byron Wetlands and Belongil Estuary Report

November

2015



Rainbow Bee-eaters

Photo by: Bruce McNaughton

This report has been prepared by
Jan Olley & edited by Anne Jones
of Byron Bird Buddies



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Introduction

Byron Bird Buddies (BBB) is a local community group involved with education, as well as bird conservation and population monitoring throughout the Byron Shire. The group has been monitoring bird populations in the Belongil Estuary since 2004 and the Byron Wetlands since 2006, with a particular focus on shorebirds and waterbirds. In collaboration with Byron Shire Council, Cape Byron Marine Parks and NSW National Parks the group has also been pro-active in undertaking a number of conservation and education projects in an attempt to avert any decline of bird populations within the shire and surrounding areas.

Based on our monitoring this report aims to highlight the importance of the West Byron Bay Area as a very significant habitat for bird species. Results of our monitoring demonstrate that, currently, the habitat is supporting a diverse number of bird species. Although BBB is monitoring two specific sites in West Byron Bay, the Belongil Estuary and the Byron Wetlands, it would be reasonable to assume that the surrounding habitat also plays an important role in supporting bird diversity in the area.

A combined total of 250 bird species has been recorded at the two sites, of which 32 species are recognised as a threatened species under the NSW Threatened Species Conservation Act 1995, and 46 species are migratory species listed under section 209 of the EPBC Act.



Educational Group - Byron Wetlands - Anne Jones



Shorebird Monitoring - Belongil Estuary - Anne Jones



Wetlands - Rose Wisemantel

Background

The West Byron Bay area is typically low lying coastal plain and is broadly comprised of Swamp Sclerophyll Forests, Sedgelands, Fernlands, Mangroves and Saltmarshes forming the Belongil Estuary, and an Intermittently Closed and Open Lake and Lagoon system (ICOLL).

Traditionally, the land was occupied by the Arakwal Aboriginal people of the Bundjalung Nation. Since settlement the area has experienced many changes ranging from clearing of vegetation, drainage of water bodies, mining, whale processing, chicken processing, grazing, light industry, a sewage treatment plant, and urban expansion for residential, tourist and recreational purposes which continues today.

Habitat

Despite the changes to date, West Byron Bay remains an area of high conservation value, providing an important corridor between the Tyagarah Nature Reserve and the wetlands of the Cumbebin Nature Reserve. Being located within a regional corridor, the area continues to support a number of complex coastal vegetation types that are recognised as environmental protection zones in the NSW State Environmental Planning Policy.

Good habitat is essential for the survival of any fauna species. Currently, within the Belongil Estuary, Byron Wetlands and surrounding habitats such as sand flats and wetlands as well as the plants and trees, are the source for a multitude of food products such as nectar, insects, fruit and seeds for many bird species. The existing remnant and riparian vegetation also provides a variety of complex structures, including thick vegetation and reed beds, where nests can be built and birds can escape from danger. Open spaces that are free from disturbance, such as intertidal zones, are particularly important for shorebirds and some waterbirds to feed, nest and roost. Varying depths of the marine and fresh water bodies are another important factor as they provide suitable habitat for other shore and waterbirds, such as jacanas, diving ducks and cormorants, and a source of drinking water for others.

While recognising that the whole of an area, in its entirety, will provide habitat for a range of common and threatened species, this report will focus on the results of BBB bird monitoring at the mouth of the Belongil Creek Estuary, and the Byron Wetlands that forms part of the Byron Sewage Treatment Plant (STP). Some aspects of each site will be discussed separately. The Belongil Creek Estuary is a marine environment and the Byron Wetlands is a freshwater environment and are only approximately 1 km apart. As mentioned above, it is highly likely that bird species will utilise both sites as well as the surrounding habitats of the West Byron area.



White-cheeked Honeyeater - Rose Wisemantel



Red-capped Plover - Reid Waters



Brahminy Kite - Ross Hollands

Bird Species

Of the combined total of 250 species recorded, 176 species of birds have been recorded at the Belongil Estuary since 2004, with a total of 229 species being recorded at the Byron Wetlands since monitoring was begun by David Stewart in November 2000. BBB members have been monitoring bird species at the Byron Wetlands since January 2006 and a report of the monitoring results is provided to Byron Shire Council annually.

As a way of highlighting the species and habitat diversity at each site, the 250 bird species have been condensed into 35 family groups and allocated a habitat. (Refer to Table 1). Bird species in family groups are likely to use the same broad habitats and Table 1 also provides columns that identify the preferred habitat the group may use. However, it is noted that some groups can use several habitats. A full list of the species for each site is included as an **Appendix** at the end of the report.

Table 1 – Byron Wetlands and Belongil Estuary Bird Species and Habitat by Family Groups

SPECIES				HABITAT					
Family Group	Family	Belongil Estuary	Byron Wetlands	Forest & Trees	Fresh-water, wetlands with moist edges	Reeds & areas of Low vegetation	Pastures-grassed areas	Air Space	Marine
1	Mound-Builders & Quails	1	4	x		x			
2	Swans, Geese, Ducks & Grebes	7	17		x				
3	Pigeons & Doves	9	12	x					
4	Frogmouths, Nightjars & Swifts	3	2	x				x	
5	Albatrosses, Petrels, Prions & Shearwaters	1							x
6	Frigatebirds & Cormorants	9	7		x				x
7	Hérons, Ibis, Spoonbills & Allies	11	17		x				x
8	Birds of Prey	9	20					x	
9	Brolgas	1	1		x				
10	Crakes, Rails & Gallinules	4	11		x				
11	Shorebirds	31	26		x				x
13	Gulls & Terns	11	5						x
14	Cockatoos & Parrots	8	11	x					
15	Cuckoos	5	9	x					
16	Owls	0	3	x					
17	Kingfishers, Rollers & Bee-eaters	6	6	x					
18	Pittas	1	0	x					
19	Bowerbirds	2	0	x					
20	Fairy-wrens	3	3			x			
21	Scrubwrens, Allies & Pardalotes	5	10						
22	Honeyeaters	13	13	x					
23	Quail-thrushes & Allies	2	1			x			
24	Cuckoo-shrikes & Trillers	4	5	x					
25	Whistlers & Shrike-thrushes	6	6	x					
26	Woodswallows	1	3					x	
27	Magpies & Butcherbirds	4	5				x		
28	Fantails	3	3	x					
29	Crows	1	1	x					
30	Flycatchers & Monarchs	4	6	x					
31	Robins, Old World Warblers & White-eyes	4	9	x					
32	Swallows & Martins	4	3					x	
33	Thrushes, Starlings, Mynas & Flowerpeckers	1	4	x					
34	Finches, Mannikins & Sparrows	2	4				x		
35	Pipits, Wagtails & Others	0	2				x		
	TOTAL (combined total 250)	176	229						

Note: Monitoring for night birds has not been conducted at Belongil.

It is important to understand that there is a natural movement of bird species within the landscape and these movements will influence species diversity and populations at a site. Some birds are sedentary and tend to remain in one area or territory but will disperse locally at the end of a breeding season e.g. wrens. Some are nomadic and undertake wandering travels of irregular patterns in timing, direction and distance in response to food and weather conditions e.g. pigeons, whistlers, flycatchers and swifts. Others are migratory and undertake regular seasonal journeys to breed. The migration may either be within, or external to, Australia and examples are the cuckoos, some of which only migrate within Australia, and shorebirds, most of which mainly migrate to Asia and Siberia.

Threatened Species

Both sites support a number of threatened species. **Table 2** provides a list of threatened species for both sites, as identified in the NSW Threatened Species Conservation Act 1995, which provides for the conservation of these species.

Most of the species in **Table 2** have been recorded by BBB either at the Belongil Estuary (since 2004) or Byron Wetlands (since 2006) up to September 2015. Species marked with an asterisk were observations made during the Byron Shire Fauna and Flora Survey 1999 and were known to be present at the site at that time, but have not been recorded by, or reported to BBB since 2000.

Table 2– Belongil Estuary and Byron Wetlands Threatened Bird Species

Common Name	Belongil	Byron Wetlands	NSW Status
Magpie Goose		x	Vulnerable
Freckled Duck		x	Vulnerable
Rose-crowned Fruit Dove	x	x	Vulnerable
Australasian Bittern		x	Endangered
Black Bittern*		x	Vulnerable
Black-necked Stork	x	x	Endangered
Eastern Osprey	x	x	Vulnerable
Square-tailed Kite		x	Vulnerable
Spotted Harrier		x	Vulnerable
Little Eagle		x	Vulnerable
Black Falcon		x	Vulnerable
Brolga	x	x	Vulnerable
Pale-vented Bush-hen		x	Vulnerable
Bush Stone-Curlew		x	Endangered
Beach Stone-curlew	x		Critically Endangered
Australian Pied Oystercatcher	x	x	Endangered
Sooty Oystercatcher	x		Vulnerable
Lesser Sand-plover	x		Vulnerable
Greater Sand-plover	x	x	Vulnerable
Comb-crested Jacana	x	x	Vulnerable
Australian Painted Snipe		x	Endangered
Eastern Curlew	x	x	Critically Endangered
Terek Sandpiper	x		Vulnerable
Curlew Sandpiper	x	x	Endangered
Sanderling	x		Vulnerable
Broad-billed Sandpiper	x		Vulnerable
Grey Ternlet	x		Vulnerable
Sooty Tern	x		Vulnerable
Little Tern	x	x	Endangered
Glossy Black Cockatoo	x	x	Vulnerable
Eastern Grass Owl*		x	Vulnerable
Grey-crowned Babbler – eastern sub-species	x		Vulnerable
TOTAL (combined total of 32)	20	23	

* Birds not observed by BBB



Little Tern & Eastern Curlew - Ross Hollands



Beach Stone-curlews - Reid Waters

Migratory Species

Both sites also support a number of species as recorded in the list of migratory species established under section 209 of the EPBC Act. These species are also protected under a number of International Agreements in order to conserve migratory birds in the East Asian - Australasian Flyway (the Flyway). All of these agreements provide for the protection and conservation of migratory birds and their important habitats, and include:

- JAMBA – Japan – Australia Migratory Bird Agreement
- CAMBA – China – Australia Migratory Bird Agreement
- ROKAMBA – Republic of Korea Migratory Bird Agreement
- Bonn convention for migratory species - includes migratory species which are native to Australia and are included in the appendices to the Bonn Convention.



Pacific Golden Plover (in breeding plumage & breeds in Siberia) - R. Hollands



Little Tern (in breeding plumage & breeds in Japan)- Reid Waters



Bar-tailed Godwits (non-breeding plumage & breeds in the Arctic Tundra)
R. Waters



Eastern Great Egret - Deborah Pearse



Spectacled Monarch - Ross Hollands

Table 3 provides a list of migratory bird species recorded at both the Belongil Estuary and Byron Wetlands which relate to the list of migratory species established by the EPBC Act. Again, most of the species have been recorded by BBB either at the Belongil Estuary (since 2004) or Byron Wetlands (since 2006) up to September 2015. Species marked with an asterisk have not been recorded by, or reported to BBB since 2000, but were observations made during the Byron Shire Fauna and Flora Survey 1999 and were known to be present at the site at that time. The list is by no means a comprehensive list of migratory species as it does not include the species that have regular migratory movements within Australia.

Table 3 – Belongil Estuary and Byron Wetlands Migratory Species

Common Name	Belongil	Byron Wet-lands	BONN	JAMBA	CAMBA	ROKAMBA
Fork-tailed Swift	x			Listed	Listed	Listed
White-throated Needletail	x	x		Listed	Listed	Listed
Cattle Egret				Listed		
Great Eastern Egret				Listed		
Pacific Golden Plover	x	x	Listed	Listed	Listed	Listed
American Golden Plover *		x	Listed	Listed	Listed	Listed
Grey Plover *	x		Listed	Listed	Listed	Listed
Double-banded Plover	x		Listed			
Lesser Sand Plover	x		Listed	Listed	Listed	Listed
Greater Sand Plover	x	x	Listed	Listed	Listed	Listed
Latham's Snipe		x	Listed	Listed		Listed
Black-tailed Godwit *	x		Listed	Listed	Listed	Listed
Bar-tailed Godwit	x	x	Listed	Listed	Listed	Listed
Little Curlew		x	Listed	Listed	Listed	Listed
Whimbrel	x	x	Listed	Listed	Listed	Listed
Eastern Curlew	x		Listed	Listed	Listed	Listed
Terek Sandpiper	x		Listed	Listed	Listed	Listed
Common Sandpiper	x		Listed	Listed	Listed	Listed
Grey-tailed Tattler	x		Listed	Listed	Listed	Listed
Common Greenshank	x	x	Listed	Listed	Listed	Listed
Marsh Sandpiper	x	x	Listed	Listed	Listed	Listed
Wood Sandpiper		x	Listed	Listed	Listed	Listed
Western Sandpiper*		x		Listed		
Ruddy Turnstone	x		Listed	Listed	Listed	Listed
Red Knot	x		Listed	Listed	Listed	Listed
Sanderling	x		Listed	Listed	Listed	
Red-necked Stint	x	x	Listed	Listed	Listed	Listed
Pectoral Sandpiper		x	Listed	Listed		Listed
Sharp-tailed Sandpiper	x	x	Listed	Listed	Listed	
Curlew Sandpiper	x	x	Listed	Listed	Listed	Listed
Broad-billed Sandpiper	x		Listed	Listed	Listed	Listed
Common Noddy	x			Listed	Listed	
Little Tern	x	x	Listed			
Gull-billed Tern	x				Listed	
Caspian Tern	x				Listed	
Common Tern	x			Listed	Listed	Listed
Yellow Wagtail		x		Listed	Listed	Listed
Spectacled Monarch			Listed			
Eastern Osprey			Listed	Listed	Listed	Listed
Rainbow Bee-eater				Listed		
Black-faced Monarch			Listed			
Rufous Fantail	x		Listed			
Lesser Frigatebird	x	x		Listed	Listed	Listed
Great Frigatebird	x	x		Listed	Listed	
Horsfield's Cuckoo		x		Listed	Listed	Listed
Glossy Ibis		x	Listed			
TOTAL (combined total of 46)	31	22				

*Birds not observed by BBB

Belongil Estuary

In summary, a total of 229 species have been recorded at the site since 2004. Of the total, 23 species are threatened species, 22 species are migratory shorebirds, 10 species are resident shorebirds and another 11 are a variety of migratory species that are listed under the International Agreements. **(Refer to Tables 2 and 3).**

The Belongil Estuary is a very significant shorebird nesting, roosting and feeding area for the Byron Shire. It is also an important roosting and feeding area for seabirds and waterbirds. The littoral rainforest and vegetation communities on both sides of the tidal creek also provide an important area for terrestrial birds to nest, roost and feed.

Anecdotal reports suggest that the threatened migratory Little Tern once nested at the Belongil Spit. However, following the Sunrise Estate Development (commenced in the 1980's) and the subsequent increase in human activity, Little Terns have not been observed nesting in that area since 1991. In spite of this, the threatened Little Terns and Common Terns, (both species protected under the International Agreements), continue to forage and roost at the estuary between October and February each year, sometimes in large numbers (Common Tern x 210, Little Tern x 70).

A pair of the endangered Pied Oystercatchers, known as the "beach pair" has been nesting in the estuary since BBB monitoring began in 2004, with a second pair known as the "island pair", nesting since 2007. Both pairs have laid 2 x eggs each year since that time, but the hatch success rate can vary for a variety of reasons. BBB has maintained a temporary fence, signage and wardening at the site since 2004 to minimise disturbances and the past two years have seen both pairs fledging chicks successfully.

The resident Red-capped Plovers and Masked Lapwings also nest in the fenced area and the critically endangered Beach Stone-curlew is a frequent visitor, either as a single bird or sometimes as a pair.



Black-necked Stork & bird hide - Byron Wetlands - Anne Jones



Belongil Estuary "Beach" Pied Oystercatchers & chicks 2015 - R. Waters

Byron Wetlands

In summary, there has been a total of 229 species recorded at the site since 2000, of which 20 are a threatened species, 21 species are migratory shorebirds, 9 species are resident shorebirds and another 13 are a variety of migratory species that are listed under the International Agreements. **(Refer to Tables 2 and 3).**

The construction of the West Byron STP which commenced in 2001, preserves a significant variety of habitats, such as paperbark swamp forests, sedgelands and fernlands, typical vegetation types of a low lying coastal plain, but which are fast disappearing from the West Byron Bay area. The site also comprises a number of settling ponds with one pond (Cell H) required to be managed specifically with regard to threatened species, migratory waders and regionally significant bird species. A variety of water levels, plant diversity and monitoring measures are required to maintain the habitat integrity for birds. Data analysis demonstrates a consistent number of around 150 species utilise the site annually. At times, some species may have a seasonally large population, such as the Eurasian Coot with 400 birds being observed in 2013 and 25 Latham's Snipe observed in 2014.

Conclusion

The results of monitoring to date (September 2015), reveal a dynamic ecosystem at the two sites that can support a wide variety of bird species. However, it would be reasonable to assume that the birds are not totally dependent on just these two sites and that the surrounding area plays an important role in their long term survival. Preserving and expanding existing habitats, and thus preventing habitat fragmentation, will be important for sustaining current and future bird species richness and populations, as well as maintaining the integrity of the existing regional corridor.

In a paper written in 2001 by Professor Hugh Possingham, Director of the ARC Centre of Excellence for Environmental Decisions (CEED) and Vice-chancellor's senior research fellow (2012-2015), who is currently working with the NSW Office of Environment and Heritage, "Saving our Species" program for threatened species recovery, stated that 'systems that become fragmented and reduced in area are expected to enter a long period of "relaxation" to lower levels of species richness. Thus there will be a substantial time lag between the loss of habitat and the consequent loss of species.'

BBB members are committed to maintaining a monitoring program for bird species at both the Belongil Estuary and Byron Wetlands.

