NOOSA SHIRE – WATERWAYS ASSESSMENT 2017

AN ASSESSMENT OF NOOSA WATERWAYS TO INFORM THE NOOSA PLAN & REHABILITATION STRATEGIES

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September 2017

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1.0 EXECUTIVE SUMMARY

Noosa's waterways play an important role in protecting biodiversity, providing water for agricultural and domestic use, regulating water quality and quantity, supporting fisheries and providing residents and visitors with a range of recreational opportunities. Noosa waterways are highly valued and significant.

Noosa shire entirely comprises the land areas of the Noosa Biosphere Reserve, making it an area that is globally recognised as having outstanding environmental values, whilst achieving a balanced relationship between humans and the environment.

To date no comprehensive database of waterway type and condition has existed across the whole shire. This has limited the ability to strategically prioritize rehabilitation efforts and provide higher levels of certainty to planning level protection and supporting endeavors, and is the driving motivation for this assessment. This report compiles and aligns geomorphological and ecological information related to the river systems within Noosa Shire.

The waterway systems within the Shire were delineated into 4 separate fluvial geomorphological zones, which follow through from assessment to the recommendations within the report:

- Steep Headwaters
- Partly confined and alluvial dominated valleys
- Paperbark and sedgeland dominated non-riverine wetlands
- Estuarine Areas

A significant number of studies and assessments have previously been undertaken in discrete parts of the shire in relation to waterway and wetland classification and condition assessment. Where possible, such past information and methodologies were incorporated into this study, and a consistent approach was applied to:

- Identifying Steep headwater;
- Identifying and classifying stream reaches throughout the Shire into segments of similar geomorphological and behavioral characteristics, utilizing the Riverstyles TM Framework;
- Assessing condition of stream reaches using Index of Stream Condition assessments and expert panel assessment processes; and,
- Prioritising steep headwaters, stream reaches and wetlands to identify recovery potential.

In the instance of non-riparian and estuarine wetlands, existing and comprehensive datasets and assessment exist however there were clear gaps in our collective knowledge of steep headwaters and partly confined and alluvial dominated valleys – our freshwater creeks and tributaries.

This assessment therefore focused on improving our knowledge of our freshwater creeks and tributaries and understanding the function and characteristics of our steep headwater areas.

After field, expert panel and desk top assessments to garner the necessary condition information had occurred, a prioritisation process was undertaken to rank waterway areas according to their recovery potential.

The philosophy behind prioritising areas for their recovery potential recognises that it is best and most cost-efficient to manage the better quality areas first, as better outcomes can be achieved with limited resourcing available to manage natural resource management issues. Implicit in this philosophy is the reality that some waterway areas, while still possessing some values, may never be able to be restored to an ecologically resilient condition given the landscape scale changes that have occurred both in their local environs but also in the upstream catchment.

A series of recommended activities is presented to both progress our understanding of Noosa's waterways and wetlands and to address key issues identified in the report. It is hopeful that Council and the community can progress these activities in partnership for the betterment of the Noosa Shire environment.

2.0 INTRODUCTION

2.1 PROJECT OBJECTIVES

The purpose of the study is to accurately map and classify waterways and wetlands in the Noosa Shire to inform land-use and environmental planning, and restoration planning.

Desired Outputs:

The investigation and development of:

1. GIS based maps with associated data sets that classify wetlands and waterways according to: stream order/ wetland type; conservation significance; ecosystem service value; and/or fluvial geomorphological character at a reach scale.
2. A report with recommendations as to the appropriate riparian buffer distances and potential planning scheme triggers and environmental planning actions to protect biodiversity and ecosystem service values.

2.2 PREVIOUS STUDIES

During the 1990's the first reports on the riparian condition and values of the Noosa Shire waterways were prepared to support the Noosa Planning Scheme and to support private riparian landholders willing to undertake rehabilitation actions through Landcare and Catchment Management programs.

In the early 2000's the Mary River and then the Noosa River Catchment Management Strategies were prepared following intensive public consultation and community liaison by the Mary River Catchment Coordinating Committee (MRCCC) and the Noosa Integrated Catchment Association (NICA). These strategies form the backbone of actions to improve the condition of the catchments contained in the Noosa Shire. Following the publication of these broad catchment strategies, specific rehabilitation plans were prepared to guide investment in waterway rehabilitation. The first catchment-wide rehabilitation plan to be prepared in Queensland was the Mary River & Tributaries Rehabilitation Plan in 2001. This rehabilitation plan incorporates the Noosa Shire section of the Mary River Catchment in particular Six Mile Creek, and was revised in 2005 to incorporate all major waterways in the catchment (including Noosa Shire waterways). In 2003 following the process to prepare the Mary River & Tributaries Rehabilitation Plan, the Kin Kin Creek Rehabilitation Plan was prepared in consultation with a planning group.

During the development of these rehabilitation plans intensive riparian and in-stream condition assessments were performed and a consistent classification process for waterways to inform these planning documents prepared. In the mid to late 2000's the MRCCC and Noosa & District Landcare Group (NDLG) were collecting riparian and in-stream condition assessments using a technique called 'Index of Stream Condition' (ISC) for

measuring ecological responses of on-ground riparian rehabilitation projects associated with the implementation of these rehabilitation plans.
Significant sections of the Noosa Shire were not incorporated into either these studies and rehabilitation plans. Therefore a consistent approach to riparian condition assessment and classification of waterways across the Noosa Shire is required. This study assists to rectify this issue.

This plan relies heavily on the following previous studies and mapping products:

1. Mary River & Tributaries Rehabilitation Plan, Implementation Edition, 2001 (MRCCC)
2. Kin Kin Creek Rehabilitation Plan, 2003 (EarthTech for DNR)
3. Mary River & Tributaries Rehabilitation Plan, revised edition, 2005 (MRCCC)
4. *Watercourse Lines, derived from Drainage and Features Geodatabase* (2015) Department of Natural Resources and Mines, Landcentre, Brisbane.
5. *Queensland Wetlands Data 4.0.* (2013) Department of Environment and Heritage Protection, Landcentre, Brisbane.

Pinbarren Creek (PIN 1) – Rocky Creek with alluvial pockets with adjoining remnant Lowland Subtropical Rainforests of Australia (EPBC listed Critically Endangered Ecological Community).

2.3 GEOGRAPHIC ASSESSMENT SCOPE

Noosa Shire contains a number of important waterways and wetlands, refer Figure 1 below. Noosa Shire straddles two large catchments in the Noosa River catchment and the Mary River catchment. The Noosa River flows generally south entering Laguna Bay near Noosa Heads, and the Mary River flows generally north entering the Great Sandy Strait near Hervey Bay.

A series of small coastal dunal catchments exist along the coastal fringe and < 1% of the shire is located within the North Maroochy River catchment (Doonan Creek) in the south.

Name	Area (ha)	% of Shire
Noosa Shire	**86,979**	
Kin Kin Catchment	20,550	24
Upper Noosa River	7,866	9
Lake Cootharaba - eastern catchment	2,771	3
Noosa River and Estuary - including Lakes	6,157	7
Noosa River Lake Coorooibah	6,744	8
Noosa River Estuary - Doonella	2,444	3
Lake Weyba	2,625	3
Noosa Catchment	49,157	57
Mary River Catchment: Six Mile Creek Upper Six Mile Creek Skyring Creek Coles Creek Blackfellows Creek Happy Jack Creek	31,571	36
North Maroochy Catchment	611	1
Coolum - Stumers Creek	447	1
Noosa coastal Streams	5,193	6
Coastal Streams	5,640	6

FIGURE 1 – NOOSA SHIRE CATCHMENTS AND AREAS

The Noosa River catchment is mostly contained in the Noosa Shire, with a sizable section of the upper catchment located in the Gympie Regional Council area. The Noosa River is recognised for its good water quality values, regularly scoring an A or A- grade according to water quality report cards developed as part of the Healthy Waterways & Catchments Report Card Program. The upper catchment is extremely important, in particular the unique Everglades which is protected in the Great Sandy National Park and attracts significant scientific and tourism interest. The Noosa River also contains a number of large, shallow natural lakes that provide crucial fish habitat namely, Cootharaba, Cooroibah, Doonella and Weyba. The largest and western-most

tributary of the Noosa River is Kin Kin Creek which displays characteristics similar to its adjoining sub-catchment in the Mary River catchment, Six Mile Creek.

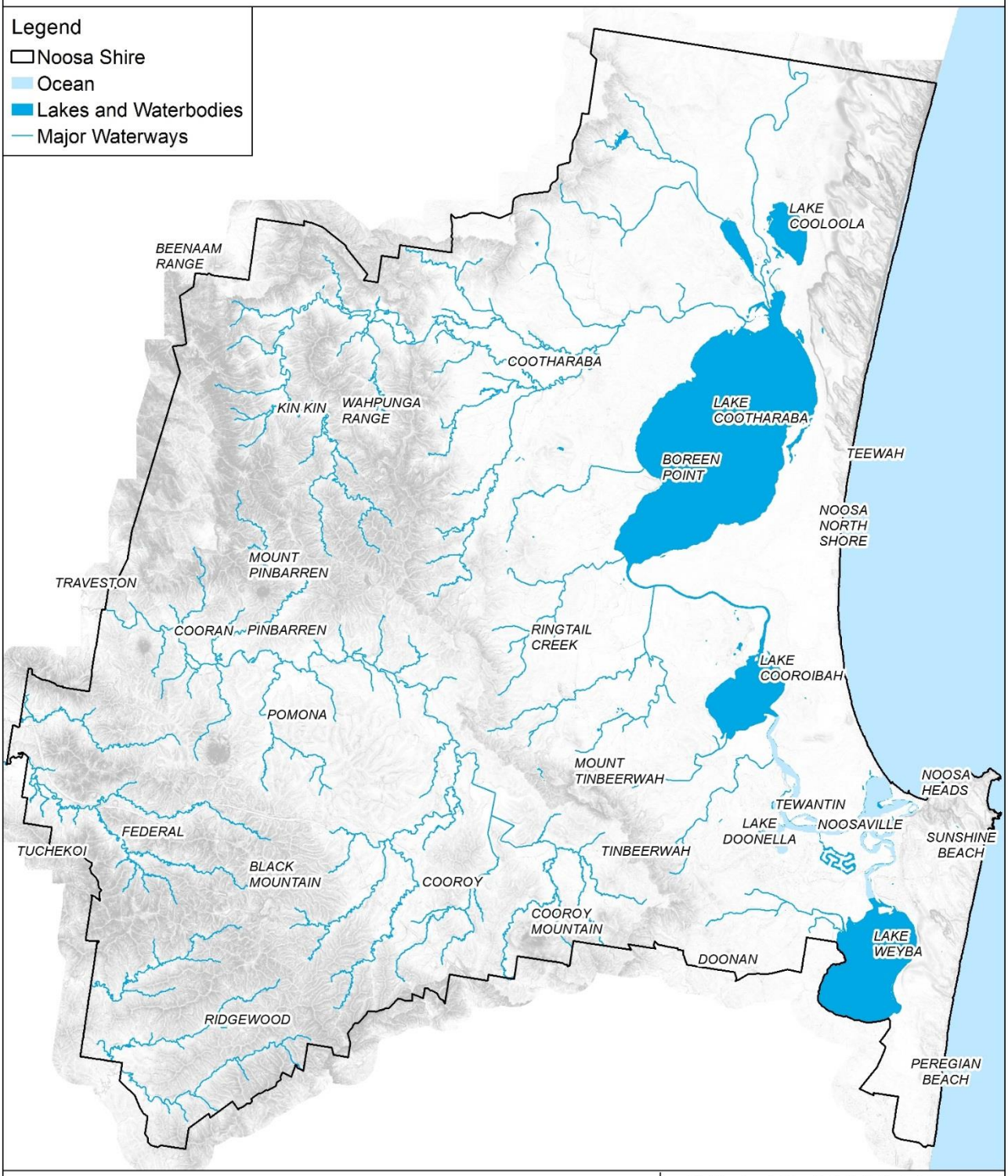
The Mary River catchment is also represented in the Noosa Shire with 36% of the shire located in this catchment. Six Mile Creek, a major tributary of the Mary River catchment, is widely recognised for its biodiversity values and intact riparian zones that provide excellent riparian habitats, and is one of only a few core habitats for the endemic and endangered Mary River Cod remaining. It is estimated that there are only approximately 1000 adult individuals remaining, with approximately 300-400 located in Six Mile Creek. Six Mile Creek is also a major component (40%) of Noosa's water supply with Lake Macdonald located near Cooroy. Six Mile Creek rises in the Noosa Shire and flows north-west, entering the Mary River at Gympie. A number of important tributaries rise in the steep hills near Cooroy and eventually flow into the Mary River, such as Skyring, Blackfellows and Happy Jack Creeks.

Noosa Shire also contains a series of waterways rising behind the main ocean beaches and sand dunes along it's coastal fringe. These waterways generally flow in a south-easterly direction and rise within wallum heathlands in the Noosa National Park before flowing directly into the ocean where located north of the Noosa River mouth. And for those south of the Noosa River mouth, flowing through housing development close to the coast before cutting through the fore dune and entering the Pacific Ocean. Small lakes (called intermittent open-closing lakes) can form where the creek flows into the ocean.

The Upper Noosa River and coastal catchments north of the Noosa River mouth were not assessed within this project because they are contained predominantly within National Park, and is consequently largely outside of the effect of Noosa Council Planning Scheme controls and rehabilitation responsibilities.

Map 1 provides a visual representation of the waterways of the Noosa Shire.

Map 1: Waterways of the Noosa Shire



0 1 2 4 6 8 10 Kilometers

1:125,000 printed A3
GDA 1994 Zone 56
Data Sources: Queensland Government, Healthy Land and Water, Noosa Landcare, Mary River Catchment Coordinating Committee
10 cm Imagery 2016; Noosa LiDAR 2015

Cartographer: S. Mooney, M. Walker, R. Lyons, B. Wedlock
Version: 4 September 2017

3.0 STUDY APPROACH

3.1 DEFINITIONS

The term **'waterway'** within this assessment is the same meaning as 'wetland' and also in accordance with the Queensland Wetlands Program definition describes:

"….. areas of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 metres. To be a wetland the area must have one or more of the following attributes:

- *at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or*
- *the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or*
- *the substratum is not soil and is saturated with water, or covered by water at some time.*

The term **'riparian'** describes:

"….the structural formation and vegetation of the banks of the river at least to the bankfull flood height. It generally includes a further vegetated 'buffer' back from the top of the high bank. The term 'waterway' describes an open permanently or intermittently flowing channel and its boundaries".

The term **'estuarine'** area, includes:
"…wetlands with oceanic water that is at least occasionally diluted with freshwater run-off from the land".

The term '**reach/ waterway management unit'** is used to define discrete management sections of similar geomorphic character, using the Riverstyle TM Framework as depicted in Figure 3. The various names used are determined by referencing Figure 2.