Some Birds of West Byron Bay



Australian Brush-turkey	Pied Oystercatcher	Red Wattlebird
Australian Wood Duck	Sooty Oystercatcher	Little Wattlebird
Plumed Whistling Duck	Black-winged Stilt	Striped Honeyeater
Wandering Whistling Duck	Pacific Golden Plover	Noisy Friarbird
Pacific Black Duck	Grey Plover	Little Friarbird
Grey Teal	Red-capped Plover	Blue-faced Honeyeater
Hardhead	Double-banded Plover	Noisy Miner
Fairy Prion	Lesser Sand Plover	Lewin's Honeyeater
Australasian Grebe	Greater Sand Plover	Yellow-faced Honeyeater
Lesser Frigatebird	Black-fronted Dotterel	Brown Honeyeater
Great Frigatebird	Red-kneed Dotterel	White-cheeked Honeyeater
Australasian Gannet	Masked Lapwing	Eastern Spinebill
Australasian Darter	Silver Gull	Scarlet Honeyeater
Little Pied Cormorant	Common Noddy	Eastern Yellow Robin
Great Cormorant	Black Noddy	Grey-crowned Babbler
Pied Cormorant	Grey Ternlet	Eastern Whipbird
Little Black Cormorant	Sooty Tern	Golden Whistler
Australian Pelican	Crested Tern	Rufous Whistler
White-faced Heron	Gull-billed Tern	Little Shrike-thrush
Little Egret	Common Tern	Grey Shrike-thrush
White-necked Heron	Little Tern	Spectacled Monarch
Eastern Great Egret	Whiskered Tern	Leaden Flycatcher
Cattle Egret	Caspian Tern	Restless Flycatcher
Intermediate Egret	White-headed Pigeon	Magpie-lark
Striated Heron	Spotted Dove	Rufous Fantail
Australian White Ibis	Brown Cuckoo-Dove	Grey Fantail
Straw-necked Ibis	Emerald Dove	Willy Wagtail
Royal Spoonbill	Crested Pigeon	Spangled Drongo
Black-necked Stork	Bar-shouldered Dove	Black-faced Cuckoo-shrike
Eastern Osprey	Wonga Pigeon	White-bellied Cuckoo-shrike
Pacific Baza	Topknot Pigeon	Cicadabird
Black-shouldered Kite	Common Bronzewing	Varied Triller
Whistling Kite	Glossy Black Cockatoo	Olive-backed Oriole
Brahminy Kite	Yellow-tailed Black Cockatoo	Figbird
White-bellied Sea Eagle	Galah	White-breasted Woodswallow
Swamp Harrier	Sulphur-crested Cockatoo	Grey Butcherbird
Brown Goshawk	Little Corella	Pied Butcherbird
Wedge-tailed Eagle	Rainbow Lorikeets	Australian Magpie
Brolga	Scaly-breasted Lorikeets	Pied Currawong
Buff-banded Rail	Eastern Rosella	Torresian Crow
Purple Swamphen	Brush Cuckoo	Green Catbird
Dusky Moorhen	Fan-tailed Cuckoo	Regent Bowerbird
Eurasian Coot	Shining Bronze-cuckoo	Double-barred Finch
Latham's Snipe	Common Koel	Red-browed Finch
Bar-tailed Godwit	Pheasant Coucal	Mistletoebird
Whimbrel	Tawny Frogmouth	Welcome Swallow
Eastern Curlew	White-throated Needletail	White-backed Swallow
Marsh Sandpiper	Fork-tailed Swift	Tree Martin
Terek Sandpiper	Azure Kingfisher	Fairy Martin
Common Greenshank	Laughing Kookaburra	Tawny Grassbird
Common Sandpiper	Sacred Kingfisher	Golden-headed Cisticola
Grey-tailed Tattler	Rainbow Bee-eater	Silvereye
Ruddy Turnstone	Dollarbird	
Red Knot	Noisy Pitta	
Sanderling	Superb Fairy-wren	
Red-necked Stint	Variegated Fairy-wren	
Sharp-tailed Sandpiper	Red-back Fairy-wren	
Curlew Sandpiper	Striated Pardalote	
Broad-billed Sandpiper	White-browed Scrubwren	
Comb-crested Jacana	Large-billed Scrubwren	
Bush Stone-curlew	White-throated Gerygone	
Beach Stone-curlew	Brown Thornbill	

Australian Brush-turkey	Pacific Baza	Glossy Black Cockatoo	White-winged Triller
Stubble Quail	White-bellied Sea Eagle	Yellow-tailed Black-	Varied Triller
Brown Quail	Whistling Kite	Cockatoo	Golden Whistler
King Quail	Brahminy Kite	Galah	Rufous Whistler
Magpie Goose	Black Kite	Little Corella	Little Shrike-thrush
Plumed Whistling-Duck	Brown Goshawk	Long-billed Corella	Grey Shrike-thrush
Wandering Whistling-Duck	Collared Sparrowhawk	Sulphur-crested Cockatoo	Australasian Figbird
Musk Duck	Grey Goshawk	Cockatiel	Olive-backed Oriole
Freckled Duck	Spotted Harrier	Rainbow Lorikeet	White-breasted
Black Swan	Swamp Harrier	Scaly-breasted Lorikeet	Woodswallow
Australian Wood Duck	Wedge-tailed Eagle	Crimson Rosella	Masked Woodswallow
Pink-eared Duck	Little Eagle	Eastern Rosella	White-browed
Australasian Shoveler	Nankeen Kestrel	Pheasant Coucal	Woodswallow
Grey Teal	Brown Falcon	Common Koel	Grey Butcherbird
Chestnut Teal	Australian Hobby	Channel-billed Cuckoo	Pied Butcherbird
Northern Mallard	Black Falcon	Horsfield's Bronze-Cuckoo	Australian Magpie
Pacific Black Duck	Peregrine Falcon	Shining Bronze-Cuckoo	Pied Currawong
Pacific Black Duck - Hybrid	Brolga	Little Bronze-Cuckoo	Spangled Drongo
Hardhead	Purple Swamphen	Pallid Cuckoo	Rufous Fantail
Australasian Grebe	Lewin's Rail	Fan-tailed Cuckoo	Grey Fantail
Hoary-headed Grebe	Buff-banded Rail	Brush Cuckoo	Willy Wagtail
Rock Dove	Baillon's Crake	Southern Boobook	Torresian Crow
White-headed Pigeon	Australian Spotted Crake	Eastern Barn Owl	Leaden Flycatcher
Spotted Dove	Spotless Crake	Eastern Grass Owl	Satin Flycatcher
Brown Cuckoo-Dove	White-browed Crake	Azure Kingfisher	Restless Flycatcher
Emerald Dove	Pale-vented Bush-hen	Laughing Kookaburra	Black-faced Monarch
Common Bronzewing	Black-tailed Native-hen	Forest Kingfisher	Spectacled Monarch
Crested Pigeon	Dusky Moorhen	Sacred Kingfisher	Magpie-lark
Peaceful Dove	Eurasian Coot	Rainbow Bee-eater	Red-capped Robin
Bar-shouldered Dove	Bush Stone-curlew	Dollarbird	Rose Robin
Wonga Pigeon	Australian Pied	Superb Fairy-wren	Eastern Yellow Robin
Rose-crowned Fruit-dove	Oystercatcher	Red-backed Fairy-wren	Golden-headed Cisticola
Topknot Pigeon	Black-winged Stilt	Variegated Fairy-wren	Australian Reed-Warbler
Tawny Frogmouth	Pacific Golden Plover	White-browed Scrubwren	Tawny Grassbird
White-throated Needletail	American Golden Plover	Large-billed Scrubwren	Little Grassbird
Lesser Frigatebird	Red-capped Plover	Brown Gerygone	Rufous Songlark
Great Frigatebird	Double-banded Plover	Mangrove Gerygone	Silvereye
Australasian Darter	Greater Sand Plover	White-throated Gerygone	Welcome Swallow
Little Pied Cormorant	Black-fronted Dotterel	Striated Thornbill	Fairy Martin
Great Cormorant	Red-kneed Dotterel	Yellow-rumped Thornbill	Tree Martin
Little Black Cormorant	Masked Lapwing	Yellow Thornbill	Russet-tailed Thrush
Pied Cormorant	Comb-crested Jacana	Brown Thornbill	Common Starling
Australian Pelican	Latham's Snipe	Striated Pardalote	Common Myna
Black-necked Stork	Australian Painted Snipe	Eastern Spinebill	Mistletoebird
Australasian Bittern	Bar-tailed Godwit	Lewin's Honeyeater	Double-barred Finch
Australian Little Bittern	Little Curlew	Yellow-faced Honeyeater	Red-browed Finch
Black Bittern	Whimbrel	Noisy Miner	Chestnut-breasted
White-necked Heron	Eastern Curlew	Little Wattlebird	Mannikin
Eastern Great Egret	Common Greenshank	Red Wattlebird	House Sparrow
Intermediate Egret	Marsh Sandpiper	Scarlet Honeyeater	Australian Pipit
Cattle Egret	Wood Sandpiper	Brown Honeyeater	Eastern Yellow Wagtail
White-faced Heron	Red-necked Stint	White-cheeked	
Little Egret	Pectoral Sandpiper	Honeyeater	
Nankeen Night Heron	Sharp-tailed Sandpiper	Blue-faced Honeyeater	
Glossy Ibis	Curlew Sandpiper	Noisy Friarbird	
Australian White Ibis	Western Sandpiper	Little Friarbird	
Straw-necked Ibis	Little Tern	Striped Honeyeater	
Royal Spoonbill	Gull-billed Tern	Eastern Whipbird	
Yellow-billed Spoonbill	Whiskered Tern	Black-faced Cuckoo-shrike	
Eastern Osprey	White-winged Black Tern	White-bellied Cuckoo-	
Black-shouldered Kite	Crested Tern	shrike	
Square-tailed Kite	Silver Gull	Cicadabird	

9. LEGAL REQUIREMENTS

There are many Acts, Regulations and policies which apply to the subject site at West Byron and these include the following:

- Environmental Planning and Assessment Act 1979
- Environmental Planning and Assessment Regulation 2000
- The Coastal Protection Act 1979
- Threatened Species Conservation Act 1995
- Native Vegetation Act 2003
- Water Management Act 2000
- Environmental Protection and Biodiversity Act 1999
- Byron Shire Local Environmental Plan 2014
- State Environmental Planning Policy 71 – Coastal Protection
- State Environmental Planning Policy 14 – Coastal Wetlands
- State Environmental Planning Policy 44 – Koala Habitat Protection
- SEPP Amendment (West Byron Bay) 2013
- SEPP (Major Development) 2005
- National Parks and Wildlife Act 1974

The site has been rezoned under part 3A of the EP&A Act, it is part of a SEPP 71 coastal protection zone, contains SEPP 14 wetlands and SEPP 44 Koala habitat.

SEPP 14 COASTAL WETLANDS

SEPP 14 "Aims to protect and preserve coastal wetlands. Around 7% of coastal wetlands in NSW are listed under SEPP 14. If a person wants to clear land, construct a levee, drain land or fill land that is part of a SEPP 14 wetland they will need consent from the council and agreement from the Department of Planning. The Director of National Parks and Wildlife must also be given a copy of the development application. Works in a SEPP 14 wetland are considered to be 'designated development' and will require an Environmental Impact Statement to be lodged with the development application. The public also has a right to comment on designated developments."

SEPP 14 restricts development as follows:

"Restriction on development of certain land

- (1) In respect of land to which this policy applies, a person shall not:
 - a) clear that land,

- b) construct a levee on that land,
 - c) drain that land, or
 - d) fill that land,
- except with the consent of the council and the concurrence of the Director.
- (2) In considering whether to grant concurrence under subclause (1), the Director shall take into consideration:
- a) the environmental effects of the proposed development, including the effect of the proposed development on:
 - (i) the growth of native plant communities,
 - (ii) the survival of native wildlife populations,
 - (iii) the provision and quality of habitats for both indigenous and migratory species,
 - (iv) the surface and groundwater characteristics of the site on which the development is proposed to be carried out and of the surrounding area, including salinity and water quality,
 - b) whether adequate safeguards and rehabilitation measures have been, or will be, made to protect the environment,
 - c) whether carrying out the development would be consistent with the aim of this policy,
 - d) the objectives and major goals of the National Conservation Strategy for Australia (as set forth in the second edition of a paper prepared by the Commonwealth Department of Home Affairs and Environment for comment at the National Conference on Conservation held in June, 1983, and published in 1984 by the Australian Government Publishing Service) in so far as they relate to wetlands and the conservation of 'living resources' generally, copies of which are deposited in the office of the Department,
 - e) whether consideration has been given to establish whether any feasible alternatives exist to the carrying out of the proposed development (either on other land or by other methods) and if so, the reasons given for choosing the proposed development,
 - f) any representations made by the Director of National Parks and Wildlife in relation to the development application, and
 - g) any wetlands surrounding the land to which the development application relates and appropriateness of imposing conditions requiring the carrying out of works to preserve or enhance the value of those surrounding wetlands.
- (3) Pursuant to section 29 of the Act, development for which consent is required by subclause (1) is declared to be designated development for the purposes of the Act."

SEPP 71

The aims of SEPP 71 coastal protection are:

- a) To protect and manage the natural, cultural, recreational and economic attributes of the NSW coast, and
- d) to protect and preserve Aboriginal cultural heritage, and Aboriginal places, values, customs, beliefs and traditional knowledge, and
- g) to protect and preserve native coastal vegetation, and
- h) to protect and preserve the marine environment of NSW, and
- j) to manage the coastal zone in accordance with the principles of ecologically sustainable development (within the meaning of section 6(2) of the Protection of the Environment Administration Act 1991).

ECOLOGICALLY SUSTAINABLE DEVELOPMENT

"One of the objects of the EP&A Act is to encourage ecologically sustainable development. The four principles of ESD are:

- The precautionary principle
Where there is a threat of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In practice, this means that public and private decisions should be guided by a careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and an assessment of the risk weighted consequences of various options.
- Intergenerational equity
The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for future generations.
- Conservation of biological diversity and ecological integrity should be a fundamental consideration.
- Improved valuation, pricing and incentive mechanisms

Environmental factors should be included in the valuation of assets and services."

THREATENED SPECIES

"Threatened species are protected under both NSW and Federal laws.

NSW Protection

The NSW Threatened Species Conservation Act 1995 (TSC Act) and the Fisheries Management Act 1994 (FM Act) contain lists of threatened plants and animals, including marine species.

It is a criminal offence to:

- harm threatened or endangered species from an endangered population or an endangered ecological community,
- pick any plant from an endangered population or an endangered ecological community, or
- trade, buy or sell any threatened or endangered species.

There are similar offences in relation to fish and marine vegetation. There are serious penalties for breaching threatened species laws.

Federal Protection

Threatened species are protected under Federal law by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The EPBC Act provides for the listing of nationally threatened native species and ecological communities, native migratory species and marine species.

Under the EPBC Act, listed threatened species and ecological communities are recognised as a matter of 'national environmental significance'. Any action that is likely to have a significant impact on listed threatened species or ecological communities must be referred to the Federal Environment Minister and undergo an environmental assessment and approval process under the EPBC Act. It is an offence to undertake an action that will have a significant impact on a nationally listed threatened species or an ecological community without first obtaining an approval from the Minister for Environment.

SEPP 44 Koala Habitat protection

"Koalas are protected under the Threatened Species Conservation Act. They are also given special protection on private property under the *State Environmental Planning Policy No 44 – Koala Habitat Protection*.

If land is over one hectare and contains 'core' koala habitat, the council cannot grant consent to carry out development on that land unless a Plan of Management has been prepared. The Plan of Management may restrict or impose conditions on the development for the protection of koala habitat. The Plan of Management may cover the whole local government area or a particular parcel of land. The Plan of Management must be approved by the Director-General of the Department of Planning."



WEST BYRON SEPP

SEPP Amendment (West Byron Bay) 2013

This SEPP lists the objectives of clause 88 as:

"Development within the coastal zone

1) The objectives of this clause are as follows:

- a) to provide for the protection of the coastal environment of the State for the benefit of both present and future generations through promoting the principles of ecologically sustainable development,
- b) to implement the principles in the NSW Coastal Policy, and in particular to:
 - (i) protect, enhance, maintain and restore the coastal environment, its associated ecosystems, ecological processes and biological diversity and its water quality, and
 - (ii) protect and preserve the natural, cultural, recreational and economic attributes of the NSW coast, and
 - (iii) provide opportunities for pedestrian public access to and along the coastal foreshore, and
 - (iv) recognise and accommodate coastal processes and climate change, and
 - (v) protect amenity and scenic quality, and
 - (vi) protect and preserve rock platforms, beach environments and beach amenity, and
 - (vii) protect and preserve native coastal vegetation, and
 - (viii) protect and preserve the marine environment, and
 - (ix) ensure that the type, bulk, scale and size of development is appropriate for the location and protects and improves the natural scenic quality of the surrounding area, and
 - (x) ensure that decisions in relation to new development consider the broader and cumulative impacts on the catchment, and
 - (xi) protect Aboriginal cultural places, values and customs, and
 - (xii) protect and preserve items of heritage, archaeological or historical significance.

2) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority has considered:

- e) how biodiversity and ecosystems, including:
 - (i) native coastal vegetation and existing wildlife corridors, and
 - (ii) rock platforms, and

(iii) water quality of coastal waterbodies, and

(iv) native fauna and native flora, and their habitats,

can be conserved, and

f) the cumulative impacts of the proposed development and other development on the coastal catchment.

3) Development consent must not be granted to development on land that is wholly or partly within the coastal zone unless the consent authority is satisfied that:

c) the proposed development will not discharge untreated stormwater into the sea, or any beach, estuary, coastal lake, coastal creek or other similar body of water, or a rock platform, and

d) the proposed development will not:

(i) be significantly affected by coastal hazards, or

(ii) have a significant impact on coastal hazards, or

(iii) increase the risk of coastal hazards in relation to any other land.

Clause 90 "Preservation of Trees or Vegetation"

1) The objective of this clause is to preserve the amenity of the area, including biodiversity values, through the preservation of trees and other vegetation.

2) This clause applies to species or kinds of trees or other vegetation that are prescribed for the purposes of this clause by a development control plan made by the Council.

Note. A development control plan may prescribe the trees or other vegetation to which this clause applies by reference to species, size, location or other manner.

3) A person must not ringbark, cut down, top, lop, remove, injure or wilfully destroy any tree or other vegetation to which any such development control plan applies without the authority conferred by:

a) development consent, or

b) a permit granted by the Council."

Clause 90 continues with the advice that:

8) This clause does not apply to or in respect of:

a) the clearing of native vegetation:

(i) that is authorised by a development consent or property vegetation plan under the *Native Vegetation Act 2003*, or

(ii) that is otherwise permitted under Division 2 or 3 of Part 3 of that Act, or

b) the clearing of vegetation on State protected land (within the meaning of clause 4 of Schedule 3 to the *Native Vegetation Act 2003*) that is

authorised by a development consent under the provisions of the *Native Vegetation Conservation Act 1997* as continued in force by that clause."

Clause 90 basically says that you must not remove or damage any trees or vegetation but this does not apply to the clearing of native vegetation.

FLOODING

Clause 98 "Flood Planning states:

- 1) The objectives of this clause are as follows:
 - a) to minimise the flood risk to life and property associated with the use of land,
 - b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of projected sea level rise,
 - c) to avoid significant adverse impacts on flood behaviour and the environment.
- 3) Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:
 - a) is compatible with the flood hazard of the land, and
 - b) is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and
 - c) incorporates appropriate measures to manage risk to life from flood, and
 - d) is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and
 - e) is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding."

This clause clearly states that consent must not be granted if development will adversely affect other properties outside the subject site.

BIOBANKING

"The Biodiversity Banking and Offsets Scheme (BioBanking) is a market-based offsetting scheme. On one side, landowners create biodiversity credits by agreeing to protect the biodiversity on their land and then sell those credits to pay for the management of the land for conservation in perpetuity. On the other side, a developer can purchase credits to offset the impact of the destruction of biodiversity on another parcel of land. Other purchasers of credits may include conservationists, philanthropists or government agencies interested in conserving biodiversity in perpetuity.

A landholder establishes a biobank site by entering into an agreement with the Minister for Climate Change and the Environment to protect and manage the biodiversity values of their land. In return, the landholder is issued with biodiversity credits and must agree to undertake management actions. The number and type of credits depends on many factors, including the quality of the habitat and the threatened species present.

A developer wishing to harm biodiversity can undertake a biobanking assessment of their site and then apply to the Department of Environment, Climate Change and Water (DECCW) for a biobanking statement. Most importantly, a biobanking statement can only be issued in respect of a proposed development if it will improve or maintain biodiversity values. To determine whether this is the case, an assessment is undertaken using the BioBanking Assessment Methodology. If the developer's application is successful, the biobanking statement will list how many biodiversity credits, and what type, the developer must buy (and retire) in order to offset the impacts of the development on threatened species. The price for credits will be determined by market mechanisms of supply and demand.

Participation in the BioBanking Scheme is voluntary. A developer can choose to have threatened species assessed via Biobanking or the assessment of significance process. DECCW keeps a public register of all biobanking statements on its website."

EXCEPTIONS TO STANDARDS

The West Byron SEPP outlines exceptions to standards that are made for everyone else so they can achieve an advantage in their development. Clause 85 states –

"Exceptions to development standards

1) The objectives of this clause are as follows:

- a) to provide an appropriate degree of flexibility in applying certain development standards to particular development,
- b) to achieve better outcomes for and from development by allowing flexibility in particular circumstances.

2) Development consent may, subject to this clause, be granted for development even though the development would contravene a development standard imposed by this or any other environmental planning instrument. However, this clause does not apply to a development standard that is expressly excluded from the operation of this clause."

The examples outlined above show how the laws we have to protect nature are circumvented by planning regulations that are invented to say that the environmental standards are not applicable for a particular site location to allow development to destroy the natural environment and achieve some political or financial gain.

The SEPP invented for West Byron is the higher order document that overrides the Byron LEP and the site specific DCP which was given to Council to complete is relegated to an advisory standard that is not enforceable against the other state policies.

PART 3A REZONING

The rezoning of West Byron has been decided by the authority delegated to the Minister for Planning under Part 3A of the EPA Act who then decides on political grounds to destroy valuable environmentally sensitive assets in the name of progress to benefit parties and corporations disconnected from the local community.

A copy of the plans approved by the Minister using the Byron LEP 1988 is included in the following pages for reference.

Since Part 3A was established by a previous Labor government, successive parties, including our present government, have made election promises to 'get rid of Part 3A' in the name of transparency and restore community involvement but they have only retained and reinforced part 3A to their obvious advantage.

A FLAWED PLANNING SYSTEM

This highlights a basic flaw in our current planning system which is based on statutory regulations enforceable in a full court of law instead of a strategic planning system which respects and values nature and local community needs.

The detailed ecological and engineering studies used to justify the West Byron rezoning have generally been commissioned by the landowners or developers and the obligatory conclusion is that there are significant effects which will damage the ecology, flora, fauna and natural environment but this is justified by the offset principle which says that these assets can be relocated or are available elsewhere so it justifies destroying the natural assets they have so eloquently described.

A voluntary biobanking agreement can also be made to have threatened species assessed, then pay money to buy credits so they can be removed.

THE OFFSET PRINCIPLE

The offset principle used to justify the rezoning of West Byron has no logic or basis in environmental or ecological terms and has simply been used for political expediency and dubious economic advantage to satisfy an outdated planning system which limits its perception to the narrow focus of producing a dominant built environment above all else, without connecting the outcomes of their actions to the real consequences.

Using the offset principle we could then say to the developers that, if you want to build 800 houses and there are already 500 houses down the road that you can offset against your total, so you now only have to build 300 houses and you can save the environment.

Planning decisions which are politically based, not environmentally based, are not sustainable, within three years or less, there will be another planning minister but nature is there forever.

Nature created biodiversity and sensitive ecological communities which cannot be relocated or replaced with imported landscaping.

To make regulations and policies that bypass environmental laws is, at best devious and manipulative, and at worst, unethical and criminal.

DEVELOPMENT CONTROL PLAN

The draft West Byron DCP lists the technical studies that have been used in the State Significant Site Study to justify the residential and industrial rezoning of the site and this list is included on the following pages for reference together with notes on biodiversity and vegetation management.

Also included are the subsequent zoning, lot size and acid sulfate soils map decided by the Minister and the State Department of Planning as the Urban Release Area for the 1988 Byron LEP.

The DCP now being processed by Council requires a Vegetation Management Plan and a Threatened Species Management Plan to offset and 'appropriately compensate' any native vegetation removed from within the urban footprint.

When you already have a natural native environment – why do you have to remove it and then try to replace it under an expensive and complex management plan?

Surely it is more logical and economic to capitalise on the environmental assets of this site with land uses and building designs that work with their natural location to maintain a balance between people and nature, rather than destroying, compensating and rehabilitating what you already have – it does not make sense.



Table E8.2 State Significant Site Study – Technical Studies

Issue	Technical Study	Author	Date
Acid Sulfate Soils	<i>Preliminary Acid Sulfate Soils Assessment</i>	Southern Cross University Environmental Analysis Laboratory	December 2010
Air Quality	<i>Odour & Air Quality Constraints West Byron</i>	PAE Holmes	December 2010
	<i>Options for Future Development on West Byron SSS Site: Odour Constraints</i>	PAE Holmes	May 2012
Aquatic Ecology	<i>Aquatic Assessment of West Byron Urban Land Release Program</i>	Peter Parker Environmental Consultants Pty Ltd	August 2010
Bushfire	<i>Bushfire Assessment</i>	LandPartners	December 2010
Civil Engineering	<i>Byron West Engineering Advice</i>	Cardno	April 2011
Contamination	<i>Preliminary Contamination Land Assessment</i>	EAL Consulting Service	December 2010
Cultural Heritage	<i>Proposed West Byron Urban Release Area Cultural Heritage Assessment</i>	Jacqueline Collins (Consultant Archaeologist)	December 2010
Ecology	<i>Preliminary Ecological Assessment</i>	LandPartners	August 2010
	<i>Ecological Assessment West Byron Project</i>	Australian Wetlands Consulting Pty Ltd	December 2010
	<i>West Byron Urban Land Release Area: Response to Submissions Received during Public Exhibition Period – Ecological Matters</i>	Australian Wetlands Consulting Pty Ltd	April 2012
Flooding	<i>West Byron Flood Impact Assessment</i>	BMT WBM	December 2010
	<i>West Byron Flood Impact Assessment – Assessment Revision - Correspondence</i>	BMT WBM	22 November 2011
	<i>West Byron Flood Impact Assessment – Response to Submissions - Correspondence</i>	BMT WBM	22 March 2012
	<i>West Byron Bay Development Proposal – Flooding – Final Report</i>	WMA Water	21 June 2012
Geotechnical	<i>Geotechnical Assessment for Development of West Byron/Belongil Fields</i>	Shaw Urquhart	June 2010
Koala Management	<i>West Byron Urban Release Area Response to Submissions by Byron Shire Council and Office of Environment and Heritage – Koala Management</i>	Austeco Environmental Consultants for Setscan Pty Ltd	6 November 2012
	<i>Koala Management in the West Byron Urban Release Area – Memorandum to Byron Bay West Landholders Association</i>	Austeco Environmental Consultants for Setscan Pty Ltd	16 November 2012



Issue	Technical Study	Author	Date
Land Use Conflicts	<i>Land Use Conflict Risk Assessment</i>	LandPartners	December 2010
Mosquitoes	<i>Mosquito Risk Assessment</i>	Sydney West Area Health Service	December 2010
Noise	<i>Revised Preliminary Acoustic Advice</i>	TTM Acoustics	June 2010
Retail and Commercial Demand	<i>West Byron Urban Release Area Retail and Commercial Demand Study</i>	Hill PDA	July 2010
Social Impact	<i>West Byron Urban Release Area Housing and Human Services Study Social Impact Assessment</i>	BBC Consulting Planners	February 2011
Traffic	<i>West Byron Development Transport Study</i>	Veitch Lister Consulting	March 2011
	<i>West Byron Development Transport Study – Supplementary Report on Changes in Level of Service</i>	Veitch Lister Consulting	March 2011
Urban Design	<i>West Byron Urban Release Area Enquiry-by-Design Workshop Outcomes Report</i>	Deicke Richards Architects	September 2010
	<i>Summary of Issues and Proposed Resolution of Traffic Noise, Visual Impact and Urban Design along Ewingsdale Road</i>	TTM Acoustics, Ennismore Field P/L & Deicke Richards P/L	May 2011
Visual Impact	<i>West Byron Urban Release Area Visual Assessment</i>	Ennismore Field Pty Ltd	Undated
Water Management	<i>West Byron Urban Land Release Project Report</i>	The Water & Carbon Group	October 2010

E8.7 Interpretation

In this chapter **Urban release area** is the West Byron Bay site identified under Part 4 of the Byron Local Environmental Plan 1988.

Any other word or expression used in this Chapter has the same meaning as it has in the standard instrument (as prescribed by the Standard Instrument (Local Environmental Plans) Order 2006) unless it is otherwise defined in this Chapter. Where the word or expression is not defined in the standard instrument, it will have the same meaning as defined in the Byron Shire DCP 2014. Wherever any discrepancy arises, the provisions used in the standard instrument prevail.

Where not otherwise defined, the meaning is to be taken as the meaning most commonly understood. A reference in this Chapter to any Australian Standard or legislation includes a reference to any amendment or replacement as made.

Notes: are included in this document to provide additional guidance and explanation of the provisions. These notes are not part of the formal provisions of the Chapter.



- j) Be consistent with other stormwater measures included in this DCP Chapter;
 - k) Staging and timing of works and financial responsibility for construction.
 - l) Identify any additional stormwater detention requirements for subdivision and subsequent development in the residential, business and industrial zones;
 - m) Outline long term management, ownership and maintenance arrangements for all stormwater infrastructure. An extended maintenance period to be provided for WSUD measures. Typically this will require that 90% of dwellings are substantially commenced within the development sub-catchment associated with the relevant treatment measure;
2. Stormwater works in the environmental zones including in the main drain to be carefully designed to minimise the removal of native vegetation. Where vegetation is proposed to be removed, details to be provided under Section E8.10.5.1.
 3. Any subsequent development application is to be consistent with the Stormwater Management Plan.
 4. Construction water quality impacts are to be mitigated through appropriate erosion and sediment controls in accordance with *Managing Urban Stormwater - Soils and Construction* ('The Blue Book').

E8.10.5 Biodiversity, Vegetation Management and Landscaping

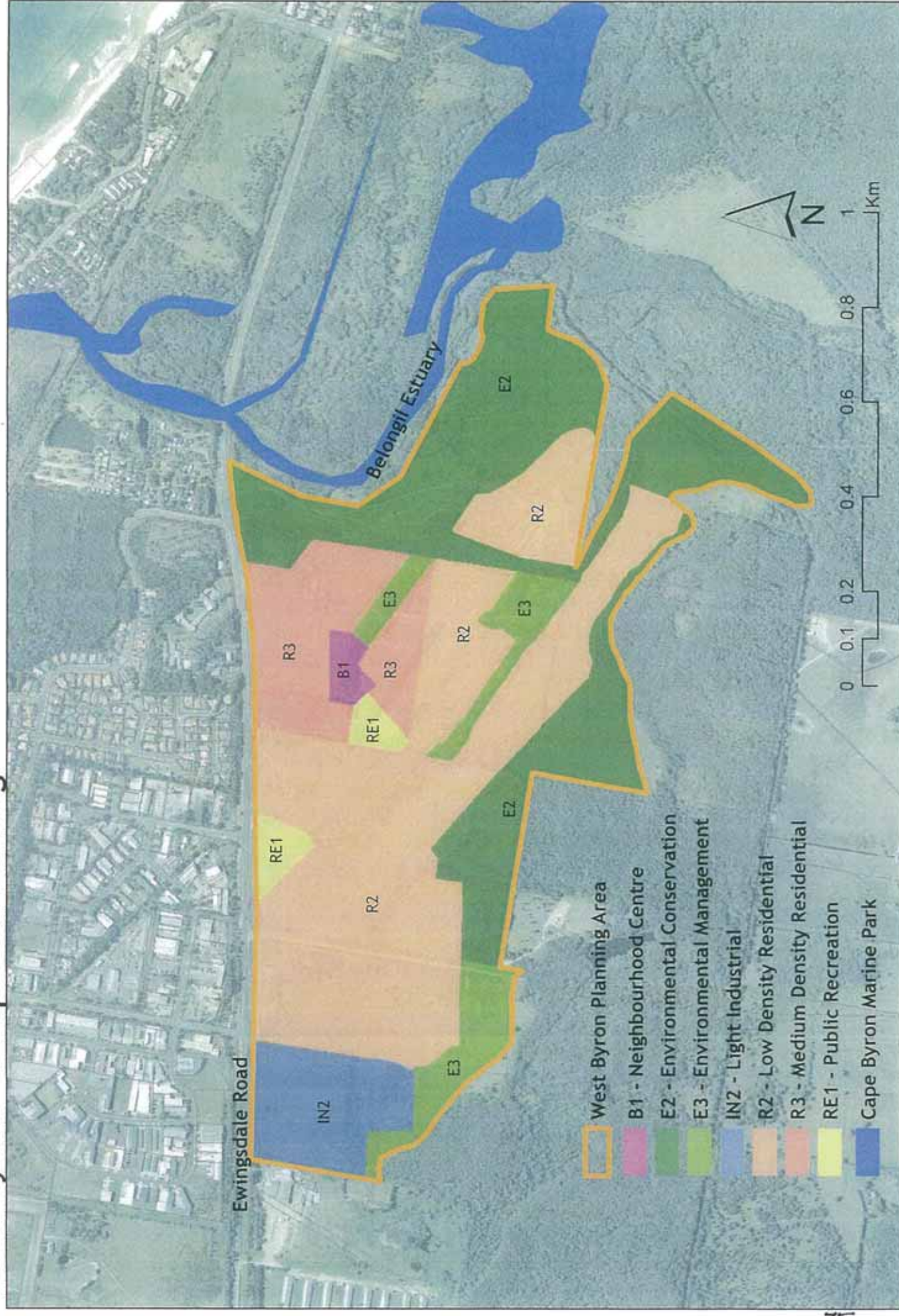
The subject site provides important habitat for a range of species and ecological communities including koalas, wallum froglet, blossom bat and remnant coastal cypress pine communities. A voluntary planning agreement has been signed between the Minister for Planning and the landowners requiring a vegetation management plan to be prepared addressing matters such as a program and implementation strategy of environmental management works for the land zoned E2 Environmental Conservation. Vegetation management however will need to apply to the entire site, and any native vegetation that is proposed to be removed from within the urban footprint will need to be appropriately compensated. Landscaping will play an important role as part of the overall environmental management of the site, and will enhance habitat attributes, whilst also playing a part in the management of stormwater. The following controls apply:

E8.10.5.1 Biodiversity and Vegetation Management

Objectives

1. *Maintain and improve habitat and ecosystem connectivity;*
2. *Protect biodiversity values of the site particularly within E2 Environmental Conservation and E3 Environmental Management zoned land including flora, fauna, habitat, wetlands, and the riparian areas of Belongil Creek.*
3. *Maintain or improve the ecological and hydrological functions and values of Belongil Creek*
4. *Environmental buffers to sensitive ecological areas*
5. *Improve koala ecological values on the site.*

West Byron - Proposed Zoning





Planning & Infrastructure

Byron Local Environmental Plan 1988—West Byron Bay— Land Zoning Map

Sheet LZN_001

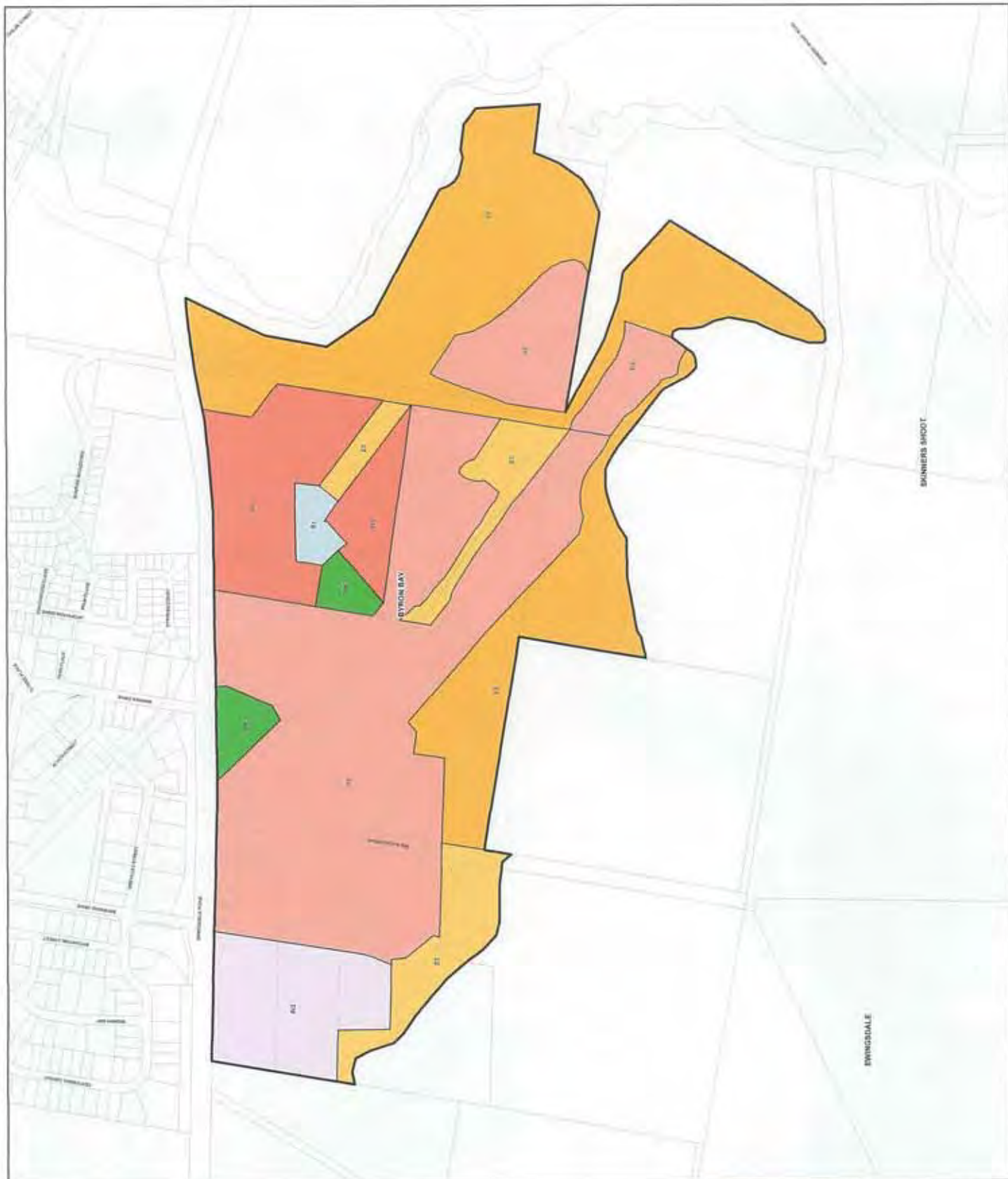
- Subject Land
- Zone**
- B1 Neighbourhood Centre
- E2 Environmental Conservation
- E3 Environmental Management
- IN2 Light Industrial
- R2 Low Density Residential
- R3 Medium Density Residential
- RE1 Public Recreation