3.2 WATERWAY DELINEATION ANALYSIS

The waterway systems within the Study area have been delineated into 4 separate fluvial geomorphological zones, which follow through from assessment to the recommendations within the report:

- Steep Headwaters
- Partly confined and alluvial dominated valleys
- Paperbark and sedgeland dominated non-riverine wetlands
- Estuarine Areas

Each zone has key fluvial characteristics and risk levels associated with degradation, sediment mobilisation and deposition.

Within this assessment, each zone was assessed initially to ascertain the availability, quality and comprehensiveness of data to deliver the objectives of the study.

The '*Paperbark and Sedgeland Dominated Non-riparian Wetlands Non-riparian Wetlands*' and '*Estuarine Wetlands*' within the Noosa Council area has considerable good quality data suitable for the purposes of the project contained within the Queensland Wetland Program's 'Queensland Wetland Data 4.0'. Consequently it is recommended that information regarding the delineation and values of these areas be sourced directly from the Queensland Government and that this was not to be the focus of the Assessment at this delineation stage.

The distinct exception to this is areas of Non-riparian Wetland that have been cleared of vegetation that are unmapped. This part of the waterway system is not covered in this assessment and requires further study.

Within the study area exists the only declared groundwater reserve in the Great Sandy Groundwater Declaration area which incorporates the upper Noosa River and waterway systems near Rainbow Beach. Groundwater systems, while a critical driver to waterway and wetland flow regimes particularly in the upper Noosa River system, were not directly addressed within this study.

3.2.1 WATERWAY MANAGEMENT UNITS

Waterways can be divided into reaches or for this study called Waterway Management Units (WMU).WMU's provide a spatial reference framework for the study based on fluvial geomorphic principles. WMU's provide a workable breakdown of a waterway based on a suite of homogenous stream characteristics and fluvial geomorphology, generally resulting in WMU's of lengths of several kilometers.

WMU's display similar characteristics such as geology, slope, streamflow rate etc and may generally be expected to change in a similar way following management intervention. Some WMU's may have internal perturbations which slightly differ from the overall classification as some waterways show great heterogeneity over short distances which can make overall classification difficult.

For this study the WMU classification is based on the Riverstyles TM Framework methodology.

A "Riverstyles" type approach (s 1.2, Brierley, 1999) was initially used to divide streams into segments of similar geomorphological and behavioural characteristics. Field inspection to fine-tune these draft style boundaries included assessment of key biophysical factors using the Index of Stream Condition method and the MRCCC riparian condition assessment method with data recorded on a combination of field sheets.

As part of the study, biophysical assessment based on riparian condition focused on:

- Riparian or Streamside zone (i.e. vegetation structure, buffer width, condition including native / exotic cover; natural regeneration).
- Physical Form & Instream habitat (i.e. bed and bank stability; instream habitat; barriers).

Where available the study team utilised existing data from the Mary River & Tributaries Rehabilitation Plan, 2001 & 2005, Kin Kin Creek Rehabilitation Plan, and Index of Stream Condition data from on-ground riparian rehabilitation project sites associated with the implementation of these rehabilitation plans. Where ISC data was not available in the Kin Kin Creek sub-catchment, an expert panel was used to assign biophysical scores, by verifying existing studies and data sources as well as expert knowledge of the local area.

Ground-truthing and Index of Stream Condition assessments were undertaken across a large number of sites as part of this study, mainly within the lower Noosa Catchment and coastal streams where no or limited data existed.

Analysis of this data enabled river styles/segments to be divided into homogeneous reaches while assessing biophysical condition and conservation integrity. The method of scoring and ranking condition is contained in Figure 10.

Insufficient time and resources were available, and accessibility issues existed that disabled our ability to undertake a complete survey of the entire waterways of the catchments.

3.3 WATERWAY MANAGEMENT UNIT ALLOCATION METHOD

Classifying Waterway Management Units according to fluvial geomorphic principles involves identifying the physical characteristics of the waterway. This is a baseline survey of the river character and behaviour. The initial consideration is the valley setting, which examines the floodplain and its key characteristics. In some instances a floodplain does not exist, particularly in the steep headwaters of catchments, and hence has a major influence on the behaviour of the WMU and the sub-catchment. Each WMU is classified according to three valley setting classes as follows:

1. 'Confined Valley' Setting: floodplains absent, with bedrock exerting a major controlling influence on character and behaviour.
2. 'Partly Confined Valley' Setting: bedrock exerts a controlling influence on character and behaviour, with floodplain pockets reflective of valley configuration.
3. 'Alluvial Valley' Setting: floodplains are continuous along valley floor, or at least less than 10% of the waterway abuts the valley margin.

A unique assemblage of channel, geomorphic and floodplain features varies for 'confined', 'partly-confined' and 'alluvial valley' settings, and this forms the basis for river pattern analysis.

River pattern and geomorphic feature analysis are conducted simultaneously. Certain geomorphic features are associated with certain river patterns, such as channel abutment, river planform and floodplain pockets.

The assessment identified 14 river patterns, see Figure 2. The Broader Riverstyles TM Framework is shown in Figure 3.

Valley Setting	*River Pattern*
Confined valley setting	steep headwaters
Confined valley setting	occasional floodplain pockets
Confined valley setting	gorge
Partly confined valley setting	bedrock-controlled discontinuous floodplain
Partly confined valley setting	meandering planform-controlled discontinuous floodplain
Partly confined valley setting,	low sinuosity planform controlled discontinuous floodplain
Alluvial setting	meandering, fine grained sediments
Alluvial setting	low sinuosity sand-bed
Alluvial setting grained	low – moderate sinuosity fine
Alluvial setting	highly sinuous
Alluvial setting	straight-meander-straight section
Alluvial setting	channelised fill
Alluvial setting	chain of ponds
Alluvial setting	ponds

FIGURE 2 - VALLEY SETTING AND RIVER PATTERN ASSESSMENT CATEGORIES

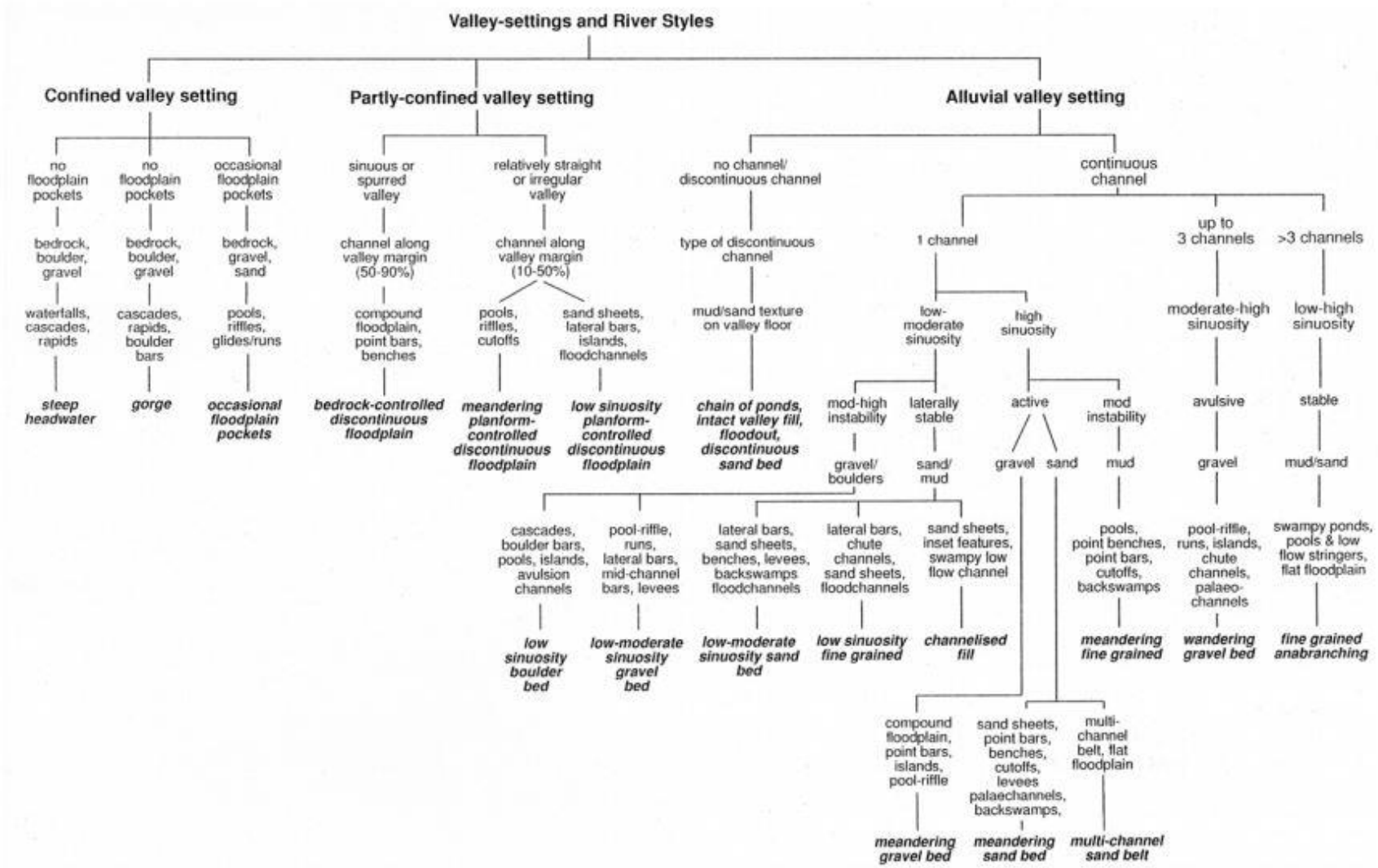
The following sources of information were used in WMU classification:

- Existing literature and fluvial geomorphic studies of the study area
- Aerial photography
- Long profiles of waterways
- Published geological topographic and road maps
- Site inspections

FIGURE 3 - THE RIVERSTYLES TM FRAMEWORK USED WITHIN THIS ASSESSMENT

Reach Naming Tree

Source: "An Introduction to the Riverstyles TM Framework"
Gary Brierley and Kirstie Fryirs



3.4 WMU BIOPHYSICAL VALUES AND CONDITION ASSESSMENT

The condition of each WMU was assessed using a methodology that considered the following factors:

- Fluvial geomorphic features and physical condition (riffles, pools, bank stability etc.)
- Riparian condition (vegetation structure, native plant diversity, weed infestations etc.)
- In-stream habitat condition (features such as log jams, undercut banks etc.)
- Aquatic ecology condition (factors that influence the ecology such as shading over the water etc.)

This assessment is an adaptation from the Index of Stream Condition assessment scoring methodology which is used widely in NSW, Victoria and Tasmania. The methodology was developed by the Victorian Government, and has been used extensively in the Mary River Catchment by the MRCCC for over 15 years. This methodology provides an easy to use assessment of a representative site of the WMU.

The biophysical score of the WMU is based on the assessment of the *physical form* and *the habitat condition* of a site selected within the WMU. Sites used for assessment purposes are those that are considered representative of the WMU. Using aerial photography, a representative site was selected. More than one site can be selected to assess, to gain a clearer picture of the WMU condition. Existing project site information and monitoring and evaluation data has been used to assist with defining the condition of the WMU in some instances.

The assessment uses two main criteria to provide an overall score for the condition of the site chosen. The two criteria are:

1. Physical form; and,
2. Habitat and ecological condition.

Pinbarren Creek (PIN 1) - Bed and Bank Erosion and absence of riparian vegetation.

3.4.1 PHYSICAL FORM

The physical form of a waterway is the structure of the streambed and streambanks. Within the bed and banks are many fluvial morphological features of macro to micro scales such as riffles, pools and sand/ gravel bars, as well as timber (log-jams), rock (bedrock or boulders, cobbles, gravel), leaf packs etc. A number of criteria are assessed to provide an overall physical form score – Refer Figure 4. This score involves determining the condition of each of these parameters, e.g. how much bank erosion has occurred, or is the streambed stable. Other factors are also considered when determining the score, such as altered hydrologic regime which may be impacting on the stream morphology and artificial barriers. Another factor is whether the instream geomorphic diversity is typical of the stream i.e. geomorphic features may be missing due to historical impact/ influences.

Physical form - stream morphology
Bed Stability Bank stability Artificial barriers preventing fish movement **Other factors considered:** Bed Material Character
Instream Geomorphic Diversity
Floodplain Connectivity
Hydrologic Regime/hydraulic influences

FIGURE 4 - PHYSICAL FORM - STREAM MORPHOLOGY CRITERIA

3.4.2 HABITAT AND ECOLOGICAL CONDITION

The habitat and ecological condition assessment is comprised of a suite of factors to determine this score – refer Figure 5. The habitat assessment considers key riparian features that provide habitat to aquatic life e.g. fish, aquatic macro-invertebrates, frogs, turtles. These factors can be broadly determined as 'in-stream habitat' features such as large woody debris abundance (to provide shelter and breeding habitat), bank overhangs (shelter and breeding habitat), shading over the water edge (water temperature), all factors that provide conditions suitable for aquatic life. When assessing the habitat condition, aspects such as degradation is considered, along with bank erosion, smothering of habitats by sand slugs etc.

Streambank & in-stream habitat
Large woody debris abundance
Bank overhangs/ undercuts
Shading over water edge
Other factors considered:
Macrophyte richness
Degradation of key habitat features

FIGURE 5 - STREAMBANK AND IN-STREAM HABITAT CRITERIA

The ecological condition assessment considers key features such as longitudinal continuity of vegetation (i.e. how continuous or unbroken the riparian vegetation is along the stream surveyed), width of the riparian vegetation (i.e. the width of the riparian buffer from the water edge to the floodplain), cover of exotic vegetation (i.e. extent of weed infestations on the stream) and aquatic ecological habitat considerations. Figure 6 identifies the specific criterion used.

Ecological condition of the riparian zone
Longitudinal continuity
Width of riparian zone
Cover of exotic vegetation
Other factors considered:
Vegetation structure and condition
Canopy cover
Land-use influences
Physical attributes

FIGURE 6 - ECOLOGICAL CONDITION CRITERIA

Figure 7 is an example of the Biophysical Condition Assessment undertaken in line with the methodology used within this assessment. Full results of the assessments undertaken for this project are contained in Appendix 3.

FIGURE 7 - BIOPHYSICAL CONDITION ASSESSMENT OF WMU (BLACKFELLOWS CREEK AS AN EXAMPLE)

Tributary	Blackfellows Creek (North)
WMU	BLF3
WMU boundaries	From headwaters near Belli Creek Road to confluence with Blackfellows Creek (south)
Sample Site Location	Bellbird
Date of Assessment	May 2012
Representative Site Name	Bellbird
Position in Catchment	Lower Freshwater (<150m ASL)
Attribute	
Physical Form	
Bed Stability Rating (ISC)	4 out of 4
Artificial Barriers	2 out of 4
Bank Stability	3 out of 4
Habitat & Ecological Condition	
Lowland Habitat Condition	3 out of 4
Longitudinal Continuity	2 out of 4
Width Rating	2 out of 4
Cover of exotic vegetation	3 out of 4
Aquatic Ecology	3 out of 4
total	22 out of 32
Score	69%

3.4.3 EXISTING DATASETS AND EXPERT PANEL

Within Noosa Shire a considerable database of riparian condition assessments exist for waterways which were prepared by NDLG and MRCCC as part of on-ground project monitoring programs implemented over the past 10 years. Generally this data was in the form of ISC compatible scoring and was very valuable to inform this waterway assessment. Where possible this existing data was located and assessed and used to inform the condition of the WMU's. Other studies involving riparian condition assessments were also compiled and reviewed and have been incorporated into this study. An expert panel was formed to review this compiled data for the Kin Kin Catchment in particular, to verify and confirm the assumptions made were representative of the condition within these WMU's.

Expert Panel Assessment utilised the following scoring system (refer Figure 8) in line with previous assessments in Kin Kin catchment.

FIGURE 8 - EXPERT PANEL SCORING SYSTEM

Waterway Attribute	Green Rating Good Condition	Yellow Rating Minor Disturbance	Disturbance	Red Rating Major Disturbance
Confidence Rating				
	Score - 0	Score - 1	Score - 3	Score - 5
Local Reach				
a. Bed Material Character	Character consistent with loction in catchment, stones are clear with no sediment smothering	Partial Sediment veneers or slight reduction in expected bed material character considering position in catchment, geology and topography.	Evidence of moderate disturbance in character as sediments as a result of sedimentation, scouring or stripping.	Evidence of significant overrepresentation of one sediment size, eg dense sediment veneer, or overlarge particle size for positioning catchment.
b. In-Stream geomorphic diversity	Abundant LWD pools, riffles, bank overhangs, rock ledges and tree roots in water consistent with position in catchment.	Minor disturbance of in-stream features eg LWD common but not abundant, reduction in trailing vegetation etc.	Moderate disturbance of features, eg only occasional LWD, tree roots in water, bank overhangs and alteration of stream controls.	Major or complete disturbance, eg channelisation, no LWD present, removal of all vegetation features acting as geomorphic features.
e. Bed Stability	Bed stabilised by abundant LWD, and/or rock, vegetated point bar, riffles etc. consistent with location in catchment, no evident degradation.	Some evidence of minor instability due to factors such as LWD removal, altered hydraulic regime, increased stream power. Patchy scour and fill, but mostly stable features.	Historic Incision and minor current instability, eg sediment deficit or moderate infillin, eg sand slugs. Partly shifting sand/head cuts, unvegetated bars.	instability/lowering evident over long periods of time. Eg low flow channel wandering between banks, riffle migration, large shifts in sand etc.
Sub total A	Sum of two highest scores for condition a-e			
RIPARIAN ZONE				
f. Vegetation Structure and Condition	Native vegetation on verge and bank with intact canopy, mid and lower strat for majority of reach.	Overstory of native vegetation on bank and verge with some disturbance in mid and lower strata for majority of reach.	Riparian vegetation significantly disturbed with removal of whole strata, verge vegetation or significant weed growth.	No native bank or verge vegetation for the majority of the reach with invasion of grasses and/or weeds.
g. Bank Stability	disturbance consistent with natural levels of accretion and deposition.	Occasional to common minor erosion and/or only isolated moderate erosion.	Frequent moderate disturbance - occasional major disturbance.	Frequent Major erosion and or abundant moderate disturbance along reach.
h. Land Use Influences	Largely intact forested sub-catchment with managed access to waterways with minimal or no evidence of impacts on waterways.	Mainly extensive agricultural landuse with reasonable riparian buffers or more intensive land use with good riparian buffers.	Evidence of moderate impacts from poorly managed stock access or poorly buffered intensive land uses.	Major riparian impacts from adjoining land use as a result of active clearing / development or intensive rural activities within zone.
i. Canopy cover	Intact Riparian vegetation provides optimum canopy cover for position in catchment.	Minor loss of canopy cover results in increased lighting/ heating of waterway.	Moderate canopy disturbance significantly disturbs ecosystem values in stream	Almost complete loss of canopy cover leading to major in-stream disturbance.
Sub total B	Sum of two higest scores for criteria f. to i.			
INSTREAM HABITAT				
p. Large Woody Debris Abundance	Abudant large woody debris of size and species reflecting intact conditions	Common large woody debris with evidnce of only minor disturbance to composition.	debris and/or moderate disturbance to the size and species composition.	No large woody debris, through historical removal, riparian clearing removing source etc.
q. Bank Overhang * Bank undercuts	Ample, relatively stable bank overhangs consistent with position in catchment.	Good sections of bank overhang with only minor impacts or threats from changes to vegetation or soil movement.	Only small areas of stable bank overhang, with loss of edge vegetation and active soil movement threatening habitat.	No bank overhang due to removal of binding vegetation, erosion, infilling etc.
Sub total D	Sum of two highest scores for condition n. to q.			
TOTAL Score	Sum of Sub-total A+B+C+D			

3.5 WMU / REACH PRIORITISATION PROCESS

The WMU biophysical prioritisation is based on the classification proposed in the *Australian Manual for Rehabilitating Streams* (Rutherford et al 1999). The process involves setting priorities taking into account:

- Rarity (rare before common)
- Condition (good before bad)
- Trajectory (degrading before recovering)
- Ease of fix (easy before hard)

Condition ratings were used in conjunction with assessments of conservation status to rank WMU's according to their biophysical status.

It was necessary to also determine the localities of conservation significance by compiling:

- Distribution of endangered/vulnerable/rare (EVR) species within aquatic and riparian habitats
- Existing and proposed protected areas
- Endangered and of-concern regional ecosystems (and essential habitat) with riparian linkages
- Valuable features of the riparian area
- Known vegetation remnants of high integrity and/ or corridor linkages

Assessing WMU recovery potential involved considering conservation status, trajectory and recovery target of the WMU using a decision-tree – Refer Figure 10. The biophysical prioritisation process for each WMU is based on the process proposed by Rutherford et al (1999), taking into account suggested categories from Brierley (1999). This method was established in the Mary River catchment in 2001, revised in 2005 and adopted for the Kin Kin Creek Rehabilitation Plan in 2003.

When determining the WMU biophysical prioritization considerations such as ecological trajectory, recovery potential, conservation status and biophysical condition score are compared, to determine the biophysical priority of each WMU.

Condition ratings were used in conjunction with assessments of conservation status to prioritise WMU's according to their biophysical status. WMU with high recovery potential and significant natural values were accorded the highest biophysical priorities.

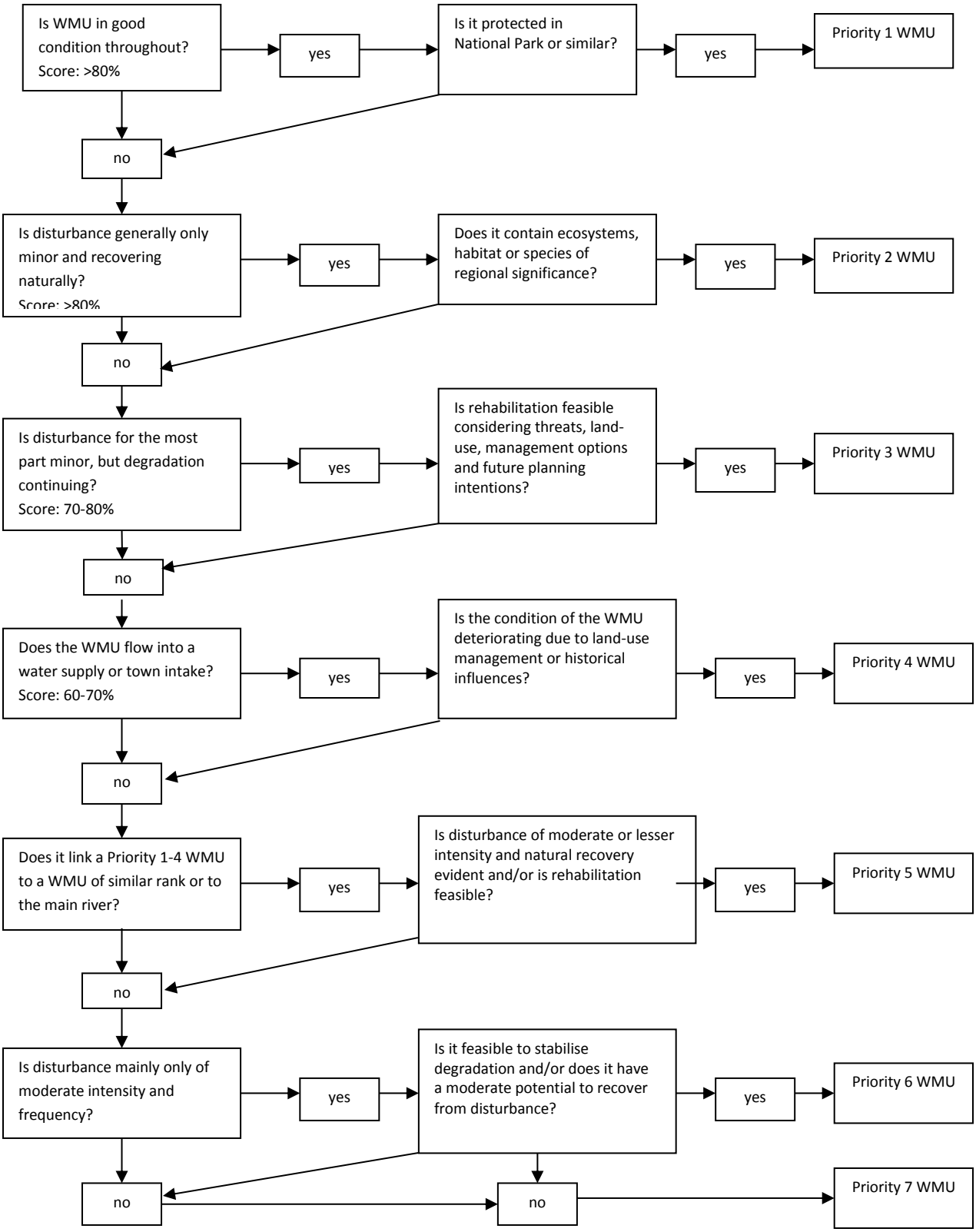
Seven categories have been identified based on conservation status, recovery and trajectory of the WMU. The seven categories are as follows in Figure 9.

FIGURE 9 - PRIORITISATION CATEGORIES FOR WMU'S

Priority	Description
1	Protected (in National Park or like) WMU in good condition throughout – 100 Score
2	Unprotected WMU of regional conservation significance - >80 score or presence of EVNT
3	WMU of local conservation significance - 60 to 80 score (long contiguous sections linking NP)
4	Deteriorating strategic WMU - 60 to 80 score (corridor linkage or water assets; or township above a P2)
5	Linking WMU and significant remnant sections - 40 to 60 score
6	WMU with moderate recovery potential - 40 to 60 score
7	WMU requiring significant investment for rehabilitation - <40 score

Cooloothin Creek (WMU – COT 3) – Laterally Unconfined Valley Riverstyle.

FIGURE 10 - DECISION-TREE & SEVEN BIOPHYSICAL PRIORITY CATEGORIES



3.6 STEEP HEADWATERS ASSESSMENT & PRIORITISATION METHOD

Steep headwaters for the purposes of this study have been identified initially using longitudinal profiles of the waterways to identify key slope and elevation characteristics typical of this landscape unit. These have been mapped through GIS analysis.

Steep headwaters comprise mostly confined drainage lines and waterways that are intermittent in nature and typically of stream order 1-3 water courses. Many waterways in the study area contain WMU's within the upper catchment classified using the Riverstyles TM method as the 'steep headwaters' fluvial unit. Analysis of this WMU classification indicated key slope and elevation characteristics to undertake GIS classification, the specifics of which are included in Section 4.1.

The assessment of steep headwaters for prioritization for remediation was undertaken using datasets related to Ecosystem Function as developed for the 'Mapping Ecosystem Function' study undertaken in Moreton Bay Regional Council area by South East Queensland Catchments in 2011. This approach acknowledges the wider ecosystem services value of steep headwaters.

Areas of high ecosystem function were mapped within the steep headwater zones which are areas of 1 ha or greater with 4 or more 'high' ecosystem function (e.g. Water Regulation, Soil Retention) and / or 14 or more 'overlapping' functions (total of 19 functions mapped). These areas of high ecosystem function support natural assets and natural areas. All other areas were considered lower ecosystem function.

Figure 11 identifies the ecosystem functions used within the prioritisation of steep headwater remediation areas.

Function Categories	Ecosystem Function	Description - ecosystem processes and components (Ecological Complexity)
Regulating Functions Maintenance of essential ecological processes and life support systems.	**(1) Gas regulation**	Relates to the influence of natural and managed systems in relation to biogeochemical processes including greenhouse gases, photo-chemical smog and volatile organic compounds (VOCs).
	(2) Climate regulation	Influence of land cover and biological mediated processes that regenerate atmospheric processes and weather patterns which in turn create the microclimate in which different plants and animals (incl. humans) live and function.
	(3) Disturbance regulation	The capacity of the soil, regolith and vegetation to buffer the effects of wind, water and waves through water and energy storage capacity and surface resistance. The soil profile stores water and reduces runoff. Vegetation enhances infiltration and provides surface resistance. Degraded soils and landscapes have a reduced capacity. Soil properties (e.g. depth, surface texture) and vegetation structure are important.
	(4) Water regulation	The influence of land cover, topography, soils, hydrological conditions in the spatial and temporal distribution of water through atmosphere, soils, aquifers, rivers, lakes and wetlands
	(5) Soil retention	Minimising soil loss through having adequate vegetation cover, root biomass and soil biota.
	(6) Nutrient regulation	The role of ecosystems in the transport, storage and recycling of nutrients.
	(7) Waste treatment and assimilation	The extent to which ecosystems are able to transport, store and recycle certain excesses of organic and inorganic wastes through distribution, assimilation, transport and chemical recomposition.
	(8) Pollination	Pollination is critical to the reproduction of most wild plants and the production of food for consumption by animals and humans. Pollination is the interaction between plants and (1) biotic vectors e.g. insects, birds and mammals and (2) abiotoic vectors e.g. wind and water in the movement of male gametes for plant production. Pollination and seed dispersal are linked.
	(9) Biological control	The interactions within biotic communities that act as restraining forces to control population of potential pests and disease vectors. This function consists of natural and biological control mechanisms.
	(10) Barrier effect of vegetation	Vegetation impedes the movement of airborne substances such as dust and aerosols (including agricultural chemicals and industrial and transport emissions), enhances air mixing and mitigates noise.
Supporting Functions Providing habitat (suitable living space) for wild plant and animal species at local and regional scales. Water, soil, biota, air	**(11) Supporting habitats**	Preservation of natural and semi natural ecosystems as suitable living space for wild biotic communities and individual species. Natural ecosystems are a storehouse of genetic information generated through evolutionary process. This function also includes the provision of suitable breeding, reproduction, nursery and refugia and corridors (connectivity) for species that are harvested or otherwise valued.
	(12) Soil Formation	Soil formation is the facilitation of soil formation processes. Soil formation processes include the chemical weathering of rocks and the transportation and accumulation of inorganic and organic matter.
Provisioning Functions Provision of natural resources.	**(13) Food**	Biomass that sustains living organisms. Material that can be converted to provide energy and nutrition. Mostly initially derived from photosynthesis.
	(14) Raw materials	Biomass that is used for any purpose other than food (excluding mining resources).
	(15) Water supply	The role of ecosystems in providing quality water through sediment trapping, infiltration, dissolution, precipitation and diffusion.
	(16) Genetic resources	Self maintaining diversity of organisms developed over evolutionary time (capable of continuing to change). Measurable at species, molecular and sub molecular levels. These processes are increasingly paralleled by human intervention.
	(17) Provision of shade and shelter	Relates to vegetation that ameliorates extremes in weather and climate at a local landscape scale. Shade or shelter is important for plants, animals and structures.
	(18) Pharmacological resources	Natural materials that are or can be used by organisms to maintain, restore or improve health. (Natural patterns can be copied by humans for synthetic products).
Cultural Functions Providing life fulfilment opportunities and cognitive development through exposure to life processes and natural systems.	**(19) Landscape opportunity**	The inspiration and motivation, traditional owner and other cultural, historical and aesthetic values; health enhancement; sense of place; amenity; recreational, scientific and educational opportunity, provided by the extent and variety of natural features and landscapes.