Cadastre

Cadastre 22/04/2013 © NSW LPI



Map Identification Number:
E385_W588_LZN_001_20130524





Planning & Infrastructure

Byron Local Environmental Plan 1988—West Byron Bay—
Lot Size Map

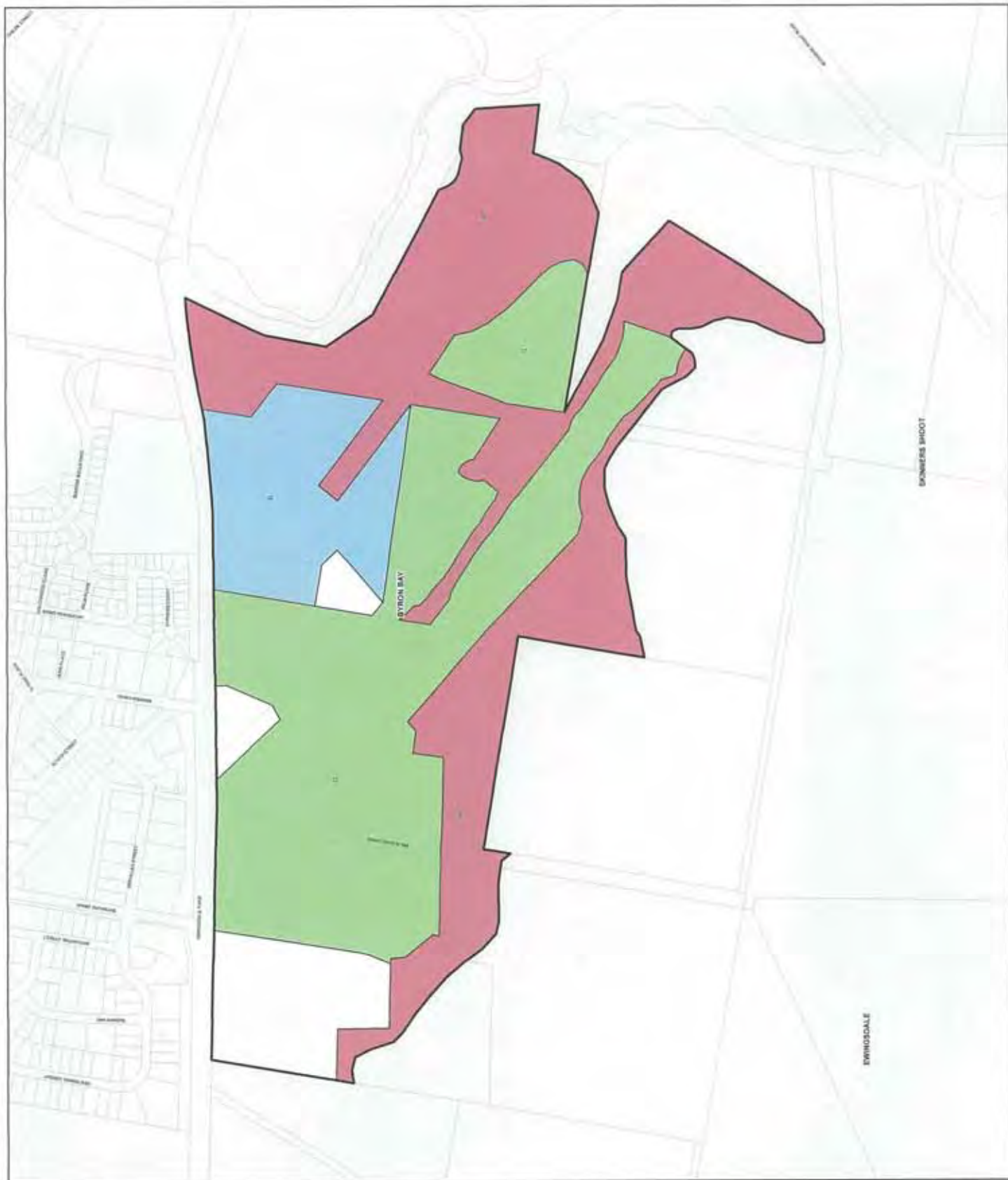
Sheet LSZ_001

- Subject Land
Minimum Lot Size (sq m)
 200
 400
 400,000 (40 ha)
Cadastral

Cadastral 22/04/2013 © NSW LPI



Map Identification Number
1390_WBP_LSZ_001_2120794





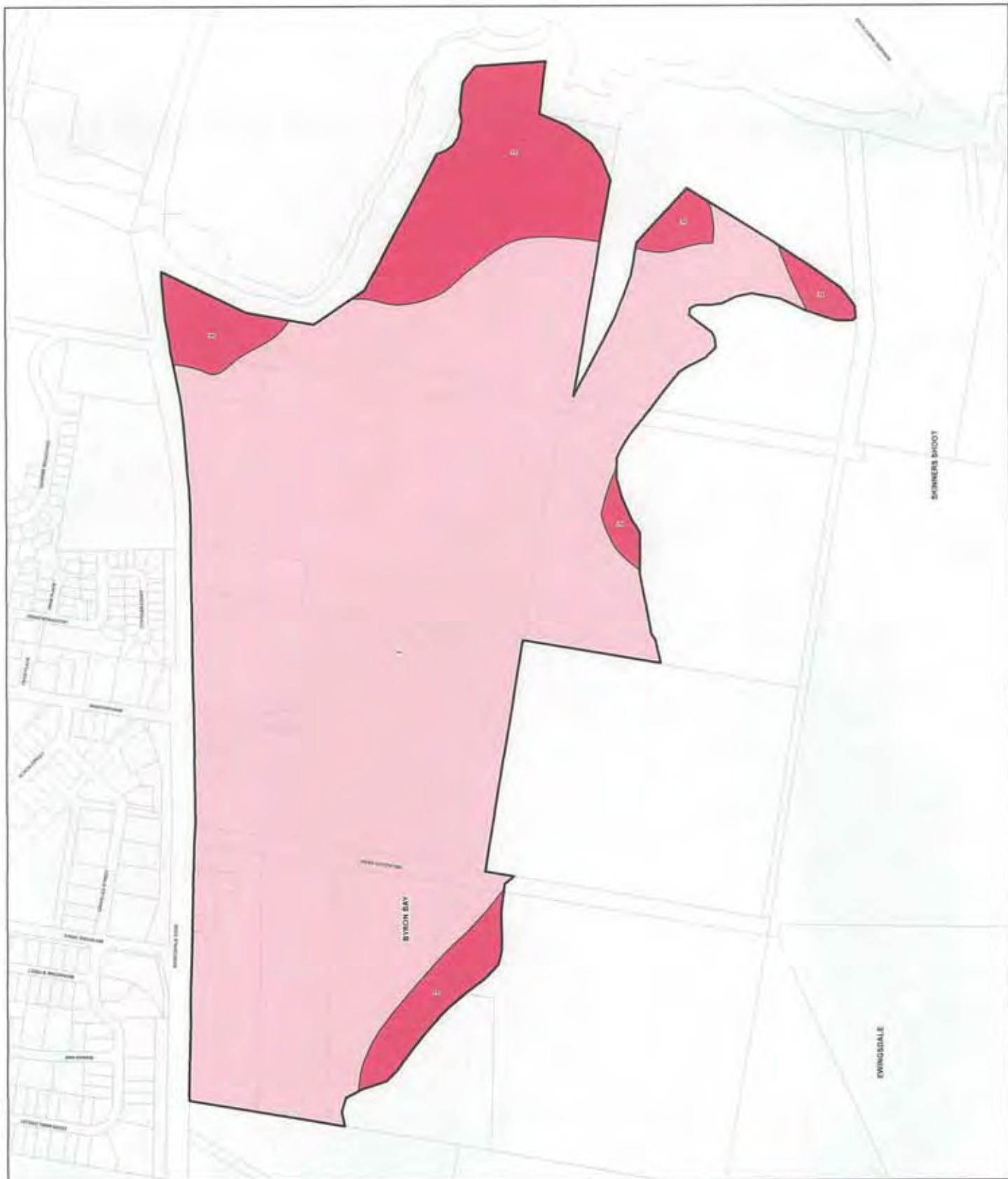
Sheet ASS_001

- Subject Land
- Acid Sulfate Soils
- Class 2
- Class 3

Cadastral 22/4/2013 © NSW LPI



Map Identification Number:
1355_MBS_ASS_001_B07_20120719



10. ENVIRONMENTAL CONSTRAINTS ASSESSMENT

FLOODING

Many reports have been completed for the Belongil Creek catchment including:

- Belongil Creek Flood Study (PWD 1986)
- Belongil Creek Data Compilation Study (Willing & Partners 1996)
- Belongil Estuary Study and Management Plan (Parker and Pont 2001)
- Byron Shire Council Draft Belongil Entrance Opening Strategy (IERM 2005)

As well as water management plans, flood management plans, stormwater, sewage treatment and disposal, marine and tidal inundation, integrated water cycle management and flood impact assessments.

The Belongil Creek Flood Study by SMEC concludes:

"The flood models indicate that flooding of the Byron Bay township to the east of the North Coast Railway line is caused by inadequate trunk drainage system capacity, lack of a surface overland flow path to the Belongil Creek Estuary and insufficient change in elevation between the low lying portions of the town and the ocean to facilitate gravity flow. The Butler Street drain is the only means of drainage for the town centre and this drain was found to be deficient in capacity. However any upgrading of this drain may also allow greater quantities of sea water to reverse flow towards the town centre during times of elevated ocean levels and consideration would need to be given to the use of flood gates, levees and pump systems to protect the town east of the railway line. In addition to the Butler Street drain, the Clarkes Beach outfall was found to be deficient in capacity, resulting in flooding of Cowper Street and the surrounding area. The capacity to convey water from Cowper Street either to Clarkes Beach or to Belongil Creek would need to be increased, or additional flood storage provided, to reduce flooding at this location.

To the west, in the Industrial Estate, a number of lots in Brigantine Street, Bayshore Drive and Grevillea Street are inundated in the 100-year ARI flood event. Flooding in this area could be reduced with upgraded drainage systems.

The flood modelling undertaken for this study demonstrates that the climate change scenarios proposed by IPCC and CSIRO would see the transformation of flooding in the Belongil Creek Floodplain from low hazard to high hazard in many areas and significantly increase the number of flood affected lots."

The MWH report states:

"The majority of challenging and resource constrained urban water cycle issues in Byron Shire yet to be resolved pertain to stormwater. Apart from stormwater quality issues that affect sensitive estuaries and waterways, Byron Shire is subject to high rainfall and major flooding events that make stormwater volumes and infrastructure a key issue for the community."

This report also notes the poor water quality in the Belongil Estuary as an issue requiring action.

SITE FILLING

The West Byron Flood Impact Assessment Report from BMT WBM comments on the proposed urban design as follows:

"Summarising the main design features included in the proposed design:

- Filling of areas has been restricted largely to areas classified as low/medium flood hazard to minimise the potential for offsite flood impacts.
- Proposed fill levels include a 500m freeboard above the 100-year ARI event peak flood level (finished Level = 3.2m AHD).
- The drainage channel traversing the site has been allocated a channel width of 30m (current width = 10m). This allows for the design of a high flow/low flow channel cross-section.

These features result in a development design which has minimal adverse impact on the flood behaviour within the Belongil Creek catchment. The flood model results are largely equivalent to the existing case flood behaviour, though with a slightly reduced flood extent in areas where catchment filling is proposed.

Assessment of the developed case scenario for the full range of flood events highlight that the proposed site filling to 3.2m AHD results in all proposed developable areas being flood free for all flood events, including the PMF event."

This concludes that areas of the site will be flood free because of all the filling to raise floor levels above calculated flood levels but does not assess the effect this will have on properties outside the site area.

Their report also shows site area which was part of the wetland that 'was wet now dry' meaning this has been filled to a flood free level.

The following diagrams from the various reports show:

SMEC figure 1 Extent of the Belongil Creek catchment

BMT WBM figure 4.1 Existing 20 year ARI flood levels

BMT WBM figure D.1 Indicative depth of fill

BMT WBM figure 6.2 Peak flood level impacts.



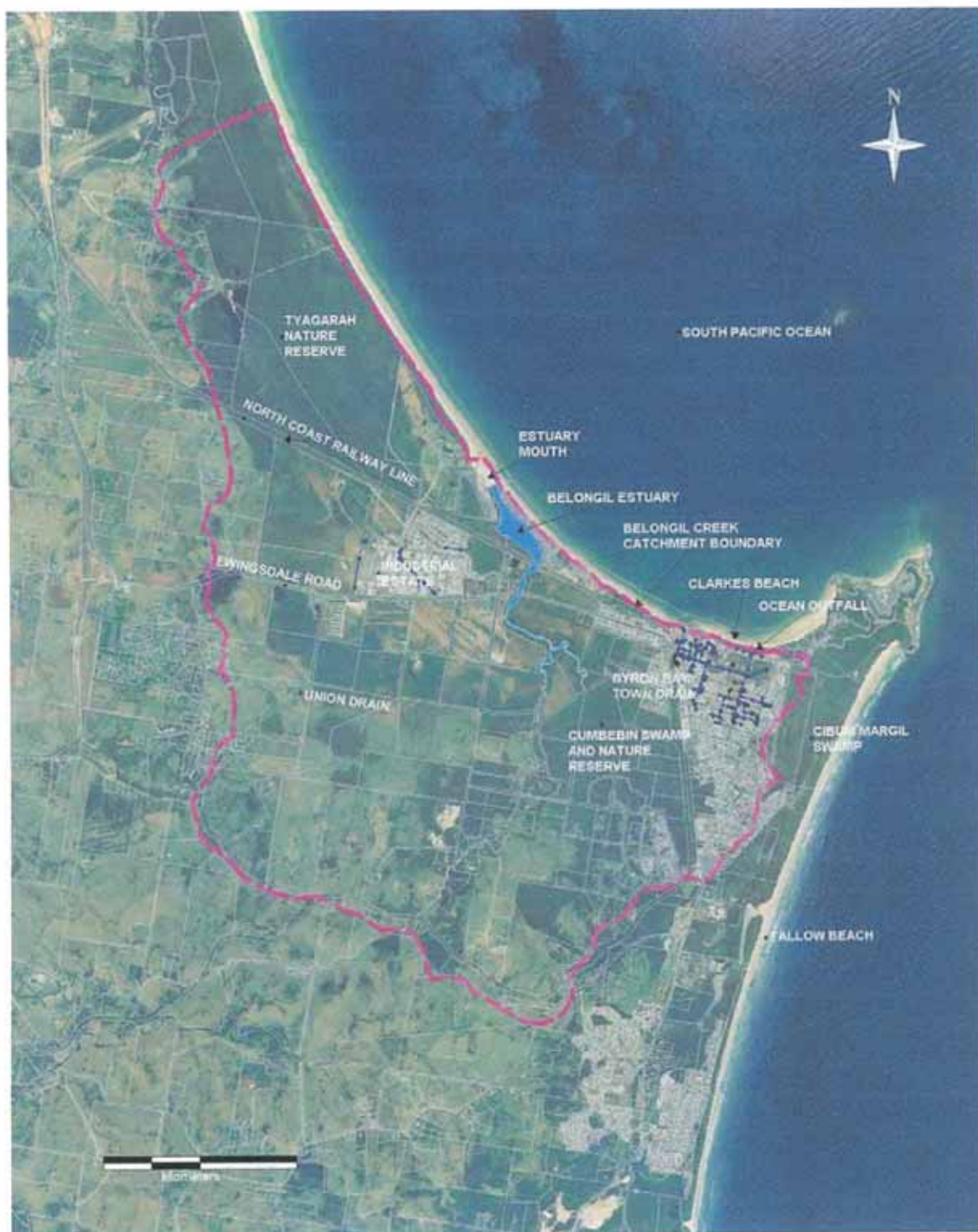
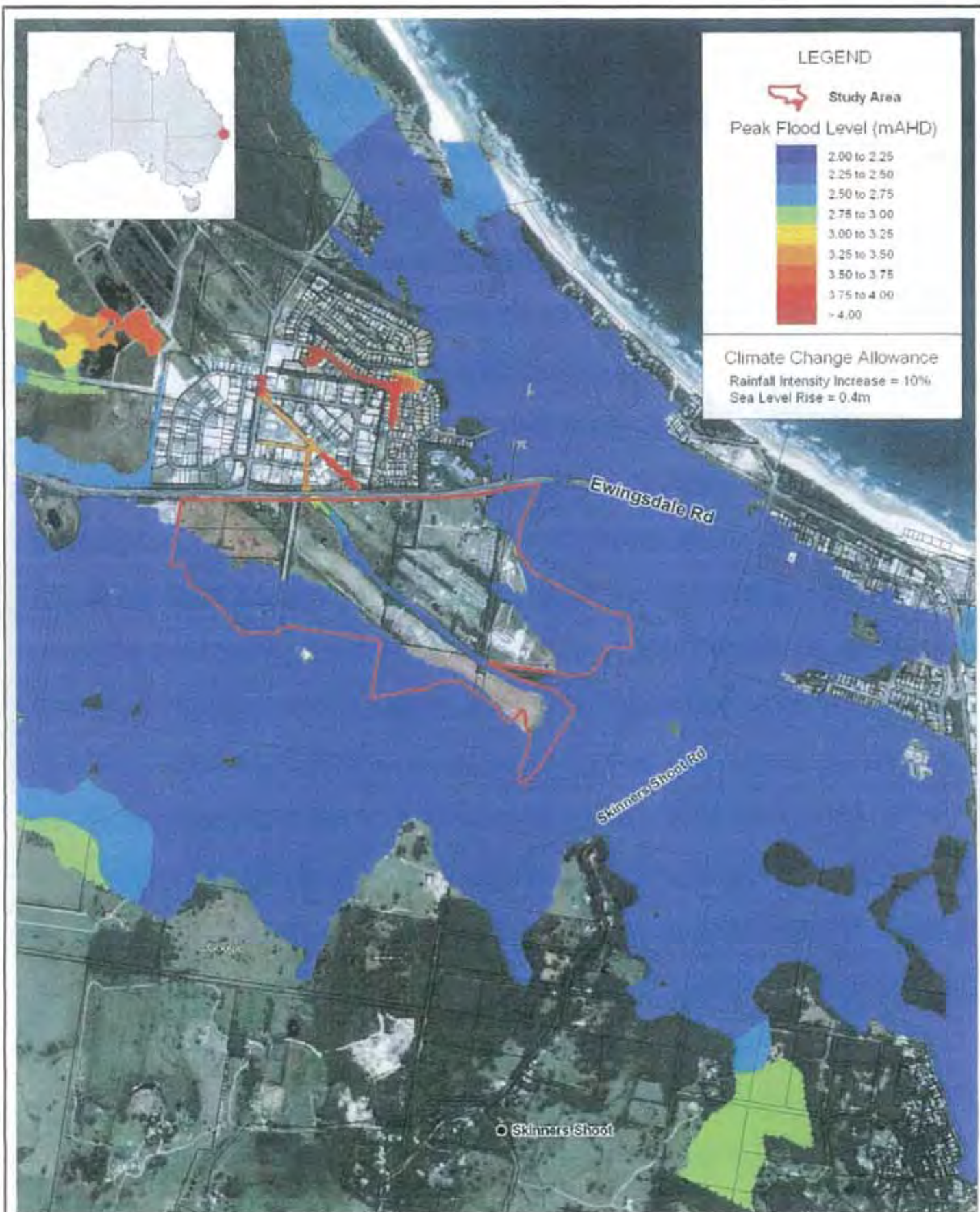


Figure 1
Locality Plan



Title:

Existing Case Peak Flood Level 20 Year ARI Event

BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 0.75 1.5km
Approx. Scale

Figure:

4-1

Rev:

A



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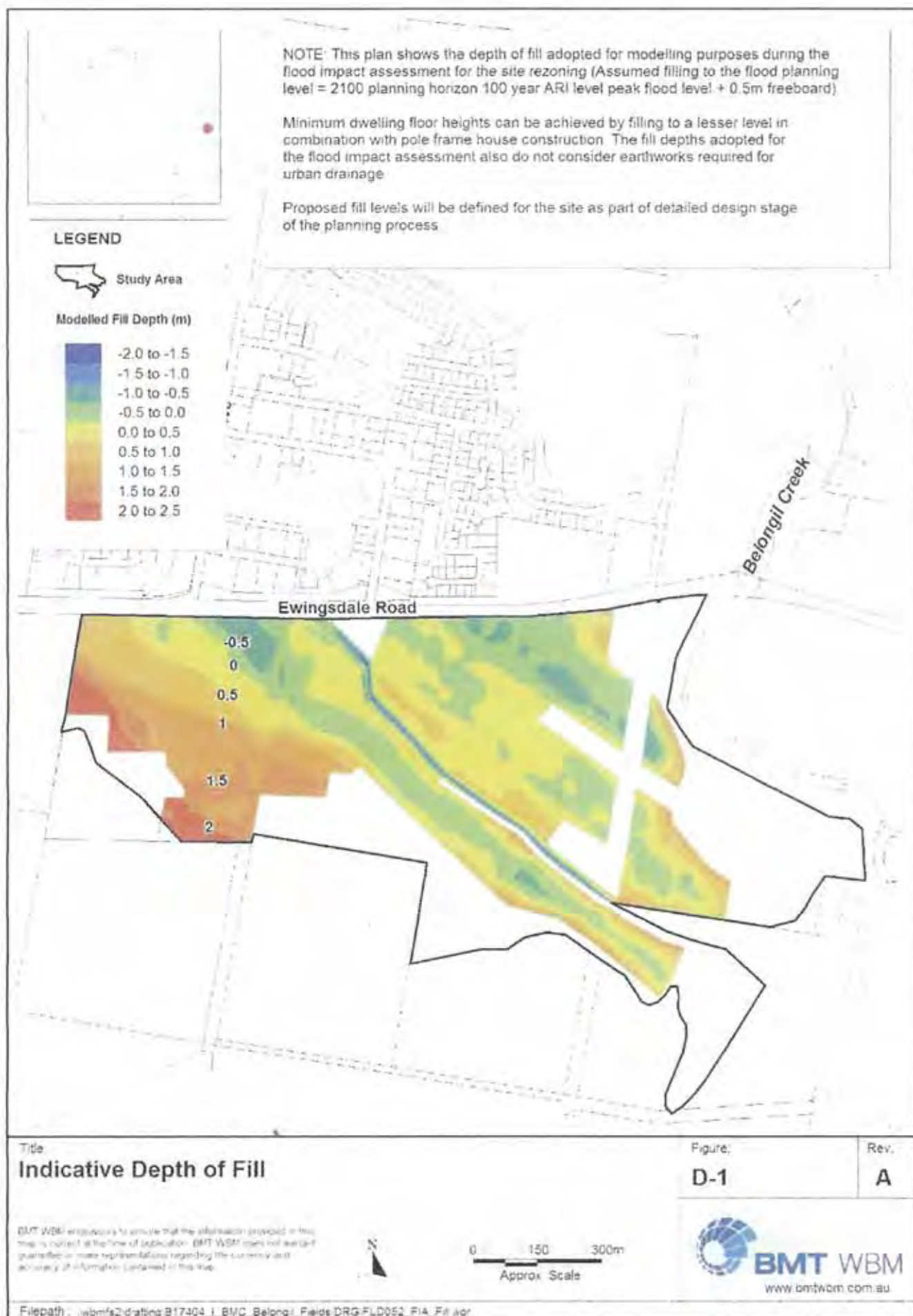
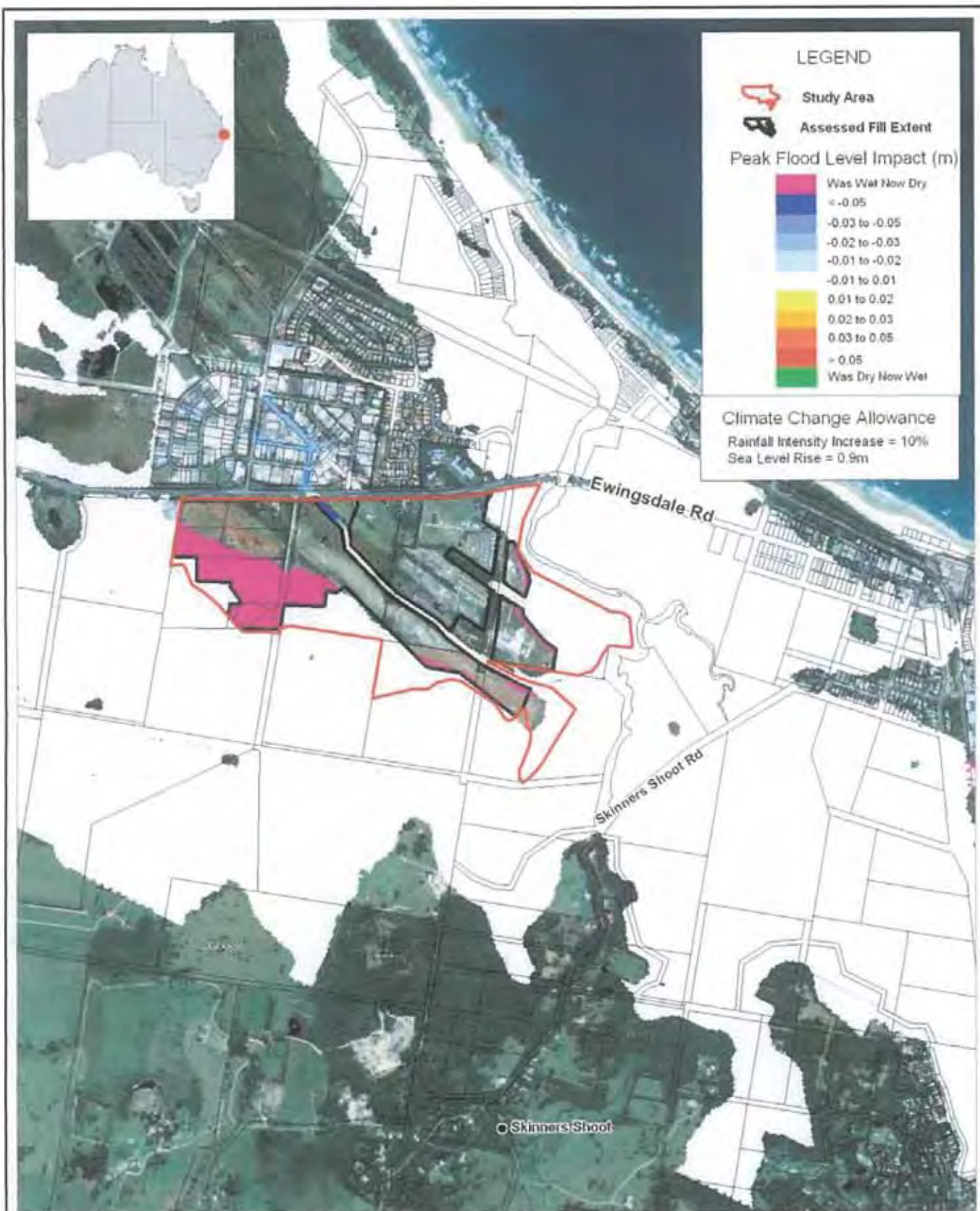


Figure 5 Modelled Depth of Fill



Title:
Developed Case 100 Year ARI Event
Peak Flood Level Impacts

Figure:
6-2

Rev:
A

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EFFECT ON SURROUNDING CATCHMENT

Another engineering report says that the removal of flood storage capacity caused by the filling of the site only equates to about 1 per cent of the total storage so this will have no effect on other properties.