FIGURE 11 - ECOSYSTEM FUNCTION DESCRIPTIONS USED TO PRIORITISE STEEP HEADWATER REMEDIATION AREAS (SEQC 2011)

4.0 RESULTS- ASSESSMENT AND PRIORITISATION

4.1 STEEP HEADWATERS

Many waterways in the study area contained WMU's within their upper catchment classified as the 'steep headwaters' fluvial geomorphic unit. This classification was particularly common in waterways in the Noosa hinterland such as Kin Kin valley (Wahpunga and Beenham Ranges) and on the Black Mountain / Ridgewood area west of Cooroy.

These ranges share a common geology known as the "Kin Kin Beds" (Rlk geologic unit, Geology of Gympie, Geological Survey of Qld, 1975). The Kin Kin Beds are comprised of phyllitic shale formed during the Early Triassic period (220 million years ago).

In the Kin Kin valley the Kin Kin Beds start north of the Wahpunga Range and extend southward to Mt Pinbarren. The Woondum Tableland (comprised of granite) forms the western limit of the Kin Kin Beds, while the Cootharaba Plain (comprised of younger alluvium) forms the eastern edge of the Kin Kin Beds. . The Kin Kin Beds strongly influence the upper catchment of Kin Kin Creek. In the ranges above Kin Kin Creek are steep slopes comprised of phyllitic shale which are prone to mass failure or landslips during high rainfall events.

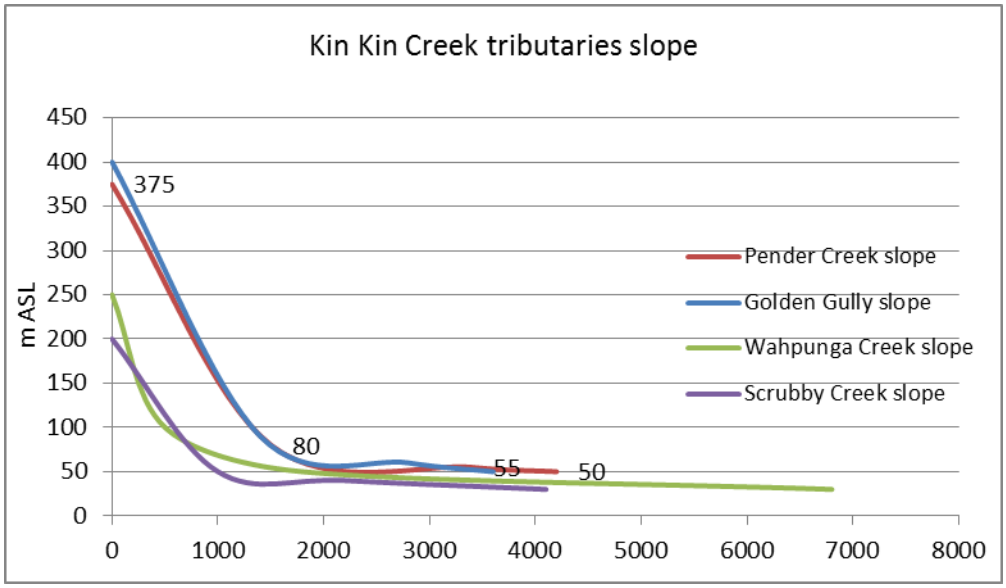
The Kin Kin Beds are overlain by the younger Pomona Beds (comprised of mudstone, sandstone) between Pomona and Cooroy and re-form west of Cooroy near Black Mountain, extending to the Ridgewood district. The sub-catchments of Skyring, Blackfellows and Happy Jack Creeks are all strongly influenced by the Kin Kin Beds, with significant mass failure in the steep slopes above these creeks during high rainfall events.

Analysis of long profiles of the tributaries of Kin Kin Creek (refer Figure 11) demonstrates that the steep headwaters classification consistently occurs at the 80 – 90 meter contour. At the 80 – 90 meter contour the slopes tend to increase in steepness rapidly. Above this 80 – 90 meter contour the mass failures (landslips) have shown to occur in the 2011 and 2013 floods. Therefore it is imperative that the land above the 80 -90 meter contour is managed sensitively with due regard to maintaining deep rooted trees and shrubs to ensure the integrity of this fragile steep headwaters is maintained. When mass failure occurs the debris that flows down the hillside from landslips is discharged into the waterway networks and creeks below, smothering aquatic habitats and fisheries.

During the 1960's the CSIRO undertook an Australia-wide assessment of soils called the "Atlas of Australian Soils" and within this study the scientists broke the landscape into "Landscape Units" using common geology, topography and soils. The Kin Kin – Black Mountain area was grouped into the "Landscape unit" Mf7 and Fu4 which correspond closely with the Kin Kin Beds. The Mf7 and Fu4 units are broadly known as phyllitic shales on

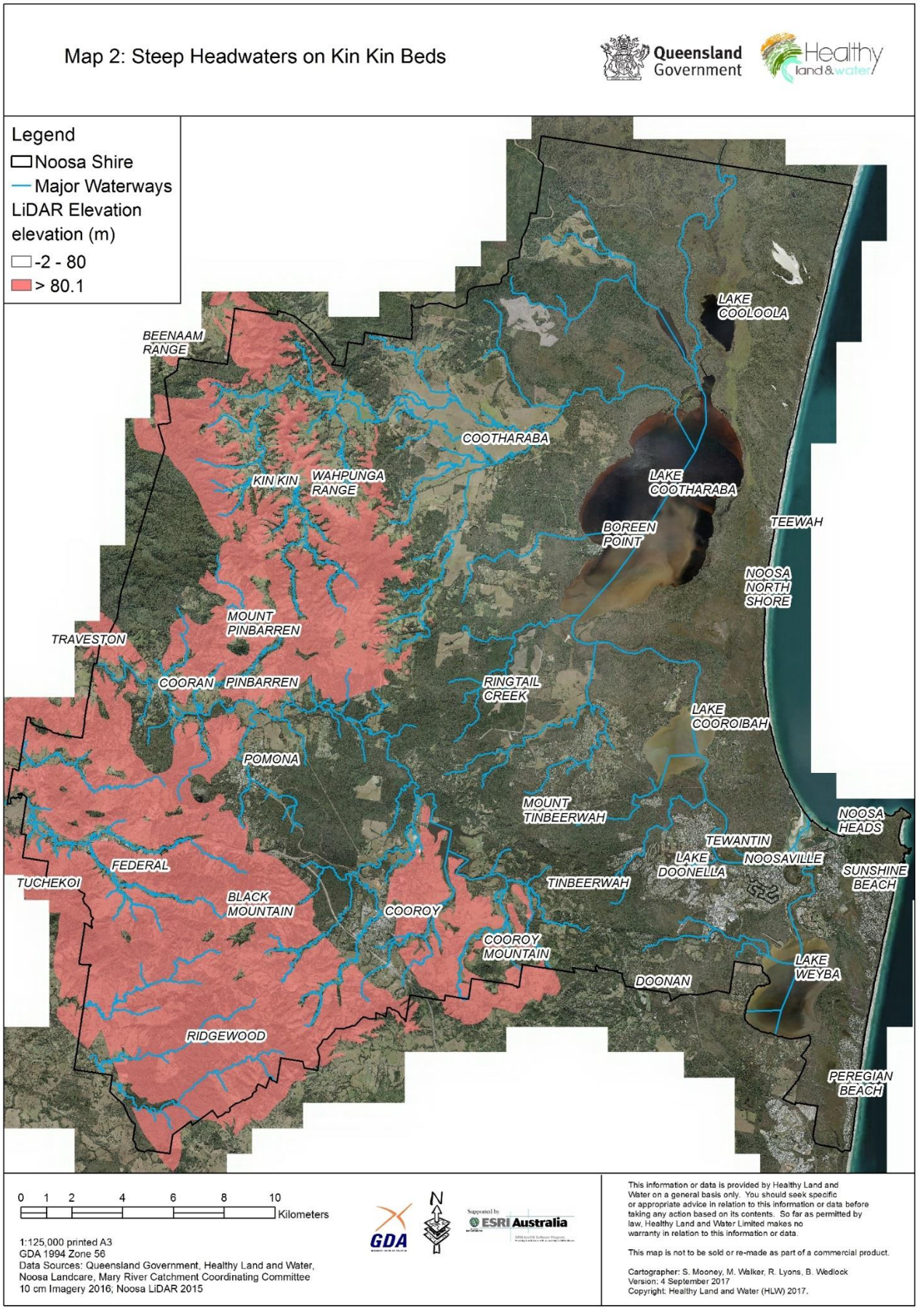
yellow earths. These units were sought after for growing green beans but were notorious for landslips when deep rooted vegetation was cleared on steep slopes.

FIGURE 12 – AN EXAMPLE OF THE LONG PROFILES OF TRIBUTARIES OF KIN KIN CREEK



Map 2 identifies Steep Headwaters for the purposes of the assessment.

For the identification of Steep Headwater remediation priorities and following the method outlined in Section 3.6, Map 3 identifies Steep Headwaters restoration priorities.


Map 2: Steep Headwaters on Kin Kin Beds
Queensland Government
Healthy land & water
Legend
Noosa Shire
Major Waterways
LiDAR Elevation
elevation (m)
-2 - 80
> 80.1
BEENAAM RANGE
LAKE COOLOOLA
COOTHARABA
KIN KIN
WAHPUNGA RANGE
LAKE COOTHARABA
TEEWAH
BOREEN POINT
NOOSA NORTH SHORE
MOUNT PINBARREN
TRAVESTON
COORAN PINBARREN
RINGTAIL CREEK
LAKE COOROIBAH
POMONA
MOUNT TINBEERWAH
NOOSA HEADS
TEWANTIN
NOOSAVILLE
LAKE DOONELLA
SUNSHINE BEACH
FEDERAL
TUCHEKOI
TINBEERWAH
BLACK MOUNTAIN
COOROY
COOROY MOUNTAIN
LAKE WEYBA
DOONAN
RIDGEWOOD
PEREGIAN BEACH
0 1 2 4 6 8 10
Kilometers
1:125,000 printed A3
GDA 1994 Zone 56
Data Sources: Queensland Government, Healthy Land and Water, Noosa Landcare, Mary River Catchment Coordinating Committee
10 cm Imagery 2016; Noosa LiDAR 2015
GDA
N
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Cartographer: S. Mooney, M. Walker, R. Lyons, B. Wedlock
Version: 4 September 2017
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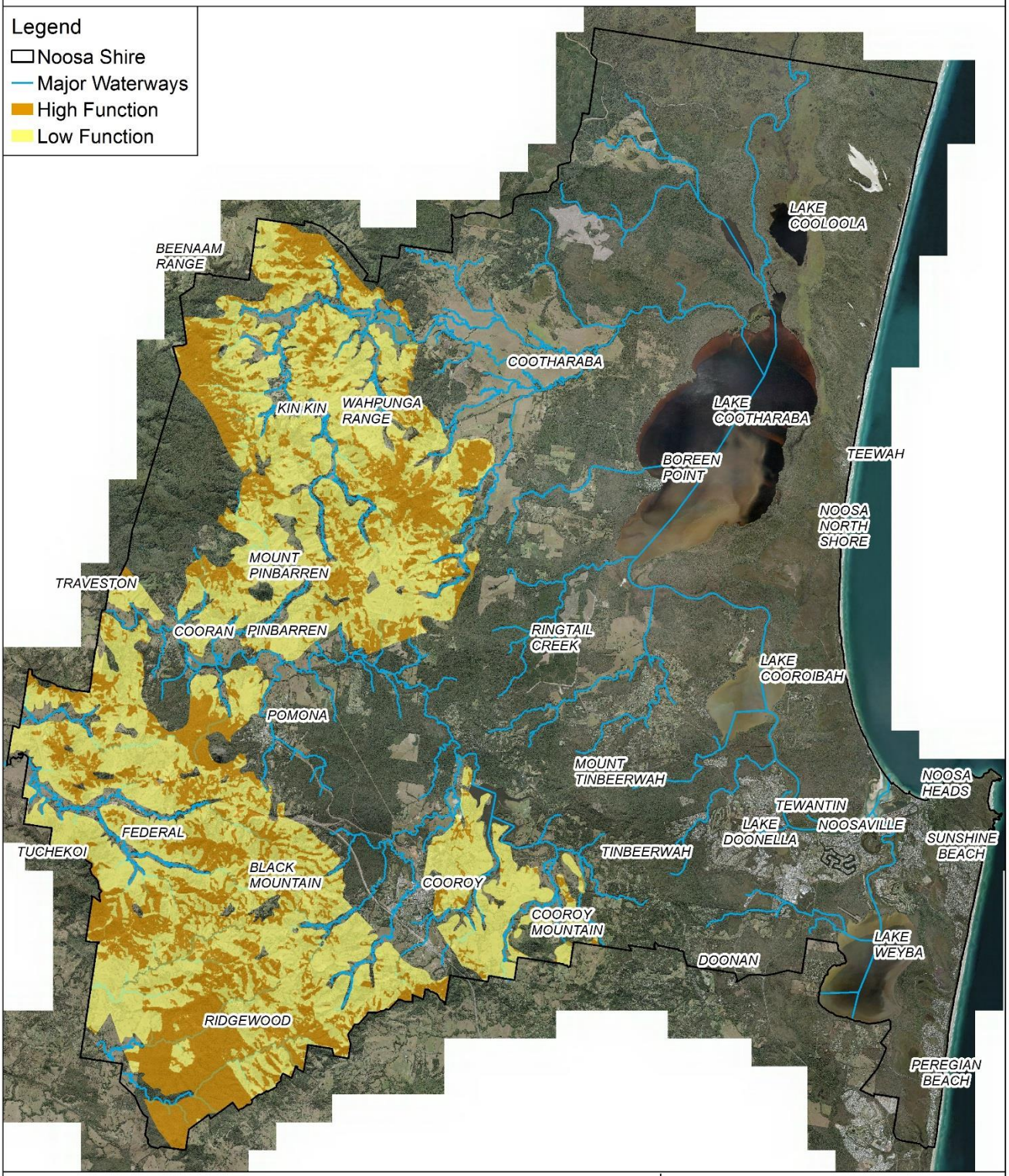
Map 3: Steep Headwaters on Kin Kin Beds
Ecological Restoration Priorities

Queensland Government

Healthy land & water



0 1 2 4 6 8 10 Kilometers

1:125,000 printed A3
GDA 1994 Zone 56
Data Sources: Queensland Government, Healthy Land and Water, Noosa Landcare, Mary River Catchment Coordinating Committee
10 cm Imagery 2016; Noosa LiDAR 2015

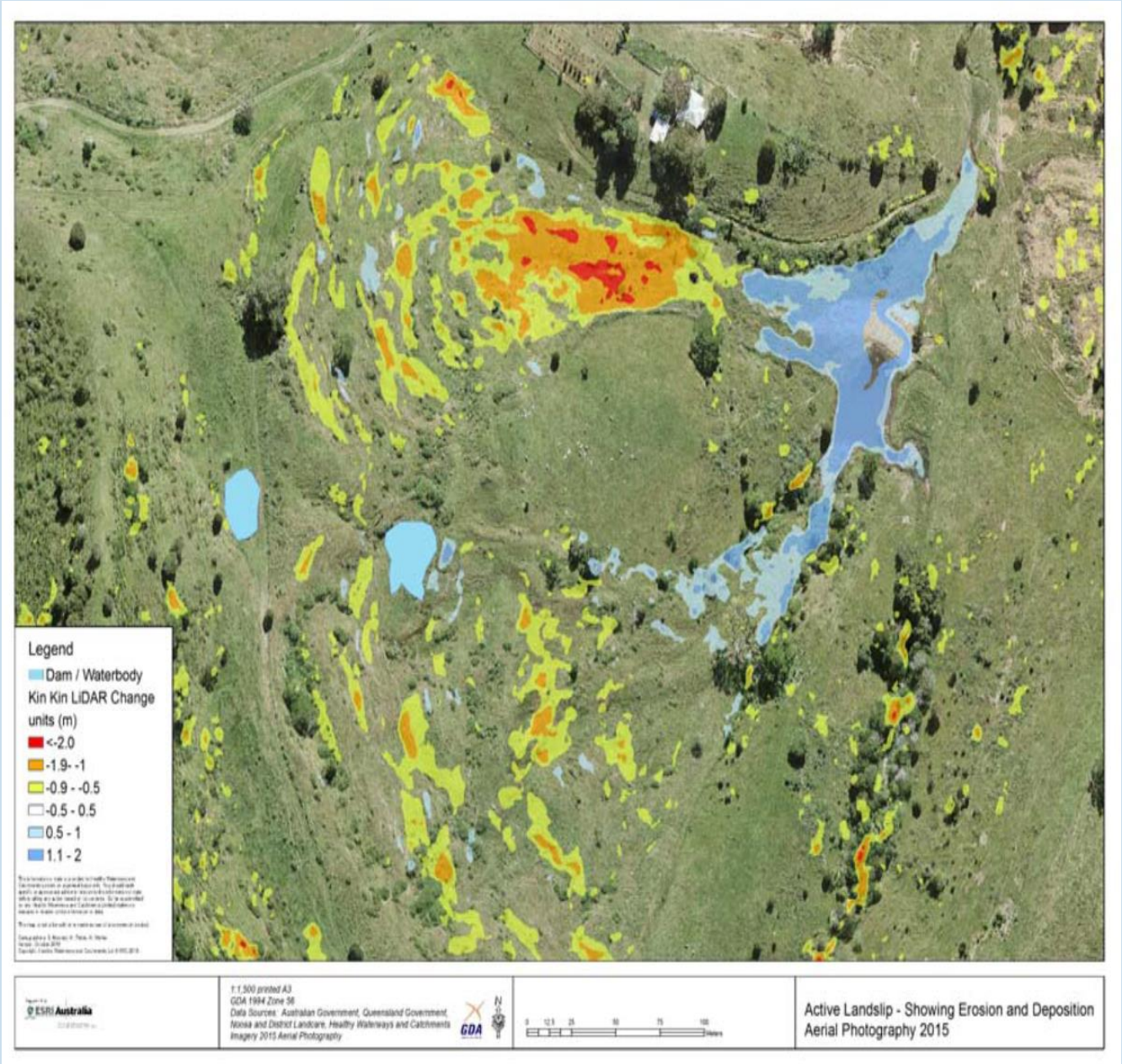
GDA

N

Supported by ESRI Australia

Cartographer: S. Mooney, M. Walker, R. Lyons, B. Wedlock
Version: 4 September 2017

Active Steep Headwaters Land-slip areas within the Sandy Creek Catchment as identified in the 'Keeping it in Kin Kin LIDAR Analysis' (HL&W 2017).



4.2 PARTLY CONFINED AND ALLUVIAL DOMINATED VALLEYS

The River Styles core criteria is the differentiation between three valley settings:

1. Confined valley
2. Partly confined valley
3. Alluvial valleys

Each valley setting has unique associations between geomorphic units, channel planform, bed material texture and river behaviour which allows finer levels of differentiation into waterway management units (Brierley & Fryirs, 2005).

4.2.1 THE MARY AND NOOSA RIVER SYSTEMS

The confined valley setting is dealt with in the "Steep headwaters" section where waterways flow through this steep confined valley setting strongly dictated by bedrock controls contained in mountainous areas.

In partly confined valley settings the bedrock of the valley margin strongly influences the distribution of floodplain pockets. The extent to which the valley extends towards the floodplain dictates the ability of the channel to move laterally (sideways on the valley floor) and determines the channel sinuosity and ultimately the degree to which floodplains occur. To be defined a 'partly confined valley' setting, the channel must flow along the valley margin approximately 50 – 90% of the length of the WMU.

Alluvial valley settings can contain either continuous or discontinuous channels, i.e. chain of ponds / wetland systems or continuous channels i.e. lower Noosa River. The coastal plain of the Noosa River containing the Everglades, Lake Cootharaba (and Cootharaba Plain), Lake Cooroibah (Cooroibah Plain), Tewantin, Lake Weyba are all contained on an 'alluvial valley' setting. In 'alluvial valley' settings less than 10% of the channel abuts the valley margin. An instance where the valley margin abuts the waterway in an 'alluvial valley' setting can be observed at the old river channel of the lower Noosa River upstream of Lions Park.

Broadly, the Noosa River is defined as an 'alluvial valley' setting, being coastal plain, while the waterways of the Mary River catchment are generally 'partly confined valley' settings. Interestingly, the upper to middle reaches of Kin Kin Creek are a 'partly confined valley' setting more closely linked to the Mary River catchment. The lower Kin Kin Creek where it extends onto the Cootharaba Plain becomes an 'alluvial valley' setting akin to the Noosa River.

'Partly confined' and 'alluvial valley' settings have some similar key characteristics with implications for appropriate management of these waterways.

'Partly confined valley' settings progressively transfer sediments downstream, with accumulation and floodplain formation occurring on the inside bend, and significant erosion and sediment removal occurring on the outside bends. Due to catchment clearing and changed hydrologic regimes accelerated erosion of outside bends are a key issue that needs careful attention with management focused on stabilising these areas through retention of

vegetation on the toe of the waterway, riparian revegetation of the entire riparian zone, installation of large woody debris for habitat or bank stabilisation or toe stabilisation techniques.

Road crossings in these 'partly confined valley' settings generally under-estimate the flows observed during flood events and can become outflanked or degrade the waterway through streambed erosion. Fish passage can be a significant problem with accelerated stream flows through single or multi-pipe causeways that are beyond the capacity of native fish to allow passage. Often the streambed slopes are relatively (surprisingly) steep in 'partly confined valley' settings resulting in pools forming above the road crossing and steep slopes on the downstream side, which eventually leads to undermining and loss of the structure. An example is Waterford Creek on Cooroy Mountain Road. Options such as bridges or low-level road crossings should be investigated.

Alluvial valley settings are broad low slope valleys where sediments accumulate on broad floodplains. These floodplains contain backswamps, however flood channels can short-cut these floodplains during flood events and create new channels (avulsions) which can be potentially unstable. This is a natural process of this Riverstyle. Consequently the floodplain can have multiple channels across it which can all become active at different stages of the flood stage, with one or two actively flowing channels when streamflow returns to ambient conditions.

During the field assessment many waterways of the Noosa River floodplain exhibited these multi-channel features. Waterways where this was observed were:

1. Cooroibah Creek
2. Wooroi Creek
3. Eenie Creek

These waterways contained multi-channels which were at various stages of degradation. The Wooroi Creek system in the Heritage Park area appeared to have been a chain-of-ponds paperbark wetland system (or a multi-channel waterway with a system of pools) and has become a channelized fill system. The conversion from chain-of-ponds to a channelized fill system has likely occurred since settlement when the upper catchment was cleared and the hydrologic regime changed with peakier and more destructive flood flows occurring creating the almost continuous channel system that is observed today. Recreating the chain-of-ponds system will be virtually impossible (some of this system can still be observed) and is not likely to be feasible, so management should focus on stabilising the channelized fill system that exists today. Actions should focus on riparian revegetation, weed control and retention / introduction of large woody debris (fallen timber) for bank and bed stabilisation.

Due to the multi-channel nature of these waterways managing storm water flows through the road network can be a difficult task – particularly when multi-channels flow perpendicular to the road network. There is a tendency to try and amalgamate these multi-channels into one central flow point under a road to efficiently pass the low-medium flows (1 – 5 year annual recurrence interval). This generally involves stream realignment involving the channelling of the network of channels into a pool or single point of entry above a culvert of multiple pipes and forcing the flows into a channel downstream of the road culvert. This method causes a suite of issues for the aquatic environment. Fish passage is one major issue as a consequence of increased stream velocity through the culvert creating velocities beyond the capacity of native fish to swim against. Generally the waterway becomes steeper than pre-disturbance conditions which can lead to streambed erosion creating a 'waterfall' on the downstream side of the culvert apron. This prevents fish passage during ambient flows as well

as creating a de-stabilising effect to the culvert structure itself though undermining. Streambed erosion inevitably leads to streambank erosion as the bed of the stream re-compensates for bank stability forming a new angle of repose. Overall there is a general loss of fluvial geomorphic features and habitat diversity required for aquatic life such as fish. An example of this can be observed at Cooroibah Creek on McKinnon Drive. Upstream of McKinnon Drive, the multi-channel Cooroibah Creek flows out of National Park in excellent condition, however below McKinnon Drive the waterway is forced into a newly aligned steep, deep single channel of low geomorphic diversity eventually re-entering the original waterway at Four Ways reserve. The creek also crosses a sewage pipeline which is likely to have compounded the reason for the stream realignment.

Cooroibah Creek (COH3/4), on entry to 4 Ways Reserve – A Multi-channeled creek has been realigned due to road and pipe infrastructure, causing streambed alterations and aquatic habitat condition decline.

The Six Mile Creek floodplain contains a number of intact floodplain wetlands which are extremely valuable, as many of these wetlands have been lost through activities such as draining and cultivation, since settlement.

The Noosa River Plan – Monitoring Report (2010) describes cross sectional monitoring of the Noosa River in seven river channel locations between Lake Cootharaba to Lake Cooroibah over a 10 year period (2000 to 2010). The monitoring showed that the outside bends (right bank) were eroding with deposition occurring on the inside bends (left bank). The report indicates that erosion along these seven cross sections could generally be attributed to natural processes, however two cross sections taken closest to Lake Cootharaba exhibited unnaturally high rates of erosion. This finding tends to indicate that the Noosa River in this location exhibits some characteristics of a partly confined river system although it is located on a broad alluvial plain.

4.1.2 THE OCEAN / COASTAL STREAMS

The ocean streams of Noosa Shire generally commence in a broad circular to tear-dropped shaped alluvial valley facing south-easterly (generally within Noosa National Park) of a discontinuous channel (no distinct channel) containing a swampy wet heathland. Occasionally bodies of open water in a series of wetlands may be observed. These valleys are generally wide with no lateral constrictions, except the sand dune close to the ocean.

South of the Noose River mouth, a channel forms in the mid to lower catchments of these waterways generally near housing developments. The waterway is then forced to cut through the fore dune into a confined valley setting before entering the ocean beach below David Low Way. These waterways generally flow in a south-easterly direction dictated by the prevailing winds from the Pacific Ocean.

A common issue observed was the difficulty passing a broad waterbody into a single culvert point when these waterways became urbanised near housing or road networks (similar issues to that examined above). These waterways are relatively steep in their lower catchment which poses difficulties locating road culverts (particularly on David Low Way), without a significant 'drop-off' that causes fish passage and stream bed erosion issues. A good example is Marcus Creek on David Low Way. Significant weed infestations were observed near urbanisation which additionally degrades the integrity of these waterways.

Marcus Creek at David Low Way (MCS 2) – Single Culvert crossing with significant 'drop-off' causing fish passage restriction and stream bed erosion.

The longitudinal slope profiles of these waterways (Examples contained in Appendix 2) are relatively steep along their entire length.

Figures 13, 14 & 15 contain the results of the WMU's River style assessment and prioritization.

Map 4 provides the coded locations of river reaches identified in Figures 13-15.

Map 5 contains the WMU prioritization spatially.

Appendix 3 contains results from the ISC and Expert Panel scoring in addition to data available from previous studies.