One per cent of the total Belongil Catchment is a substantial volume which must be accommodated within the Byron Town Centre and surrounding low lying residential areas.

These reports are generally compiled by engineers using theoretical projections to estimate future events which then need to be controlled by designed structures to mitigate resultant damage instead of incorporating natural landforms and cycles into their planning.

The engineering based reports do not link the biological and ecological factors which lead to a holistic answer for flooding drainage, sewerage, wetlands and the life cycles of nature which is now responding with climate change and unpredictability which cannot be forecast.

COASTAL WETLANDS

The SEPP 14 Coastal Wetlands policy "identifies over 1300 wetlands of high natural value within NSW. Works comprising land clearing, levee construction, drainage work or filling may only be carried out within these wetlands with the consent of the local council and the agreement of the DoP and requires the preparation of an environmental impact statement."

SEPP 14 restricts development as follows:

- 1) In respect of land to which this policy applies, a person shall not:
 - a) clear that land,
 - b) construct a levee on that land,
 - c) drain that land, or
 - d) fill that land,except with the consent of the council and the concurrence of the Director.
- 2) In considering whether to grant concurrence under subclause (1), the Director shall take into consideration:
 - a) the environmental effects of the proposed development, including the effect of the proposed development on:
 - (i) the growth of native plant communities,
 - (ii) the survival of native wildlife populations,
 - (iii) the provision and quality of habitats for both indigenous and migratory species,

- (iv) the surface and groundwater characteristics of the site on which the development is proposed to be carried out and of the surrounding area, including salinity and water quality,
- b) whether adequate safeguards and rehabilitation measures have been, or will be, made to protect the environment,
- c) whether carrying out the development would be consistent with the aim of this policy,
- d) the objectives and major goals of the National Conservation Strategy for Australia (as set forth in the second edition of a paper prepared by the Commonwealth Department of Home Affairs and Environment for comment at the National Conference on Conservation held in June 1983, and published in 1984 by the Australian Government Publishing Service) in so far as they relate to wetlands and the conservation of 'living resources' generally, copies of which are deposited in the office of the Department,
- e) whether consideration has been given to establish whether any feasible alternatives exist to the carrying out of the proposed development (either on other land or by other methods) and if so, the reasons given for choosing the proposed development,
- f) any representations made by the Director of National Parks and Wildlife in relation to the development application, and
- g) any wetlands surrounding the land to which the development application relates and appropriateness of imposing conditions requiring the carrying out of works to preserve or enhance the value of those surrounding wetlands.

The report from Land Partners advises that the SEPP 14 mapping is inaccurate. Some wetland areas are not covered by SEPP 14 whereas some pasture areas with no wetland species are subject to SEPP 14. The existing LEP zoning for 7(a) Wetlands is similarly inaccurate in places.

They further advise that SEPP 14 clause 7 matters do not apply as the process of listing the study area as a State Significant Site (ie. rezoning of the land) does not operate as a development consent.

An outline of the wetlands and site area is shown in the following diagram which would have been compiled from photogrammetry and is not site truthed.



COASTAL PROTECTION

Much of the site is subject to SEPP 71 Coastal Protection and one of the aims of this policy is to consider 'measures to conserve animals and plants (within the meaning of the *Threatened Species Conservation Act 1995*) and their habitats'.

Stormwater discharge from the site is also covered by the clause:

"The consent authority must not grant consent to a development application to carry out development on land to which this Policy applies if the consent authority is of the opinion that the development will, or is likely to, discharge untreated stormwater into the sea, a beach, or an estuary, a coastal lake, a coastal creek or other similar body of water, or onto a rock platform."

The objects of the Threatened Species Conservation Act are as follows:

- a) to conserve biological diversity and promote ecologically sustainable development, and
- b) to prevent the extinction and promote the recovery of threatened species, populations and ecological communities, and
- c) to protect the critical habitat of those threatened species, populations and ecological communities that are endangered, and
- d) to eliminate or manage certain processes that threaten the survival or evolutionary development of threatened species, populations and ecological communities, and
- e) to ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed, and
- f) to encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

The area covered by the Coastal Policy is outlined on the following diagram.



SEPP 71

- Study Area
- SEPP 71 Coastal Policy

08/03/2014

SEPP 71: Development of Infrastructure - Planning and Design (2014/2015)

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KOALA HABITAT PROTECTION

"State Environmental Planning Policy No 44 (SEPP 44) encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure permanent free-living populations will be maintained over their present range. Local councils cannot approve development in an area affected by the policy without an investigation of core koala habitat.

With regard to the proposal, the Department of Planning is the determining authority and not Byron Shire Council. It is noted that General Requirement (5) of the DGRs requires that "...a consideration of all relevant statutory and non-statutory provisions and identification of any non-compliance with such provisions is completed". This includes SEPP 44 and the Policy is addressed as follows:

Does the subject land occur in a Local Government Area identified in Schedule 1?

The Site is located within the Byron Local Government Area therefore the Policy applies.

Is the land to which the development application applies smaller than 1 hectare in area?

No. The Site is approximately 108 hectares in area.

Does the land contain areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15 percent of the total number of trees in the upper or lower strata of the tree component?

Three tree species listed under Schedule 2 of the Policy occur on the Site – Swamp Mahogany, Forest Red Gum and Scribbly Gum. Some areas of consolidated Swamp Mahogany occur at the Site where this species would exceed 15 percent of the total canopy.

Is the land potential Koala habitat?

Yes, on the basis of Swamp Mahogany forest.

Is there core habitat on the subject land?

The Policy 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".

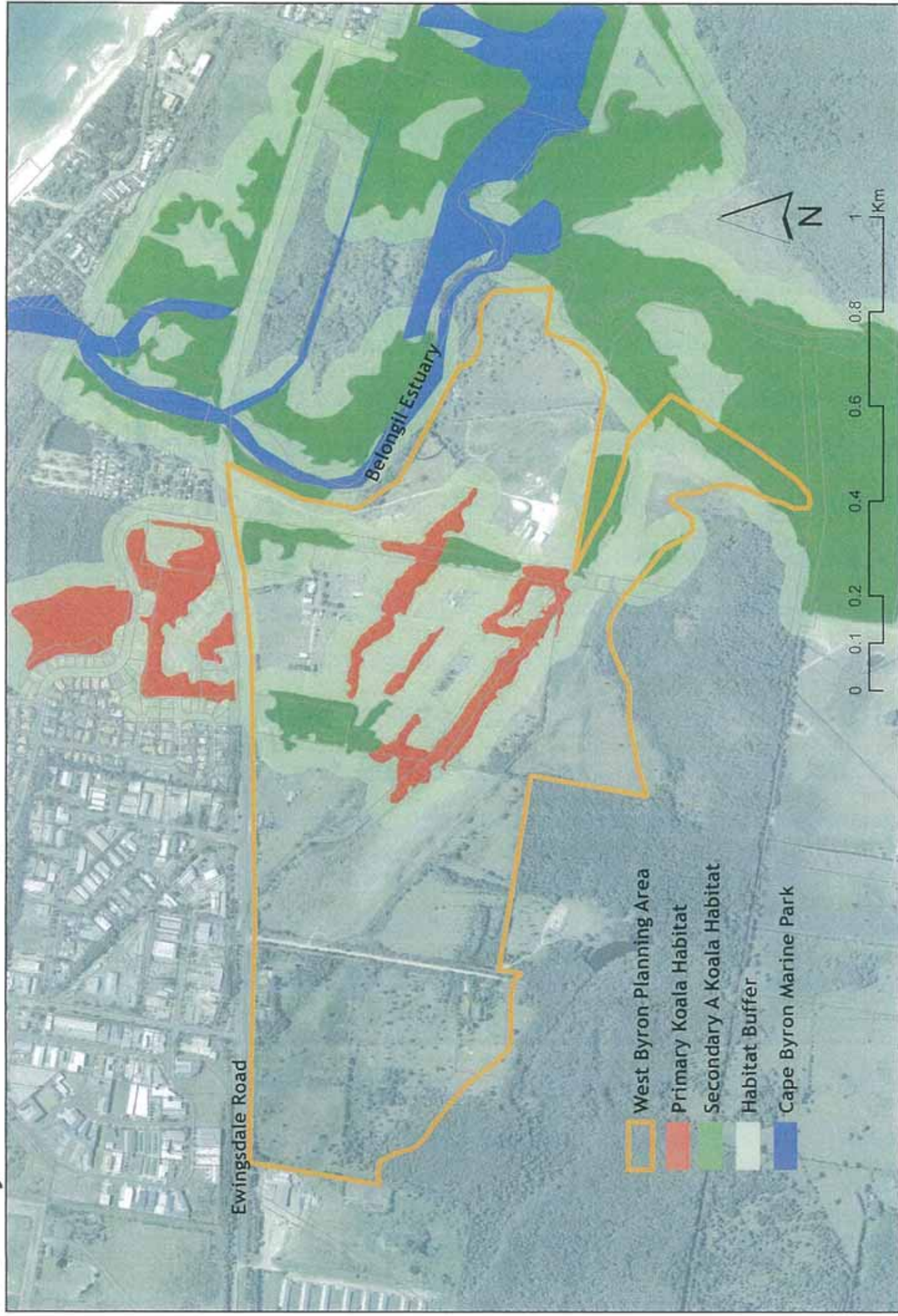
The survey undertaken to date has not determined that a population (as defined above) occurs. However, given that a female Koala was recorded at the site, and at least two animals are present, it should be considered that core Koala habitat occurs on a precautionary basis.

Is there a requirement for the preparation of a Plan of Management for identified core Koala habitat?

Yes. Core Koala habitat is likely to occur, and therefore a Plan of Management would be required for the future development of the site once the rezoning process has been finalised."

The primary and secondary core Koala habitats are shown on the following diagram which outlines a major part of the site currently used as habitat.

West Byron - Koala Habitat



ABORIGINAL CULTURAL HERITAGE

A cultural heritage assessment was compiled by Land Partners which covered approximately 57 per cent of the study area but not the total 108-hectare site. They confirm one registered site within the study area on the DECCW AHIMS database as an Aboriginal midden scatter and report that no previously unregistered Aboriginal sites were detected during the survey.

The midden was assessed to be of low significance but recommended that archaeological test excavations to establish the presence of subsurface deposits would be necessary to provide a more definitive significance assessment of this site.

An Aboriginal Elder advised that the whole of Australia constitutes traditional Aboriginal land and is thus of cultural value and attachment, irrespective of whether or not it contains archaeological sites or remembered places of ceremonial, mythological, sacred or spiritual significance. He regarded the Byron Bay area as having a particularly high level of cultural sensitivity, and cited the existence of a traditional songline/dreaming route that extends inland from Julian Rocks, as a prime example of this sensitivity.

Concern was also expressed that ancestral burials may occur in the study area. This concern is not without foundation and the report recommends Aboriginal monitoring of all ground disturbance and/or the stop-work conditions applicable to all Aboriginal objects. This would be included in the recommended Cultural Heritage Management Plan.

However, the report also advises that if the development is assessed under Part 3A of the EP&A Act, an Aboriginal Heritage Impact Permit (AHIP) under Part 6 of the National Parks & Wildlife Act 1974 would not be necessary.

In all other circumstances the legislative conditions of the NPWS Act would apply, including the requirement for an AHIP to authorise excavations and salvage.

So one wonders why the West Byron site is somehow exempted from legal obligations that apply to all other areas simply because of a ministerial edict.

Aboriginal stakeholders requested that the existing Belongil–Cumbebin Swamp flood plain forests and their biodiversity be conserved and maintained so their socio-cultural values attributed to the national environment would not be compromised.

This may happen if the management recommendations are implemented but, as mentioned above, these could be struck out under Part 3A by the Minister.

The zoned release area is within a wider area which is the subject of a registered Native Title claim lodged by the Byron Bay Bundjalung People represented by the Arakwal Aboriginal Corporation.

Another potential Aboriginal archaeological deposit was identified on the southern margin of the beach ridge plain south and south-east of the Belongil Fields Conference and Holiday Centre with potential to contain subsurface materials.

A precautionary approach was recommended under the legally enforced due diligence requirements of the NPWS Act but as mentioned above this is circumvented under Part 3A of the EP&A Act by the Planning Minister.

The Belongil union drain, although not of Aboriginal significance is also identified as a heritage item. The drain was dug by hand in 1913 to facilitate agricultural expansion but has since been deepened and widened and regularly maintained by mechanical excavators.

ACID SULFATE SOILS

"Acid sulfate soils is the common name for soils that contain metal sulfides. In an undisturbed and waterlogged state, these soils may pose no or low risk. However, when disturbed or exposed to oxygen, acid sulfate soils undergo a chemical reaction known as oxidation. Oxidation produces sulfuric acid which has led to these soils being called acid sulfate soils.

Acid sulfate soils are formed by bacterial activity in waterlogged conditions when there is no or little available oxygen.

Naturally occurring bacteria convert sulfate (dissolved salt) from seawater, groundwater or surface water into sulfide (another type of compound that contains sulfur). This sulfide reacts with metals especially iron in the soil sediments or water column, to produce metal sulfides (the main components of acid sulfate soils). In order to convert the sulfate into sulfide, the bacteria also need a source of energy provided by organic material such as decaying vegetation."

"Acid sulfate soils occur naturally around Australia's coastline. These soils were formed and deposited in areas that are, or once were, coastal environments.

Coastal acid sulfate soils are commonly found in mangrove forests, saltmarsh, floodplains, and salt- and freshwater wetlands. It is generally assumed that coastal areas with approximate surface elevations less than five metres above mean sea level, Australian Height Datum (AHD) potentially have the necessary requirements for the formation of acid sulfate soils. However, it is important to note that this elevation criterion is only a guide and there are exceptions."

THE ISSUE

"When acid sulfate soils are disturbed or exposed and react with oxygen, they produce sulfuric acid which may be accompanied by certain hazards. Metals may be released from sediments and become bioavailable in the environment, oxygen may be removed from the water column and gases such as hydrogen sulfide, sulfur dioxide and methane may be released."

Aquatic ecosystems may be affected by changes to water and soil quality. This can lead to negative effects on the species and ecological communities that depend on this ecosystem.

Areas of cultural, spiritual and ecological significance may be degraded or may not be able to be used for cultural, recreational or consumptive uses. Significant fish and plants may be affected by acidic water, metal contamination or oxygen depletion in water.

ENVIRONMENTAL SIGNIFICANCE

"The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Australian Government's central piece of environmental legislation. Under this Act, if a proposed action is likely to have a significant impact on any listed matters of national environmental significance, the action must be referred to the Minister for the Environment. The Minister is then required to make a decision on whether the action requires further assessment and approval under the EPBC Act.

While acid sulfate soils are not explicitly addressed in the EPBC Act, actions which may expose or disturb such soil must be referred to the Minister if they are likely to have a significant impact on any matters of national environmental significance."

These matters listed include:

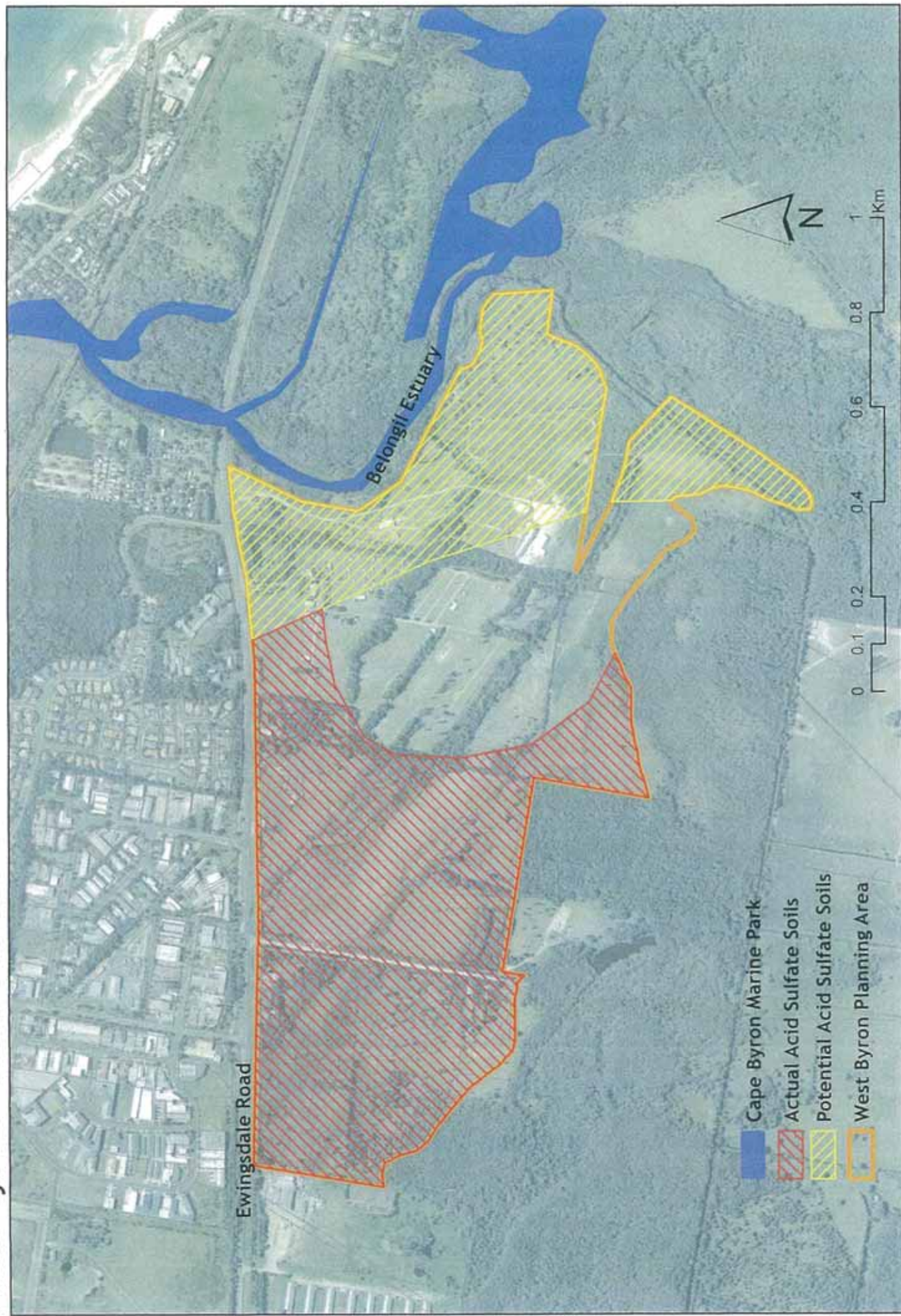
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements.

The following diagram shows the location of actual and potential acid sulfate soils in the West Byron planning area.

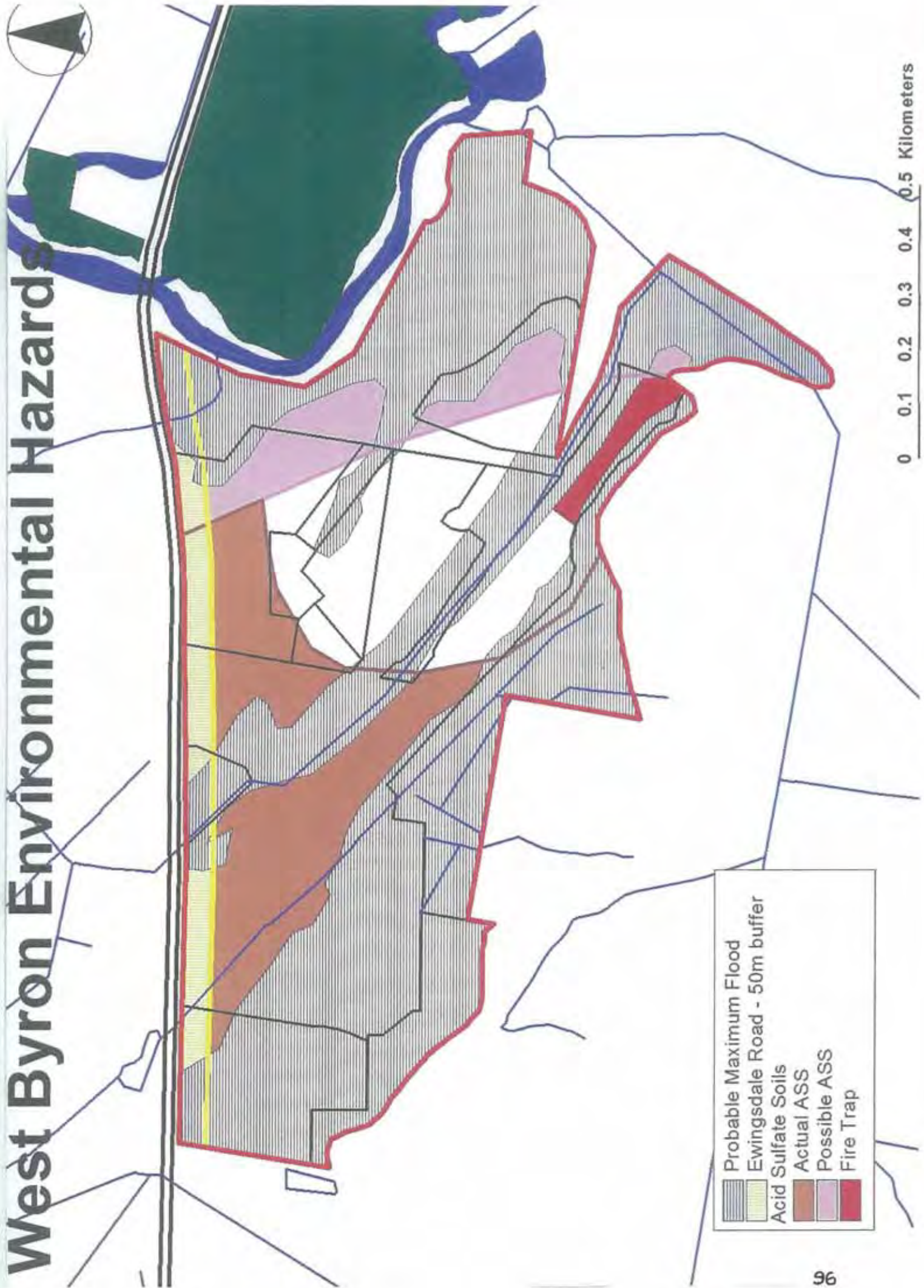
An additional diagram compiled by Dailan Pugh combines the location of acid sulfate soils with the additional environmental hazard of maximum flood potential within the site.



West Byron - Acid Sulfate Soils



West Byron Environmental Hazards



ECOLOGICAL CONSTRAINTS

An ecological assessment for the site has been done by Australian Wetlands Consulting Pty Ltd and explains that "Based on their structure plan approximately 68 hectares of the site may be cleared or alienated for development (inclusive of roads), with other areas proposed for restoration and retention (conservation) and modification (stormwater treatment). Approximately 23 hectares of land may be utilised for vegetation restoration within the conservation zone. Stormwater treatment areas would also result in the retention of vegetation/habitat, although some works would be required which may result in a nominal loss of vegetation. In combination these retention, restoration and stormwater treatment areas may support up to 39 hectares of native vegetation/habitat over time (approximately 36% of the site)."

The potential loss of vegetation from site development

Vegetation Community	Area which may be removed (ha)
Coastal Sclerophyll Forest (Cypress Pine)	-
North Coast Wet Sclerophyll Forest (Brush Box)	-
Coastal Swamp Forest Swamp Mahogany)	0.47
Coastal Swamp Forest (Broad-leaved Paperbark)	5.9
Coastal Swamp Forest (Swamp Oak)	-
Saline Wetland (Grey Mangrove)	-
Wallum Sand Heath (Coast Banksia)	-
Wallum Sand Heath (Teatree spp.)	1.65
Freshwater Wetland	0.32
Regrowth (Sally Wattle, Satinwood)	0.38
Fernland	1.0
Saltmarsh	-
Mixed Fernland/Grassland	-
TOTAL	10.2

They also summarise the potential habitat loss as follows –

Species recorded at the site	Habitat removed (ha)	Habitat retained (ha)
Olongburra Frog	Primary: None	Primary: 0.26
Wallum Froglet	Primary: 3.24	Primary: 6.29
	Secondary: 1.42	Secondary: 10.33
Black Bittern	na	na
Masked Owl	Secondary: 66.71	Secondary: 35.54
Osprey	na	na
Koala	Primary: 0.47	Primary: 2
Common Blossom Bat	Primary: None	Primary: 0.7
	Secondary: 6.28	Secondary: 8.4
Grey-headed Flying-Fox	Primary: 7.25	Primary: 12.97
Microchiropteran bats	Primary: 2.8	Primary: 8.25
	Secondary: 64.7	Secondary: 30.77
Species which may occur		
Bush-hen	Secondary: None	Secondary: 1.55
Brolga	Secondary: 9.6	Secondary: 17.6
Little Lorikeet	Secondary: 0.49	Secondary: 2

CUMBEBIN SWAMP NATURE RESERVE

"The recently expanded Cumbebin Swamp NR now occupies approximately 92 hectares and provides known habitat for four threatened species (Black-necked Stork, Koala, Little Bentwing-bat and Southern Myotis) and potential habitat for up to 43 other threatened fauna species (DECCW 2010a). The proposed rezoning would be unlikely to have any direct impacts on the Nature Reserve, and no direct access to the NR would be provided as part of any future proposals.

Future development of the site has potential for indirect impacts to the NR, primarily from disturbance by people and risks to native fauna from straying dogs/cats. However, these impacts already exist within the current context of the NR from surrounding urban and rural land."

Habitat for 48 threatened species may occur within a 5-kilometre radius of the site.

Three threatened species have been recorded at the site: the Coolamon, Olongburra frog and grey-headed flying-fox.

Habitat for 39 migratory species may occur within a 5-kilometre radius of the site: Five of these species have been recorded at the site: the Rainbow Bee-eater, Cattle Egret, Latham's Snipe, White Bellied Sea Eagle and White-throated Needletail.

There is also one threatened Ecological Community within a 5-kilometre radius of the site: Littoral Rainforest and Coastal Vine thickets of Eastern Australia.

The wetlands report concludes that –

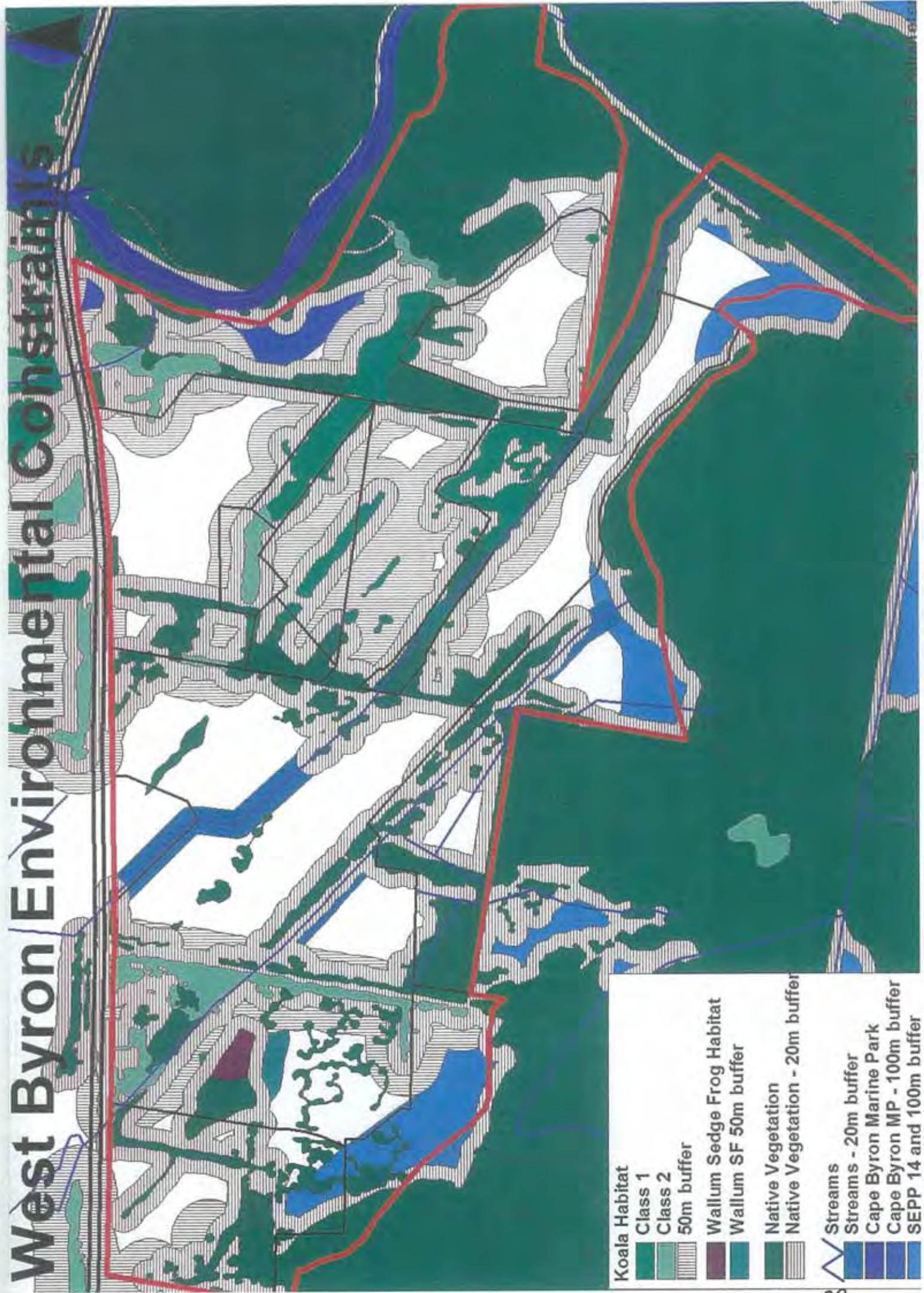
- One threatened flora species, two Endangered Ecological Communities and thirteen threatened fauna species have been recorded at the site. Potential exists for a small number of other threatened fauna species to utilise habitat at the site on an opportunistic or seasonal basis.
- Under the proposed Structure Plan, up to 10.2 hectares of native vegetation may require removal for future development of the site.
- The proposed Structure Plan has allowed for the retention of habitat for all naturally occurring threatened species and communities recorded, and the provision of approximately 23 hectares of conservation land which would be restored to provide buffers to Belongil Creek and offsets for loss of fauna habitat, thereby replacing vegetation removed at an overall ratio of approximately 2:1.

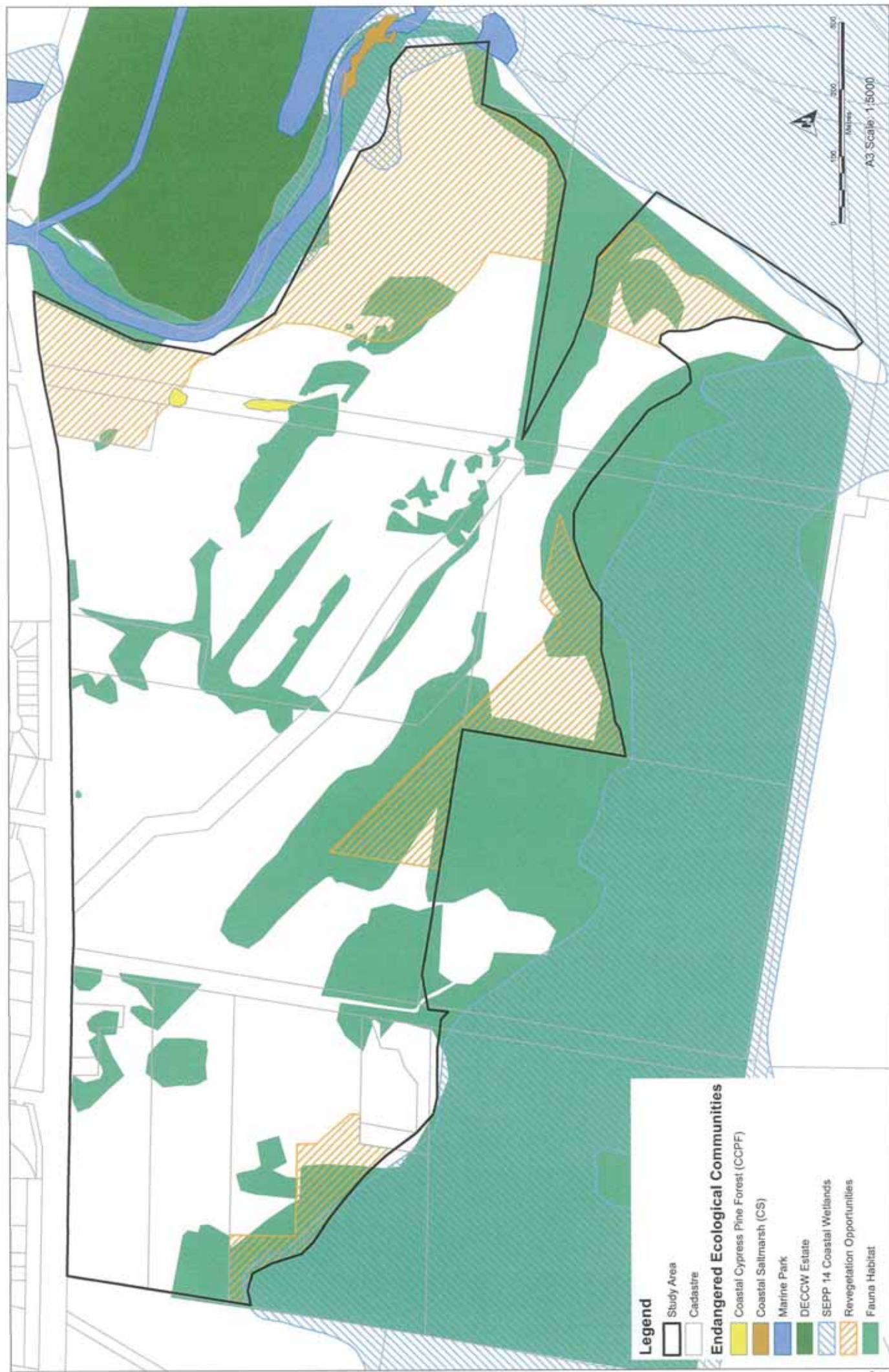
A diagram of environmental constraints in and around the site prepared by Dailan Pugh outlines the Koala Habitat, the Wallum Sedge Frog Habitat, the Native Vegetation, streams, wetlands and buffers to protect these assets.

A diagram from Land Partners is also included to show the ecological constraints.

The Land Partners diagram overlays the endangered ecological communities.

West Byron Environmental Constraints





MULTI-CRITERIA ANALYSIS

ECOLOGICAL CONSTRAINTS & OPPORTUNITIES

Sheet 2 of 5

File: BA060151-PL41A

Date: 17.06.11

11. CONSTRAINTS ANALYSIS

Constraints are the characteristics of a particular site, its location and context which influence any proposed land use within and around that site. They can be positive or negative when measured against intended land uses.

If the natural assets of a site have to be destroyed or compromised, this would suggest that the proposal is incompatible for that site. If there are more positive constraints and the natural assets of the site are preserved, the proposed use is sustainable.

The future land use should be governed by the positive use of site constraints and should enhance these assets to benefit the whole community including potential users and occupants of the site.

If the proposal uses and enhances the existing natural site assets to advantage then it is a sustainable use.

If the natural assets are compromised or destroyed this would indicate an incompatible land use.

The major constraints established in the previous research and discussion are now summarised to give a direction for the future use of the site as follows –

- A major part of the site is subject to flooding
- Filling on the site reduces the flood storage capacity of the catchment
- The site is an integral part of the Belongil Creek catchment
- Flooding extends through the wetlands to the town centre
- Filling the site increases the flood hazard externally
- SEPP 14 wetland mapping is inaccurate
- Wetland areas occur within the site
- Stormwater discharge from the site pollutes the creek and surrounding wetlands
- The site has potential to restore damaged wetlands
- There is Koala Habitat and vegetation on the site
- Removing Koala Habitat removes Koalas
- Retention of core habitat will preserve these endangered species
- The site contains large areas of acid sulfate soils
- The rezoned site development would remove over 10 hectares of native vegetation
- Removing habitat would kill animals and birds
- Filling the site destroys native vegetation

- Native vegetation and biodiversity cannot be successfully replicated off site
- The rezoning requires habitat loss for threatened species
- The immediate site contains one threatened flora species, two endangered ecological communities and thirteen threatened fauna species
- The site and surrounding wetlands contain 48 endangered species and 39 migratory species as well as threatened ecological communities
- Surrounding wetlands will be seriously impacted by residential development
- The site is an integral part of a significant wetland
- Wetlands have an intrinsic value that benefits all life and exceeds the monetary value of buildings
- Flooding in the existing industrial estate could be reduced with upgraded drainage on the site
- Disturbance of acid sulfate soils changes the water and soil quality
- Runoff from acid sulfate soils has negative effects on species and ecological communities
- The rezoning allows approximately 68 hectares of the site to be cleared or alienated for development, inclusive of roads
- Future site development impacts the adjoining nature reserve and native fauna
- Infrastructure destroys environmental zones – they are mutually exclusive
- Stormwater runoff from hard surfaces causes increased pollution and flooding of surrounding areas

Apart from the environmental and ecological constraints the following limitations would have to be overcome for the proposed new zoning to proceed –

- The substantial increase in the carbon footprint from residential development is unacceptable and would have to be offset
- Energy efficiency is a basic requirement for sustainability
- Electricity power generation and reticulation would need to be substantially upgraded to meet increased demands
- Water supply would need to be amplified for increased demands
- Existing waste collection and disposal facilities are not adequate for the increased loads
- The existing sewerage treatment would be overloaded and cause more discharge into Belongil Creek
- The large population increase is beyond the capacity of existing community facilities

Many of the technical studies, engineering and ecological reports have been commissioned by the landowners or planning authorities and only set out to justify and maximise residential development on this site.

They explain how to neutralise, overcome or offset the environmental constraints to allow buildings and infrastructure to dominate and even seek to locate this infrastructure within zoned environmental areas.

These studies are not objective in their site assessments because they don't consider alternative uses which may be more compatible with site or location constraints and don't factor in the inefficiency and cost imposition from the enormous task of revegetation after filling the site, levelling building blocks and destroying the existing vegetation.