FIGURE 13 - NOOSA CATCHMENT ASSESSMENT RESULTS AND PRIORITISATION

WMU	Tributary	Descriptor	Valley Setting	River Pattern	Easting	Northing	Biophysical condition rating (%)	Ecosystem Recovery Priority
	Cooloothin Creek							
COT1	Cooloothin Creek	Headwaters starts on escarpment near Tewantin National Park, flattens onto freehold land above Louis Bazzo Drive	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	493908	7089561	66	4 - Deteriorating strategic reach
COT2	Cooloothin Creek	Louis Bazzo Drive to McKinnon Drive, in pine plantation	Laterally unconfined valley	Channelised fill	495818	7089300	91	2 - Unprotected reach of regional conservation significance
COT3	Cooloothin Creek	From McKinnon Drive through old township to Noosa River	Laterally unconfined valley	Estuary	497033	7089911	94	2 - Unprotected reach of regional conservation significance
	Ringtail Creek							
RIN1	Ringtail Creek	Starts near Old Tewantin Rd on escarpment to base of escarpment	Confined valley	Escarpment	494200	7083008	81	2 - Unprotected reach of regional conservation significance
RIN2	Ringtail Creek	from base of escarpment to northern boundary of National Park	Confined valley	Steep headwaters	494949	7083420	81	2 - Unprotected reach of regional conservation significance
RIN3	Ringtail Creek	From northern boundary of National Park to McKinnon Drive	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	496055	7084670	81	2 - Unprotected reach of regional conservation significance
RIN4	Ringtail Creek	From McKinnon Drive to Tronson Canal	Laterally unconfined valley	Meandering fine grained	496845	7085412	81	2 - Unprotected reach of regional conservation significance
RIN5	Ringtail Creek	From Tronson Canal to Noosa River	Laterally unconfined valley	Canal	499235	7086759	88	2 - Unprotected reach of regional conservation significance
	Cooroibah Creek							
COH1	Cooroibah Creek	Starts near Mt Tinbeerwah, headwaters contained within Tewantin National Park - escarpment	Confined valley	Steep headwaters	497387	7081664	94	1 - Protected reach in good condition throughout
COH2	Cooroibah Creek	From edge of escarpment to "Forest Drive" (firebreak in NP)	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	498165	7081772	94	1 - Protected reach in good condition throughout
COH3	Cooroibah Creek	From "Forest Drive" to near McKinnon Drive	Laterally unconfined valley	Intact valley fill - waterholes	499778	7082297	94	1 - Protected reach in good condition throughout

COH4	Cooroibah Creek	From near McKinnon Drive to Noosa River	Laterally unconfined valley	Estuary	501184	7082704	94	2 - Unprotected reach of regional conservation significance
	Wooroi Creek							
WOO1	Wooroi Creek	Starts in SF 959 (National Park) to Tewantin Rd off the escarpment	Confined valley	Steep headwaters	499316	7079123	100	1 - Protected reach in good condition throughout
WOO2	Wooroi Creek	From Tewantin Rd through Heritage Park to Golf Course Drive	Laterally unconfined valley	Channelised fill	500587	7080139	75	3 - Reach of local conservation value
WOO3	Wooroi Creek	From Golf Course Drive to near McKinnon Drive	Laterally unconfined valley	Channelised fill	501430	7081082	88	2 - Unprotected reach of regional conservation significance
WOO4	Wooroi Creek	From near McKinnon Drive to Noosa River	Laterally unconfined valley	Estuary	502533	7081957	97	2 - Unprotected reach of regional conservation significance
	Cranks Creek							
CRA1	Cranks Creek	Starts in SF 959 (Tewantin NP) to Beckmans Rd	Confined valley	Steep headwaters	501260	7078702	94	1 - Protected reach in good condition throughout
CRA2	Cranks Creek	From Beckmans Rd to end of Finney Drive	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	502132	7079049	59	4 - Deteriorating strategic reach
CRA3	Cranks Creek	End of Finney Drive (off Burgess Drive)	Laterally unconfined valley	Estuary	502751	7079424	94	2 - Unprotected reach of regional conservation significance
	Eenie Creek							
EEN1	Eenie Creek	Starts near Pacific View Drive through Livistona Park to Livistona Drvie	Confined valley	Steep headwaters	500110	7077692	81	2 - Unprotected reach of regional conservation significance
EEN2	Eenie Creek	From Livistona Drive to upstream of Eumundi - Noosa Road	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	501526	7077133	81	2 - Unprotected reach of regional conservation significance
EEN3	Eenie Creek	From upstream of Eumundi - Noosa Road to Lake Entrance Blvd	Laterally unconfined valley	Channelised fill most likely, possible intact valley fill?	502640	7077418	81	2 - Unprotected reach of regional conservation significance
EEN4	Eenie Creek	From Lake Entrance Blvd with low sinuosity long straights to confluence with Lake Weyba	Laterally unconfined valley	Estuary	503946	7077539	91	2 - Unprotected reach of regional conservation significance
	Keyser Creek							
KEY1	Keyser Creek	Starts in wetlands near Eumarella Road flowing northwards to Lot2 RP160983	Laterally unconfined valley	Channelised fill or intact valley fill	504504	7075579	91	2 - Unprotected reach of regional conservation significance
KEY2	Keyser Creek	Estuary starts on Lot2 RP160983 with low sinuosity long straights to Lake Weyba	Laterally unconfined valley	Estuary	505560	7077267	91	2 - Unprotected reach of regional conservation significance
	Weyba Creek							

WEY1	Weyba Creek	Starts above Annie Drive, with riparian zone and channel almost entirely contained within a reserve that links with Lake Weyba foreshore	Laterally unconfined valley	Channelised fill	506385	7072542	91	1 - Protected reach in good condition throughout
	Murdering Creek	starts above Murdering Ck Rd (& Woodland Dv), along Win Rd, Clarendon Rd (Murdering Ck Park reference site) near confluence with Lake Weyba						
MUR1	Murdering Creek	Starts as a heathland system above Murdering Creek Road in Noosa National Park	Laterally unconfined valley	Heathland wetland	507870	7071868	100	1 - Protected reach in good condition throughout
MUR2	Murdering Creek	From upstream of Murdering Creek Park to Lake Weyba a series of waterholes is present	Laterally unconfined valley	Intact valley fill with waterholes (parts of channellised fill)			100	1 - Protected reach in good condition throughout
	Kin Kin Creek (East)							
KKE1	Kin Kin Creek (East)	Escarpment of Eastern Branch creek	Confined valley	Steep headwaters	489645	7089265	93	2 - Unprotected reach of regional conservation significance
KKE2	Kin Kin Creek (East)	The section of East Kin Kin Creek initiates at the Western foot slopes of the Wahpunga Range south of Kin Kin and joins with West Kin Kin Creek at Kin Kin Junction and becomes Kin Kin Creek. The bed material is dominates by bedrock, gravel and sand.	Confined valley	Occasional floodplain pockets	489651	7090303	7	7 – Reaches requiring significant levels of investment for recovery
	Kin Kin Creek (West)							
KKW1	Kin Kin Creek (West)	Escarpment of Western Branch Creek	Confined valley	Steep headwaters	488185	7088704	66	4 - Deteriorating strategic reach
KKW2	Kin Kin Creek (West)	Reach starts 500m south of Williams Rd to the confluence of eastern Branch	Confined valley	Occasional floodplain pockets	488259	7089960	78	4 - Deteriorating strategic reach
	Kin Kin Creek							
KK1	Kin Kin Creek	This reach commences at the junction of Eastern and Western Branch and flows northwards to finish downstream of the Pender Creek Confluence near Perserverence Rd.	Partly-confined valley	Bedrock controlled discontinuous floodplain	488067	7093143	47	6 - Reach with moderate recovery potential
KK2	Kin Kin Creek	This reach of Kin Kin Creek commences downstream of the confluence of Pender Creek and concludes approx 1km downstream of Whapunga Park / Pinch Point.	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	486495	7096655	75 assessments range from 53% to 75%	5 - Linking reach and significant remnant section

KK3	Kin Kin Creek	Starts below Wahpunga Park to the junction of Noosa River upstream of Kinaba. National Park is at the lower end of this reach with some salt intrusion.	Alluvial valley	meandering fine grained	491441	7098222	69 mixed WMU with NP at downstream end (close to 100%)	4 - Deteriorating strategic reach
	Sister Tree Creek							
ST1	Sister Tree Creek	Escarpment (near Mt Teitsel) of Sister Tree Creek to easement off Cedar Pocket Rd.	Confined valley	Steep headwaters	482943	7099361	no data	no data
ST2	Sister Tree Creek	From Easment off Cedar Pocket Rd to 700m upstream of Sister Tree Creek rd Crossing.	Confined valley	Occasional floodplain pockets	483900	7099268	no data	no data
ST3	Sister Tree Creek	This reach commences 700m upstream of Sister Tree Creek rd where the valley opens up an begins meandering through the floodplain down to the confluence with Kin Kin Creek near Jeremy's Rd.	Alluvial valley	Meandering fine grained	484812	7099203	47	6 - Reach with moderate recovery potential
	Wahpunga Creek							
WAH1	Wahpunga Creek	Escarpment above the Sheppersons Quary site flows north.	Confined valley	Steep headwaters	490265	7093510	46	5 - Linking reach and significant remnant section
WAH2	Wahpunga Creek	Sheppersons Quarry to Sheppersons Park (Noosa Trail intersection)	Confined valley	Occasional floodplain pockets	490137	7094146	47	6 - Reach with moderate recovery potential
WAH3	Wahpunga Creek	Reach from Sheppersons Park to confluence of Kin Kin Creek near Wahpunga Lane.	Partly-confined valley	Bedrock controlled discontinuous floodplain	489886	7095341	46	6 - Reach with moderate recovery potential
	Kinmond Creek							
KIN1	Kinmond Creek	Escarpment of Kidmond Creek on the eastern side of the Wahpunga Range commencing near Simpsons Rd and concluding approximately 500m downstream of commencement of mapped watercourse as the slope reduces.	Confined valley	Steep headwaters	490860	7092450	100	2 - Unprotected reach of regional conservation significance
KIN2	Kinmond Creek	Lower escarpment of Kidmond Creek commencing 500m downstream of the mapped watercourse and concluding 250m west of the end of the Richards Rd road reserve.	Confined valley	steeper occasional floodplain	491320	7092798	59	5 - Linking reach and significant remnant section

KIN3	Kinmond Creek	This reach commences 250m west of the end of the Richards Rd road reserve and concludes 800m upstream of the Kidmond Creek Rd dogleg and un-named road reserve junction	Confined valley	Occasional floodplain pockets	491618	7093243	63	5 - Linking reach and significant remnant section
KIN4	Kinmond Creek	This section of Kidmond Creek breaks out from the Eastern Valley confinelment of the Wahpunga Ranges and flows through floodplain to the confluence with Kin Kin Creek / Sandy Creek. The bed material is dominated by mud.	Alluvial valley	Low sinuosity fine grained	492298	7094324	69	5 - Linking reach and significant remnant section
	Sandy Creek							
SAND1	Sandy Creek	Escarpment of Sandy Creek commences 100m north of Louis Bazzo Drive and concludes 1.3km downstream along the mapped watercourse.	Confined valley	Steep headwaters	492517	7087486	100	2 - Unprotected reach of regional conservation significance
SAND2	Sandy Creek	Reach commences 1.3km downstream from mapped watercourse start and concludes 300m upstream of Cootharaba rd crossing.	Partly-confined valley	Bedrock controlled discontinuous floodplain	493173	7088511	83	2 - Unprotected reach of regional conservation significance
SAND3	Sandy Creek	This section of Sandy Creek commences 300m upstream of Cootharaba Rd crossing meanders through floodplain and concludes 800m east of the end of Hempsall Rd.	Alluvial valley	Meandering sand bed	492907	7090829	44	5 - Linking reach and significant remnant section
SAND4	Sandy Creek	This section of Sandy Creek breaks out of the confinement of the valley and flows through the floodplain ot the confluence with Kinmond/ Kin Kin Creek	Alluvial valley	Low sinuosity fine grained	494174	7093714	24	7 – Reaches requiring significant levels of investment for recovery
	Eulama Creek							
EUL	Eulama Creek	Eulama Creek originates in the northern Wolvi range and drains southeast through a swampy floodplain to the confluence with Kin Kin Creek. The creek is incised into the floodplain alluvium. The bed material is dominated by mud.	Alluvial valley	Low sinuosity fine grained	492378	7100604	72	4 - Deteriorating strategic reach
	Scrubby Creek							
SBB1	Scrubby Creek	Starts on ridgleline of the Simpson Road reserve (Noosa Trail) to Maravista macadamia farm	Confined valley	Steep headwaters	-26.290335°	152.910444°	no data	no data

SBB2	Scrubby Creek	At Maravista the creek flows into a series of farm dams and flows under Kinmond Creek Road	Partly confined valley	Series of farm dams	-26.288504°	152.919856°	no data	no data
SBB3	Scrubby Creek	From Kinmond Creek Road to the confluence with Sandy Creek	Alluvial valley	Low sinuosity fine grained	-26.286964°	152.928594°	47	5 - Linking reach and significant remnant section
	Pender Creek							
PEN1	Pender Creek	Starts on Hills Road reserve in Woondum National Park in steep headwaters to the National Park boundary	Confined valley	Steep headwaters	484321	7095547	100	1 - Protected reach in good condition throughout
PEN2	Pender Creek	From national park boundary to near confluence with South Pender Creek (near intersection with Stratton Road)	Confined valley	Occasional floodplain pockets	484915	7095276	47	4 - Deteriorating strategic reach
PEN3	Pender Creek	From South Pender Creek confluence to Kin Kin Creek	Partly confined valley	Meandering planform-controlled discontinuous floodplain	485788	7095451	47	5 - Linking reach and significant remnant section
	South Pender Creek							
PDS1	South Pender Creek	South Pender Creek starts on the Upper Pinbarren Creek Road ridgeline dropping to Arthur Stubbins Road	Confined valley	Steep headwaters	484760	7093507	no data	no data
PDS2	South Pender Creek	From Arthur Stubbins Road the valley is confined with occasional floodplain pockets along the Pender Creek Road reserve until the confluence with Pender Creek	Confined valley	Occasional floodplain pockets	485117	7094239	69	4 - Deteriorating strategic reach
	Golden Gully							
GOL1	Golden Gully	Golden Gully starts on the ridgeline adjacent to Woondum National Park flowing due east to the start of Golden Gully Road	Confined valley	Steep headwaters	-26.253041°	152.830119°	no data	no data
GOL2	Golden Gully	From the start of Golden Gully Road to near Sister Tree Creek Road	Confined valley	Occasional floodplain pockets	-26.254070°	152.843908°	47	5 - Linking reach and significant remnant section
GOL3	Golden Gully	From above Sister Tree Creek Road to the confluence with Kin Kin Creek	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	-26.254672°	152.856206°	47	5 - Linking reach and significant remnant section
	Banyan Creek							
BAN1	Banyan Creek	Banyan Creek commences below the Cooloola Way in State Forest	Confined valley	Steep headwaters	-26.195652°	152.950274°	100	1 - Protected reach in good condition throughout
BAN2	Banyan Creek	From Bates Road creek crossing through vegetation until downstream of remaining remnant vegetation on Baynan Creek	Partly-confined valley	Wetland - Channelised Fill	-26.214069°	152.958719°	70	4 - Deteriorating strategic reach