This is a strong indication of an incompatible proposal which does not respect its environment or attempt to use the substantial environmental assets to their advantage.

The best result can only be achieved by allowing the natural assets of the site to dictate the most compatible use for a particular area and then capitalise on the enhancement of this highest use value to benefit both nature and the community at large.



12. MASTER PLAN CONCEPT

The Master Plan Concept outlined uses the existing positive constraints of the site to establish the most suitable higher order uses based on the most efficient and sustainable uses for the existing site assets.

The following criteria were used to assess alternative site uses and compare the compatibility between other possible developments to optimise the site potential, community benefits and the future sustainability of all activities.

1. SPIRITUAL

If it is not spiritual it is not Byron.

Does the concept support the spirit and healing of the land, the water and the people.

2. ETHICAL

It does not take advantage of others or damage a person's health or wellbeing or harm the environment.

3. SUSTAINABLE

To be self-supporting or renewable and does not deplete available local resources.

4. ENVIRONMENTAL

To support the biodiversity of the natural environment and contribute to the security of nature.

5. SOCIAL

To respect the local community, encourage social interaction and support people's involvement and aspirations.

6. ECONOMIC

Economy is more than money and turnover. It is the efficient, not wasteful, use of resources with a direct flow of benefit to the local economy.

7. POLITICAL

To be decided locally with initial input starting at grassroots level and feeding into the system from ground up, not by outside interests.

This assessment allows us to optimise the site potential by sensitively using the existing assets of the site and enhancing these to create the activities which would benefit most from the site context and its ability to make a positive contribution to the Byron Bay township and its component social, economic and environmental parts.

This led to a natural solution which dictated the resolution of all the negative constraints through a design that incorporated and used nature to resolve and turn these issues to positive advantage. This plan capitalises on the natural assets of the existing site for optimum return.

An aerial photo of the site and surrounding areas and the Concept Master Plan is shown on the following pages.



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Scale = 1:3,446

Meters 200 400 600 800

(Scale correct in A3 size)

10/07/2015

The Master Plan shown is a positive vision which shows how we can retain the existing natural environment and extend this throughout the site.

The central drain is widened into a series of ponds which filter the water through reed beds to increase habitat, allow canoe exploration, increase flood storage capacity and reduce flood levels in the existing town centre and residential areas.

We can learn about koalas and other endangered species, regenerate, research and discover new areas along the boardwalks and nature trails.

The 200 residential lots are contained within a less sensitive area and are totally self-sufficient by generating their own energy, collecting and re-using their own food in a natural zero carbon environment.

The disused chicken processing buildings are recycled as a community meeting place for markets, cafes, social events and functions run by the Island Quarry group or as a viable commercial enterprise.

The eco-resort and Environmental Studies Campus are made possible only by the rehabilitation and of the site areas to the greater wetland environment and the opportunities for research and learning presented by nature.

Tourists are not going to visit Byron to look at houses and commercial buildings, but they will come to discover, learn, research, enjoy and play in a unique wetland that is alive with biodiversity and an example of what is possible by respecting and co-creating with our natural assets.

All this is sustainable, environmentally positive, beneficial to the community and economically viable. Wetlands give us water, food, health and enjoyment and are essential to life on this planet.

This plan will give a positive focus to the many visitors that come to Byron as well as rehabilitating the wetlands, providing habitat for all species to survive and multiply in an economically viable development that will benefit nature and the community.

The different components that make up this master plan are discussed in detail on the following pages.

Research highlighted the outstanding value of this wetland with its direct connection to the vast catchment outside the site boundaries and the significant effect this has on the biodiversity and ecological communities of the Belongil Creek estuary.

The facts emerged that many species of flora and fauna were threatened or endangered showed that urgent and immediate action is required to protect and save these amazing communities which give so much to our quality of life and survival.

This environment has a direct effect on our health and wellbeing, our lifestyle, and the visitors who come to Byron to enjoy and share the natural and social uniqueness we already have and will continue to share if we don't destroy it.

CONNECTIVITY

The eastern site boundary directly adjoins Belongil Creek with the Cumbebin Swamp nature reserve on the opposite creek bank.

The Belongil estuary is a rich ecological environment that gives life to many land-based, migratory and ocean species and feeds directly into the Cape Byron Marine Park with the marine sanctuary and habitat protection areas that encompass the Byron Bay coastline.

The southern boundary is defined by the union drain which is catchment to a large area of flat land back to St Helena hill and Ewingsdale as well as draining part of the southern and western sections of the site. This drain also carries treated effluent from the council sewage treatment plant and discharges into Belongil Creek.

The western boundary of this study area is outside the defined urban release area and is bounded by the Island Quarry site which affords a significant topographical boundary to the available land potential uses.

The western land was originally occupied by the Sunnybrand Chicken Company who have left their processing buildings for potential adaptive reuse. The site is mostly flood liable and falls into the union drain.

Along the northern boundary is Ewingsdale Road which is the only northern access to the Byron Bay township. The overland flow of stormwater from the Arts and Industry Estate on the north side of Ewingsdale Road discharges into a diagonal drain that crosses the study site and empties into the Belongil Creek.

PLANNING PRINCIPLES

The planning principles used to establish the Master Plan Concept outlined are based on the environmental significance and economic sustainability of the site and the influence it has on its surrounding location.

The site is at the central congruence of the Belongil catchment and has a concentration of ecological potential not available in the more distant areas of this catchment.

Whatever happens on the West Byron site will radiate its influence to the whole catchment area and beyond to the marine life which relies on this fertile estuary for its survival.

The site area is inextricably linked to the Cape Byron State Conservation Area, Arakwal National Park, the Cumbebin Wetland and Tyagarah Natural Reserve which formalise what Byron Bay represents and the uniqueness of our coastal location.

The principles established in realising this Master Plan are to –

- Retain and enhance the significant environmental assets of the site
- Provide additional opportunities and habitat for the many threatened species to survive and multiply
- Allow the biodiversity to naturally regenerate

- Use the existing natural site assets as the economic basis for future sustainable land uses
- Capitalise on the existing available natural assets
- Increase flood storage capacity within the site to minimise flood conditions outside the site
- Manage water onsite by natural means
- Connect the protected coastal wetland areas
- Use the site for education and recreation as well as housing
- Provide places in nature where the community can learn and enjoy
- Provide a community meeting place
- Increase tourist potential with areas of interest
- Minimise reliance on existing infrastructure services
- Be self-sufficient in energy, water, waste and food
- Increase carbon sequestration in the wetlands
- Make all buildings energy-efficient with zero carbon emissions
- Co-create with nature a place of sustainable natural beauty
- Provide nature trails and walkways through wetland areas
- Provide environmental information and education centres
- Establish a nature based stormwater management system with grey water reticulation to buildings
- Respect the spirit of the land, the water and the people
- Respect and honour the traditional owners
- Provide an alternative place for people to visit.



13. MASTER PLAN COMPONENTS

The overall master plan is a representation of the many components which contribute to the total environment, economics, land use and management of the site assets. These are now explained in detail.

CONSERVATION

The central theme is the conservation of the natural assets within the site and their symbiotic link with the surrounding areas which extend to the whole Belongil creek catchment.

The eastern site area has a concentration of biodiversity with the Belongil Creek frontage, mangroves, tidal flat areas, wetland vegetation and wildlife corridors.

The core wildlife area allows endangered koalas and other wildlife to connect from the Tyagarah Nature Reserve through the vegetated areas of the SAE and caravan park to the regenerated wildlife area which shows mostly existing vegetation on the plan, to the nature reserves south and east of the site study area.

The ponds along the central drain area add to the variety of habitats for wildlife and will encourage the natural bounty of birds, animals and marine life to thrive and add to the interests of observers and researchers.

The surveyed Wollum frog and froglet habitats have been marked with an 'F' on the plan and have been preserved as key areas within the site.

Areas marked for regeneration will extend the existing habitat areas and mapped conservation wetland areas marked on the survey plans which are not accurate and need to be site truthed.

Shell middens and a significant aboriginal site have been identified by survey and are protected as part of the overall conservation.

The core wildlife area justifies a koala information centre and the learning and conference centre provides another facility in the Byron Bay calendar for environmental studies centre and meeting venue for corporate, community and educational programs.

The Cumbebin Research Centre would add to the educational facility and used for scientific, management and rehabilitation of the wetland flora and fauna as well as migratory and marine species.



EDUCATION AND RESEARCH

The mouth of the Belongil estuary, the sand dunes and sewage treatment ponds are home to the many birds listed in the Byron Bird Buddies report in Section 8 of this study.

They report that a combined total of over 250 bird species has been recorded at the two sites of which 31 species are recognised as a threatened species under the NSW Threatened Species Conservation Act 1995 and 39 species are migratory species listed under section 209 of the EPBC Act.

Byron Bird Buddies outline the background and habitat of the West Byron area as follows –

"The West Byron Bay area is typically low lying coastal plain and is broadly comprised of Swamp Sclerophyll Forests, Sedgeland, Fernlands, mangroves and salt marshes forming the Belongil Estuary, and an Intermittently Closed and Open Lake and Lagoon system.

Traditionally, the land was occupied by the Arakwal Aboriginal people of the Bundjalung Nation. Since settlement the area has experienced many changes ranging from clearing of vegetation, drainage of water bodies, mining, whale processing, chicken processing, grazing, light industry, a sewage treatment plant, and urban expansion for residential, tourist and recreational purposes and which continues today.

Despite the changes to date, West Byron Bay remains an area of high conservation value, providing an important corridor between the Tyagarah Nature Reserve and the wetlands of the Cumbebin Nature Reserve. Being located within a regional corridor, the area continues to support a number of complex coastal vegetation types that are recognised as environmental protection zones in the NSW State Environmental Planning Policy.

Good habitat is essential for the survival of any fauna species. Currently, within the Belongil Estuary, Byron Wetlands and surrounding habitats such as sand flats, wetlands, plants and trees, provide multiple food sources such as, nectar, insects, fruit and seeds, for bird species. Another important element of the existing remnant and riparian vegetation is that it provides a variety of complex structures including thick vegetation and reed beds where nests can be built and birds can escape from danger. Open spaces that are free from disturbance are also important such as the intertidal zones, especially for shorebirds and some waterbirds to feed, nest and rest, as are the varying depths of the marine and fresh water bodies which provide suitable habitat for some waterbirds such as diving ducks and cormorants and a source of drinking water for others."

From their research Byron Bird Buddies further conclude –

"The results of monitoring to date (September 2015) reveal a dynamic ecosystem at the two sites that can support a wide variety of bird species. However, it would be reasonable to assume that the birds are not totally dependent on just these two sites and that the surrounding area plays an important role in their long-term survival. Preserving and expanding existing habitats and thus preventing habitat fragmentation will be important for sustaining current and future bird species richness and populations as well as maintaining the integrity of the existing regional corridor."

TEMPLE BYRON

Temple Byron plays a significant role in the spiritual life of Byron Bay and is located in the centre of the West Byron site.

Byron Bay is one of the most culturally diverse places in the world and Temple Byron offers a non-sectarian sacred temple space which is readily available and respects the many values and beliefs of residents and visitors alike.

This home of spiritual development and wellbeing presents an important component of this Master Plan and must be recognised as a significant focus for all activities and land uses within the site.

Their activities and purpose are outlined as follows –

"Temple Byron is a unique facility comprising a community hall with wonderfully landscaped grounds and surrounded by lush tropical gardens, the hall is set on three acres which border a native Melaleuca forest (with tea tree oil renowned for its medicinal properties).

The hall, and a unique Mongolian yurt, support paths of learning that will assist people in their higher vision quest. They provide a sacred space for spiritual practices as well as seminars and workshops designed to promote self-discovery and personal transformation.

Temple Byron radiates a wonderful healing energy. It is designed to allow people a space to be at peace and to express their unique talents.

We offer this wonderful place to all groups to carry out their programs and practice. Temple Byron is available for a large range of uses, current uses include yoga, meditation, aikido, astrology, sacred music, art therapy, sound healings, Buddhist teachings, counselling, as well as a range of one-off workshops, seminars and classes. We also make the space available for other community uses in tune with spiritual development.

Temple Byron's lovingly landscaped gardens feature many delights including large healing crystals, Buddha statues, tranquil water features and niches for solitude and quiet contemplation. The grounds also provide ample outdoor seating for workshops and events.

Temple Byron aligns itself with the vision that our precious gifts lie within, awaiting the sunrise of a new consciousness for humanity and our planet Earth."

The full significance of Temple Byron cannot be confined within the boundaries of a small lot bordered by roads and houses. This heart and healing energy must be respected and honoured for its true value within the context of a supporting and complementary natural environment.



WETLANDS DISCOVERY CENTRE

The Wetlands Discovery Centre was inspired by the Hunter Wetlands Centre located at Shortland west of Newcastle City. Details of the centre management, education, research and layout are included in section 6 of this study.

Similar programs and activities could be provided at the West Byron Wetlands Discovery Centre which would be the focus for eco-tourism with many activities and programs such as –

- wetland tours
- bush tucker garden
- live reptile displays
- interactive nature talks and walks
- discovery playground
- daily bird feeding
- bike hire
- breakfast with the birds
- wildlife observation walks
- vulnerable species breeding programs
- canoe hire
- gift shop
- cafe
- short courses



and many other programs related to education and research within the wetlands.

These could be supported by the many volunteer groups in Byron and government sponsored programs with grants available for specific projects.

Extensive boardwalks and interpretive nature trails are shown on the Master Plan with information and observation nodes and bird hides along these trails to allow full access to the wonder of the wetlands without harming the pristine environment.

There is a possibility of having the West Byron area listed as a Ramsar Wetlands of international significance subject to property ownership agreements although the area may be too degraded and beyond rehabilitation.

The Hunter Wetlands Centre has been altered by floodgates, transmission lines, a drainage canal, a garbage dump, sports fields on filled wetlands and an abandoned building.

In 1984 a group of community representatives recognised the potential of the site for conservation, education and research and the rehabilitated site is now a vibrant operating Ramsar Wetlands.

The West Byron Wetland is not as degraded as this so the possibility always remains that it can become a viable environmental study and recreation centre. All we have to do is to stop destroying it and nature will help us do the rest.

HYDROLOGY

The hydrology of the West Byron site is of critical importance because it is part of a significant wetland. The main characteristic of a wetland is that it floods on a regular basis and the severe weather events around Byron Bay are well documented.

The impact of flooding and using up to two metres of fill on the site is discussed in section 10 Environmental Constraints.

The topography of the site is crossed diagonally with two major sand dunes which show clearly on the aerial photo and define the central drainage channel between these two dunes which carries the stormwater catchment from the industrial estate and discharge into Belongil Creek to the east.

The union drain runs along the south boundary of the study area and carries up to three megalitres of excess treated water per day from the sewerage treatment plant as well as draining a much larger stormwater catchment area.

Stormwater runoff and pollution from hard paved areas and compacted fill would only exacerbate the effects of major storms with tidal surge and sea level rise adding to the hazardous situation.

The central theme of this Master Plan is to create a series of ponds or mini-lakes along the main drainage channel through the site which processes the runoff by using reed bed and planting to filter the pollution and purify the water before discharging into Belongil Creek. This would also increase flood storage capacity and provide habitat for wildlife.

The ponds create a natural wetlands setting for the discovery centre activities and can be used for canoe hire with intimate observation and enjoyment of the abundant wildlife. They also allow efficient water management and can be used during the dry season to irrigate and regenerate degraded areas and provide a water supply for the community gardens.



RESIDENTIAL

The Master Plan accommodates 200 residential lots with 100 low-density sites of 600 square metres measuring 15 metres by 40 metres and 100 medium-density sites of 240 square metres measuring 8 metres by 30 metres.

The larger lots have the potential to accommodate a granny flat or studio which could be used for additional accommodation which would allow a total of 300 dwelling units for the overall site.

The smaller lots could be designed with zero lot line allowing duplex townhouses to maximise open space living areas and allow efficient onsite carparking.

All the larger lots have a road frontage and open onto green open space along the rear boundary which is part of the overall site open space or a 20-metre wide green corridor running between back-to-back lots.

The lots are interspersed with small green play and recreation areas and the medium-density groups have access to open space which is part of the larger open landscaped areas that surround the residential precinct.

Filling of the site for buildings and infrastructure would destroy the vegetation and the resultant runoff with pollution and weeds would invade and degenerate the adjoining wetland as well as affecting the flood levels.

Infrastructure and environmental zones are mutually exclusive. This residential subdivision and all buildings are designed with no fill.

The residential precinct is located on the higher less sensitive area of the site and is totally designed with no fill above the existing levels.

The housing designs would incorporate floor levels to comply with projected flood heights and be of modular design with columns and concrete pad footing touching the ground lightly. This not only minimises site disturbance but allows increased ventilation in a hot climate and maintains the site flood storage capacity.

Many houses in Ocean Shores and other flood liable areas in Byron and Lismore are designed this way and are more compatible with their site conditions.

The central theme of this residential precinct is natural green open space with all houses self-sufficient in energy, water, waste and flood and zero carbon emissions.

This is not only possible with good design but makes good economic sense when all houses are planned to include all these features built into the new buildings then it simply becomes part of the selling costs in the overall marketing.



ENERGY

For energy freedom all houses would have solar panels with battery storage and grid connection backup. This grid could be a community owned microgrid which feeds all buildings within the site directly and only connects to the state grid when excess power is generated to feed in from the total site or backup energy supply is needed during inclement weather.

Hot water and space heating would be provided by evacuated tube solar roof mounted units with onground hot water storage tanks and electrical backup.

There are other possible economies of scale for such a large development with group battery storage and backup generation to provide a total site service which is fully sustainable and cost-efficient.

Many of these concepts are already progressing in Byron Shire with initiatives such as COREM (Community Owned Renewable Energy Mullumbimby), a private program to install 100 new solar PV systems within 12 months, the launch of a new energy retailer ENOVA that provides all energy from renewable sources and council's sustainability plan to generate and directly distribute power between their many buildings and work sites.

WATER

For each dwelling, roofwater is collected in a tank with pump and filters for the house and garden supply. Grey water recycling systems could also be used for additional efficiency and used for clothes washing, toilet flushing and landscaping.

It is also possible to have a package sewer treatment plant for this number of dwellings which would treat and process all sewage generated onsite. This could also process grey water with a dedicated reticulation supply system back to the houses or used onsite for fire fighting water storage and for irrigation of the common open space. A suggested location for this site sewerage treatment plant and transpiration area is shown on the Master Plan.

WASTE

Waste is a resource and onsite collection and storage would provide efficiencies of scale. Waste would be collected by an onsite contractor and stored in a central area for bulk collection by a council contractor.

This would be much more efficient and allow roads to be designed so they would not have to accommodate large noisy garbage trucks requiring extensive turning and manoeuvring areas of paving which would allow more area for landscaping, on-street parking, pleasant streetscape and infrastructure services. Emergency vehicle access is still necessary but this would not be required on a regular basis.

FOOD

Byron has a reputation for local organic food supplies with regular farmers markets, outlets like The Farm on Ewingsdale Road, community gardens at Mullumbimby and Ocean Shores and many other fresh vegetarian food outlets.

West Byron could easily become part of this network with an onsite community garden which could supply all the houses and onsite cafe and be part of a local market at the 'meeting place' in the reused chicken processing buildings adjacent to the residential area.

ZERO CARBON

The Byron Shire Council has partnered with Beyond Zero Emissions (BZE) to make the whole of Byron Shire zero carbon emissions within ten years.

This initiative, which started with a public forum in June 2015, has much community support and regular input from over 50 people volunteering their time and expertise within the working groups for energy, transport, waste, buildings and agriculture.

The program known as Zero Emissions Byron (ZEB) is overseen by BZE who provide expertise, experience, knowledge and guidance from their education, research and publications which are geared to a national zero carbon strategy.

Local groups are now collating baseload information to formulate programs which reduce emissions and Mayor Simon Richardson is participating in the Paris Climate Change Conferences (COP 21) to present Byron Shire's intentions and glean expertise from other countries and areas where this is already happening.

The concept of any development on the West Byron site that is not zero carbon flies in the face of this community initiative and would be a dinosaur, totally alien to the Byron way of being sustainable and responsible and respecting our land, our water and our people.

Carbon results from all human activities and is necessary for the growth of trees, plants and nature which uses photosynthesis to produce oxygen which is returned to us and is necessary for human life. This synergy is out of balance when the capacity of the planet to absorb carbon becomes overloaded and has to respond to restore the equilibrium.

Blue Carbon is carbon that is absorbed by wetlands which sequester carbon at up to five times the rate of forests and other plants. Section 7 of this study outlines the Blue Carbon initiative and the importance of wetlands to become an integral part of this process.

The International Union for Conservation of Nature (IUCN) tells us that, "The world's most crucial climate-combating wetland ecosystems, mangroves, saltmarshes, seagrasses, known collectively as Blue Carbon sinks, and estuaries capture and store the equivalent of up to half of the carbon emissions from the entire global transport sector every year, estimated at around 1 billion metric tons of carbon each year. Yet we are degrading these wetland ecosystems at a rapid pace from urban expansion, coastal development and through inappropriate catchment management practices."

WetlandCare Australia is mainstreaming the Blue Carbon Agenda and is involved with rehabilitation and research and is already working with farmers in the Byron Bay hinterland on restoration works with government funding available for this.

This master plan not only reduces carbon emissions within the development process and building design, construction and use but offsets this carbon by sequestration within the rehabilitated wetlands.

A MEETING PLACE

ISLAND QUARRY ARTS AND ECO CENTRE

The processing buildings previously used by Sunnybrand Chickens and their site has been purchased by one of the West Byron landowners and is now included in this overall master plan.

The existing buildings could become a community meeting place with adaptive re-use or replaced by new structures if this is more economically viable. Renovation could make the buildings functional in the short-term and assist in giving identity to the project.

It is envisaged that this building group could be used for community functions, education, workshops, concerts and more intimate performances, a covered and open market venue, West Byron community events, and many other social pursuits.

Adjoining the western boundary of this site is the Island Quarry which houses an 8-acre (3.3 hectare) abandoned quarry now occupied and managed by Island Quarry Inc who wrote –

"The Island Quarry Arts & Eco Centre is Byron Bay's most innovative and exciting community project. Our vision is to create a model for sustainable living through environmental, economic and social activity. We hope to demonstrate environmentally sustainable practices whilst protecting and enhancing the natural and scenic values. Island Quarry is fostering local arts, environment, new industries and sustainable technologies, whilst recognising and promoting valuable cultural heritage that relates to our region. In turn a unique and diverse local culture will be developed. Together, our community shares this common vision and is engaged in an ambitious enterprise, the Island Quarry, otherwise known as 'IQ'.

The Island Quarry is made up of its members, friends and volunteers from our local community. Our centre is managed by a community-based association, the Island Quarry Incorporated, which has been appointed the Trustee."

The Island Quarry site is surrounded by natural wetland and has also been included in this Master Plan because of its historical and geographical relevance, the compatibility with potential land uses and the integration of this dominant topographical feature with the environmental significance of its location.

The functions of the Island Quarry Arts & Eco Centre could be combined with the newly renovated meeting place to reinforce the social, economic and environmental functions within and around the West Byron site.



ECO RESORT

The western site area is subject to flooding in the 20-year ARI storm event with the possible exception of the existing buildings which are built up in the north-east corner. The site also carries overland flow from the Cavanbah Centre site and surrounds on the north side of Ewingsdale Road.

The eco resort and environmental studies centre have been located in this area because they are larger scale commercial buildings and can easily be designed with carparking and services on the lower level and the main functional and accommodation areas on the upper levels above the flood height. Elevated walkways would ensure all weather and emergency access. This design concept does not require any filling of the site and maintains the existing flood storage capacity with overland flows not impeded by buildings.

There are many examples of buildings designed with upper level access ways and connections to higher ground.

Thamesmead in London is a complete neighbourhood built within the River Thames flood zone and has an extensive upper level pedestrian network with vehicles and services on the existing ground area below.

The resort is envisaged as an integral part of the wetland with sensitive walkways linking the major nature trails of the larger site.

With two accommodation and function levels above the carpark, this should allow more than enough area for a financially viable tourist, education and accommodation facility.

The Kingfisher Bay Resort on Fraser Island is a good example with the central amenities, restaurants, administration and function room building on the edge of a sensitive wetland which has been retained and regenerated with walking track access and interpretive tours by National Park guides through the wetland. All buildings are built above the ground level to allow full access of water, wildlife and plants on this sensitive site.

The West Byron project could be designed as a genuine eco resort with self-contained sustainable features incorporated into the building and without the green washing so prevalent with other projects.

As such it would be a shining example of true integration between buildings and their natural environment.



ENVIRONMENTAL STUDIES CAMPUS

Because the wetland has been retained and regenerated with educational and research facilities this then creates a demand for further detailed investigation, research and studies and justifies an Environmental Studies Campus.

Informal discussions have been held with two universities who would be interested in setting up a Byron Bay Environmental Campus subject to the recognition of this significant coastal area with its connection to extensive land and interacting marine environments.

Some student and staff accommodation could be arranged within the campus, the resort or residential precinct as an added bonus to the overall concept for people caring for the environment.

The campus buildings would also be designed with carparking and services on the lower level and the major access and activity areas on the two levels above the designed flood height.

Direct access to the wetland for study and research would benefit both students, teachers, and the feedback used directly in education and information available to visitors wanting to be part of this bold initiative which integrates all aspects of living and learning with nature as our teacher.



14. IMPLEMENTATION

"You cannot solve a problem with the same consciousness that created it."

Albert Einstein

The Problem

The problem that we now have with the West Byron rezoning was created by a politically based planning system that has manipulated its own planning regulations to circumvent environmental laws made to protect the natural environment.

We cannot resolve the problems created by this fundamentally flawed planning system with DCPs, management plans, development controls or biased expert studies within this system because it is based on politics, greed, power and control which values the built environment above natural eco-systems and sets out to justify the destruction of nature in the name of progress.

What has been proposed is the old paradigm which has not worked for the last 30 years and has been implemented in places like Kellyville, Albion Park, Campbelltown, Salt Village and Tweed Heads which all comply with planning regulations but are nothing more than a collection of insensitive buildings without soul and detached from the nature they destroyed to build houses.

The resultant aesthetic, social and health issues that are bred by these insensitive developments then feed into our health, social service and legal systems to create jobs and feed the economic basis of our political system.

The issues of West Byron cannot be resolved through the flawed planning system that created them.

The New Paradigm

The new paradigm which is now emerging is based on respect for our land, our water and people who value the true contribution of nature to our existence, there is now a recognition of the real value of nature by many organisations and groups such as Planet Ark, The Wilderness Society, 2020 Vision, Greening Australia, National Geographic Society and the recent Paris Climate Agreement which all look at how to preserve the bounty that nature gives to our way of life.

This report looks at the true value of nature and the wetland that past generations have bequeathed to us and by capitalising on this inheritance we can respect, care and become part of the evolution to restore this priceless environment as we accept our responsibility to pass this on to future generations.

The answer to our current dilemma is to pursue the new paradigm that values and respects nature with our aware community and our intention to prioritise the value of nature above short-term financial gain and realise the full potential of the priceless assets we already have.

Working together

There are many social and environmental organisations and ethical corporations that respect and support nature with sustainable activities.

There is government and corporate funding available and currently used in many environmental restoration projects with some of these organisations and welfare contacts listed as follows –

- Australian Government Department of Environment (EPBC Act, Ramsar Convention and Registry of Important Wetlands)
- NSW Office of Environment and Heritage (Native Vegetation Act)
- NSW Department of Primary Industries (Agriculture)
- Northern Rivers Catchment Management Authority
- Natural Heritage Trust
- Byron Shire Council – Biodiversity Conservation Strategy
- Belongil Drainage Union
- Belongil Rehabilitation Working Group
- Byron Bay Wastewater Steering Committee
- WetlandCare Australia
- Hunter Wetlands Centre
- Byron Bird Buddies
- Brunswick Valley Landcare
- National Parks & Wildlife
- Friends of Koalas
- Coastcare
- Landcare
- Coastkeepers
- Waterwatch
- Dune Care
- Greening Australia
- Australian Conservation Foundation
- Legal Information Access Centre
- Environmental Defenders Office
- Nature Conservation Council
- Total Environment Centre
- The Wilderness Society
- WIRES



There is potential to capitalise on West Byron with more money to be made from sustainable projects which conserve and increase in value with time rather than a destructive and dominating built environment with an economic life cycle that depreciates and deteriorates over time and needs more capital to restore derelict buildings and a degraded environment.

Why would you destroy an existing asset when you can make more money from keeping it? Just factor the rehabilitation costs into the financial feasibility and the result will be self-evident.

This Master Plan sets out a positive alternative that capitalises on the natural assets of its wetlands environment and strategic location to co-create with nature a financially viable and economically sustainable development that reflects the true values of Byron Bay and the aspirations of the community it serves.

The environmental value, the tourist potential, the education and research resource, the cultural value, real growth, the economic sustainability, the recognition that there is a better way and all this is available to us now. We have the power and we can show there is another way just by doing it – this is the new paradigm.

We now choose to preserve, enhance and live sustainably in these wetlands to share our way of life with nature and inspire the many visitors who search for a unique experience.

ACTION PLAN

There are many avenues available to us to progress this plan with much of the research contained in the multiple individual reports completed over many years by government and environmental organisations which can now be co-ordinated to focus this information towards our real purpose in optimising the true value and potential so that we can use and enjoy the asset we have today.

Some actions available to us are as follows –

- confirm community agreement and support
- open public presentations and feedback
- landowner and developer consultation
- adjoining landowners' input
- possibility of eco-resort and commercial ventures
- application for register of Significant Wetlands
- WetlandCare Australia rehabilitation plan and actions
- Council support
- Arakwal traditional owners' input
- Consult NSW Office of Environment & Heritage (Native Vegetation Act)
- Consult Australian Department of Environment (EPBC Act)

- applications to government departments
- funding for restoration
- environmental volunteer groups
- investigate legal irregularities
- EDO support and feedback
- activate Blue Carbon initiative
- check possible Ramsar application
- feedback from Zero Emissions Byron (ZEB)
- Beyond Zero Emissions (BZE) support
- instigate ongoing research on wetlands, flora, fauna and hydrology
- feedback from Hunter Wetlands Discovery Centre
- input from Friends of Koalas
- feedback from VIA Byron and NSW Tourism
- Island Quarry involvement
- follow up university faculty involvement
- investigate education and research potential
- investigate funding sources – public, private, government
- prepare overall financial feasibility
- organise and co-ordinate community interest groups
- International support
- Plan of Management for total site
- Belongil Catchment input
- involvement of NPWS and environmental groups

It does not make sense to destroy a wetland to make money when you can save a wetland to make money.

In summary the West Byron Wetland has an intrinsic value that is connected to the surrounding biodiversity and this value can be substantially increased by rehabilitation to encourage the plants, animals, birds and fish to multiply in harmony with their supporting environment so people can learn, interact, enjoy and regenerate with nature.

We have to work together if we want to evolve and grow to be the amazing beings we already are in this amazing place we already have.

15. CONCLUSION

Initial investigations highlighted the natural assets of the site and led to its significance in the larger context of the whole Belongil catchment and its direct connection to the national park and nature reserves within this 30 square kilometre area.

The Town Centre and West Byron rely on this natural wetland and are subject to the continual motions of the vast Belongil catchment and the direct interaction of the sea with this living land.

The Belongil estuary feeds the ocean marine sanctuary which makes up the significant eco-system that covers the whole of Byron Bay and is the reason so many visitors come to this place.

THE VALUE OF NATURE

The value of nature has recently become evident with local, national and international recognition of this vanishing resource we once had.

Local volunteer groups, national organisations – sometimes supported by government – with international assessments, treaties, agreements and policies to protect our wetlands which they have assessed as having a higher monetary value than total global GDP can all work together to rehabilitate this priceless wetland catchment.

As one Aboriginal Elder said about the threat to Kakadu wetlands by mining interests –

"Money comes and goes. You can always make money other ways, like, with visitors but you can't replace that land."

WetlandCare Australia have shown us how the Belongil catchment and West Byron can be rehabilitated and the Hunter Wetlands at Shortland, west of Newcastle, have successfully capitalised on their wetland resource.

COST OF DEVELOPMENT

The NSW state government has recently decided to release a significant area of land in West Byron for urban development wedged into the spurs of land on the ancient sand dunes that extend into the wetland.

This would not only destroy the native vegetation and habitat within the site outlined but would decimate the adjacent wetlands and habitat with pollution, drainage runoff, weed invasion, excessive flooding and all the negative activities that urban development brings to the natural environment.

With all the environmental and legal constraints clearly set out in the many reports, there is an alternative which allows limited occupation with self-contained housing, educational, tourist and research activities that capitalise on the unique assets of this site and justify the economic rehabilitation of the surrounding wetland.

The total real cost of any proposal must consider all aspects in any financial feasibility assessment which includes social, political, economic, environmental, sustainable,

ethical, health, rehabilitation, safety, ecology, food security, marine and wildlife preservation, flooding costs and amenity which all affect our total community and lifestyle, otherwise the predicted financial return would only benefit a few individuals to the detriment of the community at large.

The Master Plan outlined in this report is not only financially viable with the co-operation of all the landowners, but will give a faster return on investment and provide a lasting return to the community through tourism, education, accommodation and reputation.

THE MASTER PLAN

This Master Plan concept resulted from making all the constraints a positive asset by capitalising on the retention and rehabilitation of the wetland and natural vegetation and extending this throughout the site with supporting compatible land uses.

"The central drain is widened into a series of ponds which filter the water through reed beds to increase habitat, allow canoe exploration, increase flood storage capacity and reduce flood levels in the existing town centre and residential areas.

We can learn about koalas and other endangered species, regenerate, research and discover new areas along the boardwalks and nature trails.

The 200 residential lots are contained within a less sensitive area and are totally self-sufficient by generating their own energy, collecting and re-using their own water, treating their own sewage, recycling their own waste and growing their own food in a natural zero carbon environment.

The disused chicken processing buildings are recycled as a community meeting place for markets, cafes, social events and functions run by the Island Quarry group.

The eco-resort and Environmental Studies Campus are made possible only by the rehabilitation of the site areas to the greater wetland environment and the opportunities for research and learning presented by nature.

Tourists are not coming to visit Byron to look at houses and commercial buildings, but they will come to discover, learn, research, enjoy and play in a unique wetlands that is alive with biodiversity and an example of what is possible by respecting and co-creating with our natural assets.

All this is sustainable, environmentally positive, beneficial to the community and economically viable. Wetlands give us water, food, health and enjoyment and are essential to life on this planet."

We can look beyond the tunnel vision of city-based planners who are politically motivated to follow their corporate masters, and open our eyes to the full potential of the Belongil catchment which covers the whole of Byron Bay and connects to the rich marine environment of the ocean and beyond.

We can reclaim, regenerate, rehabilitate, research and rediscover the amazing wetland that was always there.

We can join the national park, state recreation areas, beach reserves, nature reserves, wetlands, creeks, estuary, riparian and wildlife corridors with the habitat protection and sanctuary zones of the Cape Byron Marine Park to restore the intensive and unique ecological community it once was.

We can move beyond the limited perceptions of an outdated planning system and capitalise on the real Byron by respecting, honouring, using and co-creating with nature the real world we were meant to live in.

This is the new paradigm.

THE NEW PARADIGM

The intrinsic value of nature reaches beyond survival into our wellbeing, our physical, mental and emotional health, our life journey aspirations and growth, as we embrace the biodiversity and connection with all the life we are freely given through being part of this amazing eco-system that supplies all our needs.

As we accept the bounty of nature we also accept our stewardship to care for this land and encourage it to regenerate so our existence and all life can continue to exist.

We can do better – there is no excuse for the blatant destruction of a priceless wetland. This is 2016 and with our knowledge and understanding of science and technology we can now consciously create or destroy.

Through respect for our land, our water and ourselves we can consciously work with nature to create an amazing place for all peoples to live, work, play and enjoy as an example of what we can have when we work together with nature.

We have the power to create this vision through co-operation not conflict, helping not hurting, nurturing not exploiting, including not separating, inspiring, learning, understanding and accepting and by allowing, not controlling the natural environment given to us to share and care for.

THE WAY FORWARD

To be self-sufficient, not taking from the land and resources but by giving back our energies and exchanging our knowledge to create the synergy between all life that always was and always will be connected and interdependent. This is our future because we now know what is possible and we can do this. It is our choice and we are at the crossroads.

This is the new way forward. This is the proper way because we are one with each other and one with the nature that supports us to live, work and play, to eat, sleep and live and to be in this amazing place that we have made.

To use the natural asset that is ours to enjoy, to make this place unique for all people to share, to reclaim the spirit of the land, the water and the people – this is the way we choose, this is the Byron way.

Because we choose to do this we can and we will – for ourselves, for each other and for the life force that is within every living thing from the smallest fungus to plants and creatures, humans, our planet and the universe.

We will do this because that is our purpose, this is the evolution we are now consciously choosing, This is our future and the future is now.

JOHN SPARKS

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ACKNOWLEDGEMENTS

This Master Plan is compiled with much information from many local people with incredible knowledge, expertise and passion for this amazing place called Byron Bay where we have all chosen to live.

The depth of their research and findings were given freely and their comments on the initial concept plan has allowed a more positive final Master Plan which incorporates the wisdom of many people and responds directly to nature.

Thank you to Mary Gardner for sharing your extensive research on ecology, biology, history and blue carbon; to Andrew Murray for your botanist overview of the wetland structure, formation and content; to Dailan Pugh for sharing your detailed research, your passion for wildlife and allowing the use of your diagrams; to Jan Olley from Byron Bird Buddies for collating and sharing your detailed observations on our amazing bird life and threatened species; to Suzie Deyris for your contacts and connections which made such extensive feedback possible; to Barry Ferrier for bringing my vision to the internet to invite open discussion; to Hans Lovejoy and *The Echo* for believing and sharing this positive vision; to Tuppy Lang for your patient and accurate typing and collating which led to the printing of this report; to Simon Richardson for your encouragement and faith that we can do better, to Nyck Jeanes for your interest and probing questions to make one think deeper, to the authors of the many reports that have been quoted and the diagrams used in this text, and to my partner Debby for guiding me through the reality that nobody else sees.

I acknowledge the Arakwal people of the Bundjalung Nation past and present with grateful thanks for the love and caring you give to this land for thousands of years, the present and the future.

I honour these people and the many others who share this vision and make it possible just by believing. Our collective voice comes from the heart and this is powerful beyond measure.



ABOUT THE AUTHOR

JOHN W SPARKS ASTC (Arch) Dip CD, MPIA, CPP, ARAIA, FAPI
Managing Director of John Sparks and Associates (now JSA Architects Pty Ltd)
from 1975

PROFESSIONAL QUALIFICATIONS

- Diploma of Architecture University of NSW
- Chartered Architect NSW
- Post-Graduate Diploma of Civic Design
- Certified Practising Planner NSW

AFFILIATIONS

- Associate of the Royal Australian Institute of Architects
- Corporate Member of the Planning Institute of Australia
- Fellow of the Australian Property Institute
- Former member of the International Federation for Housing and Planning, The Hague, Netherlands
- Member of the Retirement Village Association of NSW
- Representative on former Ku-ring-gai Education Group, assisting the NSW Premier on Educational issues

John is an Architect and Town Planner, with 35 years experience in architectural design, documentation and administration, urban planning, master planning, land use assessment and the design of new and expanded towns. He established his own private practice with responsibility for retail, commercial, industrial, houses, medium density residential, child care centre, clubs, ski lodges, rural subdivisions, motels, taverns, retirement villages, health care, recreational, resort, interior commercial fit-outs, civic and urban planning for government, corporate and private clients, sustainable eco-village master planning and resort projects.

Additionally, John

- was a part-time Lecturer and Tutor, School of Town Planning, University of NSW 1969-77
- Australian delegate to the 30th World Congress of the International Federation for Housing and Planning at Barcelona 1970 and the Congress at Adelaide 1986
- Guest Lecturer at UTS Post Graduate Urban Estates Management course and tutorials 1998-99
- Founding member of the Retirement Village Association, he has published features on design for retirement villages, presented seminars on planning for disabled access and the Master Planning of Retirement Villages for the RAI and Australian Property Institute
- represented the API on the preparation of Standards for accessible purpose made buildings for Standards Australia.

He has initiated and contributed to Mobility maps, Development Control Plans on Access and Mobility and Adaptable Housing, access awards and other issues through involvement in the Willoughby Council Access Committee and the Northern Region Access Forum, as well as contributing to State Environmental Policy and Planning reviews.

Since retiring John has published a Master Plan for the Byron Bay Town Centre, instigated the involvement of Beyond Zero Emissions to the Zero Emissions Byron initiative which seeks to make Byron Shire zero carbon in 10 years, made submissions to Council and authorities on planning issues, prepared concept plans for planning precincts, presented on radio and to community groups, launched a website with Facebook connections, and prepared a Master Plan for West Byron, always based on working with nature to connect us with our priceless natural environment as an integral part of our lives and who we are.

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