BAN3	Banyan Creek	From remnant vegetation the creek flows easterly within an excavated channel to the confluence with Kin Kin Creek	Laterally unconfined valley	Channelised fill	-26.233594°	152.970985°	50	5 - Linking reach and significant remnant section
	Sandy Creek left branch							
SDL1	Sandy Creek left branch	Sandy Creek left branch commences below the ridgeline of Cootharaba Road flowing due east in predominantly cleared country	Confined valley	Steep headwaters	-26.319419°	152.903168°	60	5 - Linking reach and significant remnant section
SDL2	Sandy Creek left branch	no descriptor	Confined valley	Occasional floodplain pockets	-26.319895°	152.913617°	50	6 - Reach with moderate recovery potential
SDL3	Sandy Creek left branch	no descriptor	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	-26.320501°	152.917879°	60	5 - Linking reach and significant remnant section
	Tompkinson Creek							
TOM1	Tompkinson Creek	The headwaters of Tompkinsons Creek starts on the ridgeline of Cootharaba Road flowing due east in the valley	Confined valley	Steep headwaters	-26.311098°	152.906894°	no data	no data
TOM2	Tompkinson Creek	no descriptor	Confined valley	Occasional floodplain pockets	-26.310212°	152.913483°	50	5 - Linking reach and significant remnant section
TOM3	Tompkinson Creek	no descriptor	Partly-confined valley	Low sinuosity fine grained	-26.307838°	152.919292°	70	4 - Deteriorating strategic reach
	Fern Creek							
FC1	Fern Creek	Fern Creek starts below the ridgeline of Simpsons Road reserve dropping towards Kinmond Creek Road	Confined valley	Steep headwaters	-26.293861°	152.910726°	no data	no data
FC2	Fern Creek	From near the Kinmond Creek Road crossing to the confluence with Sandy Creek	Confined valley	Occasional floodplain pockets	-26.300122°	152.919085°	50	5 - Linking reach and significant remnant section

FIGURE 14 - MARY CATCHMENT ASSESSMENT RESULTS AND PRIORITISATION

WMU	Tributary	Descriptor	Valley Setting	River Pattern	Easting	Northing	Biophysical condition rating (%)	Ecosystem Recovery Priority
	Blackfellows Creek (South)							
BLF1	Blackfellows Creek (South)	From Old Ceylon Road to State Forest boundary	Confined valley	Steep Headwaters	487921	7072673	84	3 - Reach of local conservation value
BLF2	Blackfellows Creek (South)	From State Forest boundary to confluence with Blackfellows Creek (North)	Partly-confined valley	Bedrock controlled discontinuous floodplain	484150	7071900	97	1 - Protected reach in good condition throughout
BLF3	Blackfellows Creek (North)	From headwaters near Belli Creek Road to confluence with Blackfellows Creek (south)	Confined valley	Steep Headwaters	485473	7075586	69	4 - Deteriorating strategic reach
BLF4	Blackfellows Creek	From confluence of north/south Blackfellows Creek to confluence with Belli Creek	Partly-confined valley	Bedrock controlled discontinuous floodplain	480100	7071500	72	3 - Reach of local conservation value
	Coles Creek							
COL1	Coles Creek	From Cooroora State Forest to Bruce Highway	Partly-confined valley	Bedrock controlled discontinuous floodplain	481900	7084200	66	3 - Reach of local conservation value
COL2	Coles Creek	From Bruce Highway to Mary River confluence	Alluvial Setting	Meandering fine grained	474300	7084400	56	6 - Reach with moderate recovery potential
	Cooroora Creek							
COO1	Cooroora Creek	From Yurol State Forest to near Hill St	Partly-confined valley	Bedrock controlled discontinuous floodplain	487900	7081000	88	4 - Deteriorating strategic reach
COO2	Cooroora Creek	From near Hill Street to near Mill Street, Pomona	Alluvial Setting	Meandering fine grained	485800	7083400	81	4 - Deteriorating strategic reach
COO3	Cooroora Creek	From Mill Street to confluence with Six Mile Creek	Alluvial Setting	Meandering fine grained	485500	7084250	81	4 - Deteriorating strategic reach
	Cooroy Creek							
COR1	Cooroy Creek	From end of Musavale Road to Wust Road	Confined valley	Occasional floodplain pockets	488490	7072828	75	3 - Reach of local conservation value
COR2	Cooroy Creek	From Wust Road to Cooroy	Alluvial valley	Meandering fine grained	489050	7075500	63	5 - Linking reach and significant remnant section
COR3	Cooroy Creek	From Cooroy to confluence with Six Mile Creek (left branch)	Alluvial valley	Low-moderate sinuosity sandbed or finegrained	490900	7078200	53	6 - Reach with moderate recovery potential
	Happy Jack Creek							

HAP1	Happy Jack Creek	From confluence of two gorges to near Skyring Creek Road	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	480500	7074500	84	3 - Reach of local conservation value
HAP2	Happy Jack Creek	From near Skyring Creek Road to confluence with Mary River	Alluvial valley	Fine grained	477000	7075800	69	5 - Linking reach and significant remnant section
	Middle Creek							
MID1	Middle Creek	From headwaters near Black Mountain Road to Andersons Road	Partly-confined valley	Occasional Floodplain Pockets	486300	7078300	78	3 - Reach of local conservation value
MID2	Middle Creek	From Andersons Road to confluence with Skyring Creek	Partly Confined	Bedrock controlled discontinuous floodplain	481000	7079200	59	5 - Linking reach and significant remnant section
PIN1	Pinbarren Creek	From headwaters to near Binalong Road	Partly-confined valley	Bedrock-controlled discontinuous floodplain	484500	7092500	53	5 - Linking reach and significant remnant section
PIN2	Pinbarren Creek	From Binalong Road to confluence with Six Mile Creek	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	485200	7087500	78	2 - Unprotected reach of regional conservation significance
	Six Mile Creek							
SIX1	Six Mile Creek	Rocky headwater waterways from Cooroy Mt to Lake Macdonald Dam	Alluvial valley	Low-moderate sinuosity fine grained	492020	7076400	72	4 - Deteriorating strategic reach
SIX2	Six Mile Creek	Lake Macdonald spillway to Pomona (downstream of Louis Bazzo Drive)	Alluvial valley	Low-moderate sinuosity fine grained	493025	7082796	88	2 - Unprotected reach of regional conservation significance
SIX3	Six Mile Creek	Downstream of Louis Bazzo Drive to Falls Creek confluence (Cooran)	Alluvial valley	Meandering fine grained	489782	7085856	81	2 - Unprotected reach of regional conservation significance
SIX4	Six Mile Creek	Falls Creek confluence to Woondum Creek confluence	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	479961	7087958	81	2 - Unprotected reach of regional conservation significance
SIX5	Six Mile Creek	Woondum Creek confluence to Mary River confluence (MAR9)	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	474159	7095769	81	4 - Deteriorating strategic reach
	Skyring Creek							
SKY1	Skyring Creek	Skyring Creek Headwaters to Bruce Highway	Confined valley	Occasional floodplain pockets	486000	7080000	72	5 - Linking reach and significant remnant section

SKY2	Skyring Creek	Bruce Highway to Federal Hall	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	483500	7081100	59	6 - Reach with moderate recovery potential
SKY3	Skyring Creek	Federal hall to Mary River confluence	Alluvial valley	Meandering fine grained	479500	7081000	53	6 - Reach with moderate recovery potential
	Dath Henderson Creek							
DHE1	Dath Henderson Creek	Dath Henderson Creek starts above Sunrise Road	Confined valley	Steep headwaters	-26.440742°	152.981591°	31	2 - Unprotected reach of regional conservation significance
DHE2	Dath Henderson Creek	no descriptor	Confined valley	Occasional floodplain pockets	-26.436182°	152.979192°	31	4 - Deteriorating strategic reach
DHE3	Dath Henderson Creek	From upstream of Dath Henderson Road near Tumba Lane to the confluence with Six Mile Creek (upper Lake Macdonald) at Tewantin Cooroy Road	Laterally unconfined valley	Low-moderate sinuosity fine grained	-26.425217°	152.971409°	72	4 - Deteriorating strategic reach
	Waterford Creek							
WAT1	Waterford Creek	Starts below Sunrise Road flowing northward through a confined valley parallel to Solar Road to the Beauty Spot	Confined valley	Steep headwaters	-26.443715°	152.969123°	31	7 – Reaches requiring significant levels of investment for recovery
WAT2	Waterford Creek	Starts at Beauty Spot reserve to confluence with Six Mile Creek downstream of Cooroy Mt Rd	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	-26.430185°	152.961617°	50	5 - Linking reach and significant remnant section
	Six Mile Creek Left Branch							
SXL1	Six Mile Creek Left Branch	Starts below the ridgeline on Lawnville Road and Cooroy Belli Creek Road to near Mary River Road	Confined valley	Occasional floodplain pockets	-26.435730°	152.858514°	72	4 - Deteriorating strategic reach
SXL2	Six Mile Creek Left Branch	From near Mary River Road to near Liane Drive off Lake Macdonald Drive the creek flows north through forested country with low sinuosity to Elm Street bridge where the creek meanders and becomes more sinuous behind Wimmers (ex PGH Brick factory)	Alluvial valley	Low-moderate sinuosity fine grained	-26.413336°	152.895841°	53	5 - Linking reach and significant remnant section
SXL3	Six Mile Creek Left Branch	From near Liane Drive off Lake Macdonald Drive the creek flows through forested country to the confluence with Six Mile Creek in State Forest	Laterally unconfined valley	Low-moderate sinuosity fine grained	-26.382501°	152.922560°	78	3 - Reach of local conservation value
	Frogmouth Creek							

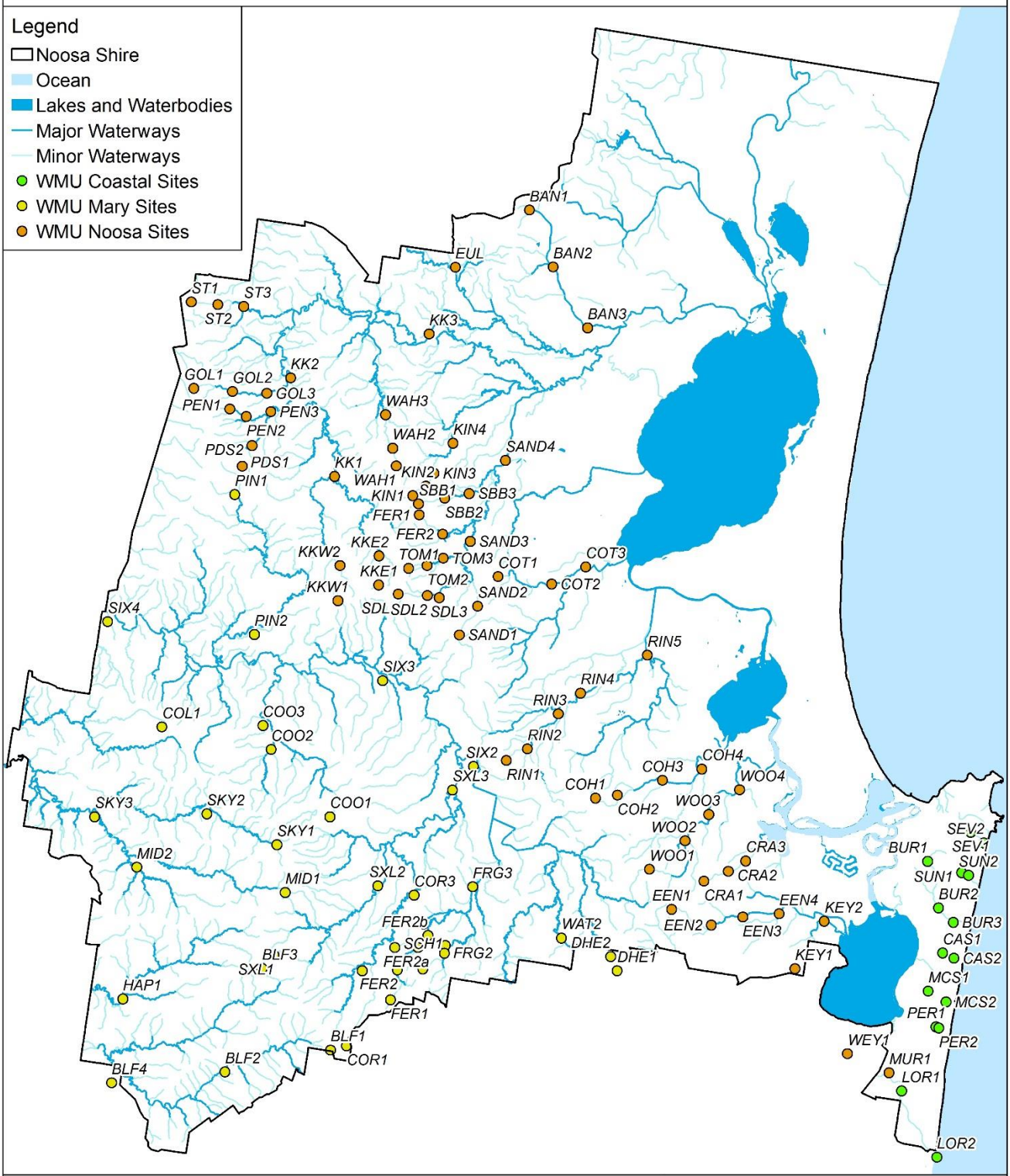
FRG1	Frogmouth Creek	Frogmouth Creek starts on the western side of the Bruce Highway near Holts Road ending on the eastern side of the Bruce Highway near the North Coast railway line on Nandroya Road	Confined valley	Occasional floodplain pockets	-26.440188°	152.911882°	47	6 - Reach with moderate recovery potential
FRG2	Frogmouth Creek	From the North Coast railway line the creek displays a high degree of sinuosity in a partly confined valley setting ending at the Noosa Cooroy Road	Partly-confined valley	Meandering planform-controlled discontinuous floodplain	-26.435034°	152.919659°	47	6 - Reach with moderate recovery potential
FRG3	Frogmouth Creek	From the Noosa Cooroy Road to Lake Macdonald	Alluvial valley	Low-moderate sinuosity fine grained	-26.413725°	152.929791°	56	6 - Reach with moderate recovery potential
	School Creek							
SCH1	School Creek	From above Roberts Road, School Creek flows north-easterly towards the Bruce Highway ending at Noosa District High School	Confined valley	Occasional floodplain pockets	-26.433235°	152.901880°	44	6 - Reach with moderate recovery potential
SCH2	School Creek	From Noosa District High School the creek flows through the Cooroy Golf Course, the North Coast railway line, Miva Street to the confluence with Ferrells Creek	Partly-confined valley	Low sinuosity planform-controlled discontinuous floodplain	-26.425907°	152.912157°	56	6 - Reach with moderate recovery potential
	Ferrells Creek							
FER1	Ferrells Creek	From the end of Ferrells Road to near Tree Frog Lane	Confined valley	Occasional floodplain pockets	-26.450102°	152.900374°	41	6 - Reach with moderate recovery potential
FER2	Ferrells Creek	From near Tree Frog Lane to the Bruce Highway	Laterally unconfined valley	Low-moderate sinuosity fine grained	-26.440449°	152.902826°	56	6 - Reach with moderate recovery potential
FER2a	Ferrells Creek	Above Bruce Highway interchange to Cooroy Golf Course	Confined valley	Stream realignment - channel	-26.433237°	152.910136°	53	6 - Reach with moderate recovery potential
FER2b	Ferrells Creek	From Cooroy Golf Course to confluence with Frogmouth Creek (towards the confluence the valley margin tightens, reflecting a confined valley setting)	Laterally unconfined valley	Low-moderate sinuosity fine grained	-26.429389°	152.913731°	59	6 - Reach with moderate recovery potential

FIGURE 15 - COASTAL CATCHMENTS ASSESSMENT RESULTS AND PRIORITISATION

WMU	Tributary	Descriptor	Valley Setting	River Pattern	Easting	Northing	Biophysical condition rating (%)	Ecosystem Recovery Priority
	Burgess Creek							
BUR1	Burgess Creek	Starts from heathland wetland in Noosa National Park near Cooyar Street	Laterally unconfined	Heathland wetland	509252	7079412	100	1 - Protected reach in good condition throughout
BUR2	Burgess Creek	From upstream of Eenie Creek Road to a series of waterholes in Noosa National Park	Laterally unconfined	Waterholes	509638	7077748	100	1 - Protected reach in good condition throughout
BUR3	Burgess Creek	From boardwalk crossing (Rainbow Park) Burgess Creek near Rainbow Crescent to downstream of David Low Way where the creek enters the Pacific Ocean	Confined valley	Planform controlled by sand-dune	510170	7077232	57	5 - Linking reach and significant remnant section
	Sunrise Creek							
SUN1	Sunrise Creek	Starts above David Low Way in Heathland Park, storm water drain	Confined valley	Drain?	510463	7079005	31	7 – Reaches requiring significant levels of investment for recovery
SUN2	Sunrise Creek	From below David Low Way the creek flows through a confined valley created by sand dunes to the Pacific Ocean on Sunrise Beach	Confined valley	Planform controlled by sand-dune	510705	7078907	72	4 - Deteriorating strategic reach
	Sunshine Creek							
SEV1	Seaview Creek	Starting in the Noosa National Park and entering Dolphin Bay Park, ending at Seaview Terrace	Confined valley	Planform controlled by sand-dune	510786	7080450	75	3 - Reach of local conservation value
SEV2	Seaview Creek	From Seaview Terrace to Sunshine Beach	Confined valley	Drain?	511263	7080069	38	7 – Reaches requiring significant levels of investment for recovery
	Castaways Creek							

CAS1	Castaways Creek	Castaways Creek commences in heathland wetland in the Noosa National Park to near Moonbeam Park (Moonbeam Crescent)	Laterally unconfined	Heathland wetland	509782	7076139	94	1 - Protected reach in good condition throughout
CAS2	Castaways Creek	From near Moonbean Park, crossing David Low Way entering the Pacific Ocean at Marcus Beach Park	Confine valley	Planform controlled by sand-dune	510187	7075949	94	2 - Unprotected reach of regional conservation significance
	Marcus Creek							
MCS1	Marcus Creek	Marcus Creek commences in a broad valley of heathland wetland in Noosa National Park behind the Marcus Beach village	Laterally unconfined	Heathland wetland	509266	7074772	81	1 - Protected reach in good condition throughout
MCS2	Marcus Creek	From near Peppertree Close, changing direction of flow to the north-east upstream of David Low Way where the creek enters the Pacific Ocean at Marcus Beach in a small ICOL	Confined valley	Planform controlled by sand-dune	509903	7074390	81	2 - Unprotected reach of regional conservation significance
Lorikeet Creek								
LOR1	Lorikeet Creek	Starting in the Noosa National Park to David Low Way, Peregian	Laterally unconfined	Heathland wetland	-26.476474°	153.080162°	91	1 - Protected reach in good condition throughout
LOR2	Lorikeet Creek	From David Low Way to Pacific Ocean - channelised fill under DL Way and Lorikeet Dv flowing into paperbark wetland formed by sand dune into confined channel to ocean	Confined valley	Planform controlled by sand-dune	-26.497929°	153.092628°	81	2 - Unprotected reach of regional conservation significance
Peregian Creek								
PER1	Peregian Creek	Commencing in National Park to upstream of David Low Way	Laterally unconfined	Heathland wetland	-26.455909°	153.092591°	72 Weed invasion in lower sections	1 - Protected reach in good condition throughout
PER2	Peregian Creek	From upstream of David Low Way to Pacific Ocean	Confined valley	Planform controlled by sand-dune	-26.459179°	153.096765°	63	4 - Deteriorating strategic reach

Map 3: Coded Locations of River Reaches

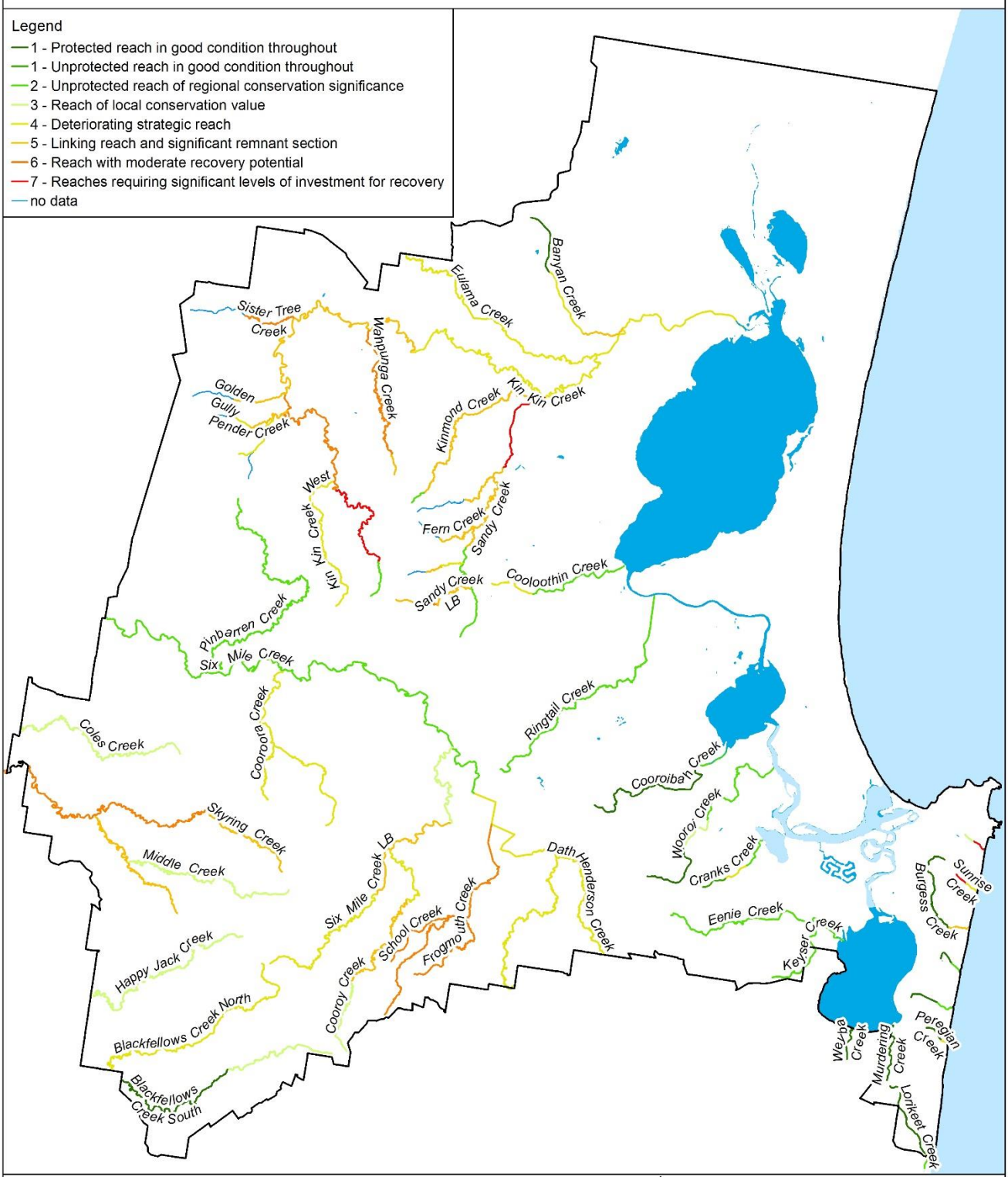


0 1 2 4 6 8 10 Kilometers

1:125,000 printed A3
GDA 1994 Zone 56
Data Sources: Queensland Government, Healthy Land and Water, Noosa Landcare, Mary River Catchment Coordinating Committee
10 cm Imagery 2016; Noosa LiDAR 2015

Cartographer: S. Mooney, M. Walker, R. Lyons, B. Wedlock
Version: 4 September 2017

Map 5: Ecosystem Recovery Priority of River Reaches



Cartographer: S. Mooney, M. Walker, R. Lyons, B. Wedlock
Version: 4 September 2017

4.3 PAPERBARK AND SEDGELAND DOMINATED NON-RIVERINE WETLANDS

Categorisation of non-riverine wetlands for this study directly utilized Wetland Mapping Delineation (Queensland Wetlands Data 4.0) data. The following Regional Ecosystems comprised the specific wetland types included in this category – refer Figure 16.

FIGURE 16 - REGIONAL ECOSYSTEMS CONSIDERED PAPERBARK AND SEDGELAND DOMINATED NON-RIPARIAN WETLANDS WITHIN THIS STUDY

Non-riparian Wetlands		
RE Code	**Short Description**	**Description**
12.2.12	Closed heath on seasonally waterlogged sand plains	Closed or wet heath +/- stunted emergent shrubs/low trees. Characteristic shrubs include Banksia spp. (especially *B. robur*) *Boronia falcifolia, Epacris spp., Baeckea frutescens, Schoenus brevifolius, Leptospermum spp., Hakea actites, Melaleuca thymifolia, M. nodosa, Xanthorrhoea fulva* with *Baloskion spp.* and Sporadanthus spp. in ground layer. Occurs on poorly drained Quaternary coastal dunes and sandplains. Low part of sand mass coastal landscapes where water collects from both overland flow and infiltration from adjoining sand dunes. (BVG1M: 29a)
12.3.13	Closed heathland on seasonally waterlogged alluvial plains usually near coast	Closed or wet heathland. Characteristic species include *Melaleuca thymifolia, Banksia robur, Xanthorrhoea fulva, Hakea actites, Leptospermum spp.* and *Baeckea frutescens.* Occurs on seasonally waterlogged Quaternary alluvial plains along coastal lowlands. (BVG1M: 29a)
12.3.4	*Melaleuca quinquenervia, Eucalyptus robusta* woodland on coastal alluvium	Open forest to woodland of *Melaleuca quinquenervia* and *Eucalyptus robusta.* Occurs fringing drainage lines and on floodplains in coastal areas. (BVG1M: 22a)
12.3.5	*Melaleuca quinquenervia* open forest on coastal alluvium	*Melaleuca quinquenervia* open forest to woodland. Understorey depends upon duration of water logging; sedges and ferns, especially *Blechnum indicum*, in wetter microhabitats and grasses and shrubs in drier microhabitats. Ground layer species include the grasses *Leersia hexandra* and *Imperata cylindrica*, the sedges/rushes, *Baumea rubiginosa, Gahnia sieberiana, Lepironia articulata, Schoenus brevifolius* and *Schoenus scabripes* and the fern *Lygodium microphyllum*. Other tree species that may be present as scattered individuals or clumps include *Lophostemon suaveolens, Eucalyptus robusta, E. tereticornis, E. bancroftii, E. latisinensis, Corymbia intermedia, Melaleuca salicina, Livistona australis, Casuarina glauca, Endiandra sieberi. Melastoma malabathricum subsp. malabathricum, Glochidion sumatranum* and *Melicope elleryana* are often in understorey. Occurs on Quaternary alluvium in coastal areas. (BVG1M: 22a)
12.2.15	*Gahnia sieberiana, Empodisma minus, Gleichenia spp*. closed sedgeland in coastal swamps	Closed sedgeland in coastal swamps and associated water bodies. Characteristic species include *Gahnia sieberiana, Empodisma minus, Gleichenia spp., Blechnum indicum, Lepironia articulata, Baumea spp., Juncus spp*., and *Eleocharis spp*. Occurs on Quaternary coastal dunes and beaches. Low part of coastal landscape where water collects from both overland flow and infiltration from adjoining sand dunes. (BVG1M: 34c)

12.2.7	*Melaleuca quinquenervia* or rarely *M. dealbata* open forest on sand plains	*Melaleuca quinquenervia* or rarely *M. dealbata* open forest. Other species include *Eucalyptus tereticornis, Corymbia intermedia, E. bancroftii, E. latisinensis, E. robusta, Lophostemon suaveolens* and *Livistona decora*. A shrub layer may occur with frequent species including *Melastoma malabathricum subsp. malabathricum* or *Banksia robur*. The ground layer is sparse to dense and comprised of species including the ferns *Pteridium esculentum* and *Blechnum indicum* the sedges *Schoenus brevifolius, Baloskion tetraphyllum subsp. meiostachyum, Baumea rubiginosa* and *Gahnia sieberiana* and the grass *Imperata cylindrica*. Occurs on Quaternary coastal dunes and seasonally waterlogged sandplains usually fringing drainage system behind beach ridge plains or on old dunes, swales and sandy coastal creek levees. (BVG1M: 22a)
12.3.13	Closed heathland on seasonally waterlogged alluvial plains usually near coast	Closed or wet heathland. Characteristic species include *Melaleuca thymifolia, Banksia robur, Xanthorrhoea fulva, Hakea actites, Leptospermum spp*. and *Baeckea frutescens*. Occurs on seasonally waterlogged Quaternary alluvial plains along coastal lowlands. (BVG1M: 29a)
12.9-10.22	Closed sedgeland/shrubland on sedimentary rocks. Generally coastal	Closed sedgeland to heathland with emergent trees. Characteristic species include *Schoenus brevifolius* and/or *Baumea juncea* and/or *Banksia robur* and/or *Melaleuca nodosa*. Sometimes grading into Banksia aemula woodland on rises. Usually occurs on lower slopes subject to periodic water logging on Cainozoic and Mesozoic sediments. (BVG1M: 34f)
12.3.6	*Melaleuca quinquenervia +/- Eucalyptus tereticornis, Lophostemon suaveolens, Corymbia intermedia* open forest on coastal alluvial plains	*Melaleuca quinquenervia +/- Eucalyptus tereticornis, Lophostemon suaveolens, Corymbia intermedia* open forest to woodland with a grassy ground layer dominated by species such as *Imperata cylindrica. Eucalyptus tereticornis* may be present as an emergent layer. *Eucalyptus seeana* may also occur in this regional ecosystem to the south and east of Brisbane. Occurs on Quaternary floodplains and fringing drainage lines in coastal areas. (BVG1M: 22a)

After analysis of the available data, and with consideration of the timeframes and scale of this assessment, it was deemed most appropriate to adopt as the best available data, the *Queensland Wetland Program's Aquabamm methodology* and *Aquatic Conservation Assessment (ACA)* scores for ecological value prioritization of Paperbark and Sedgeland Dominated Non-riverine Wetlands.

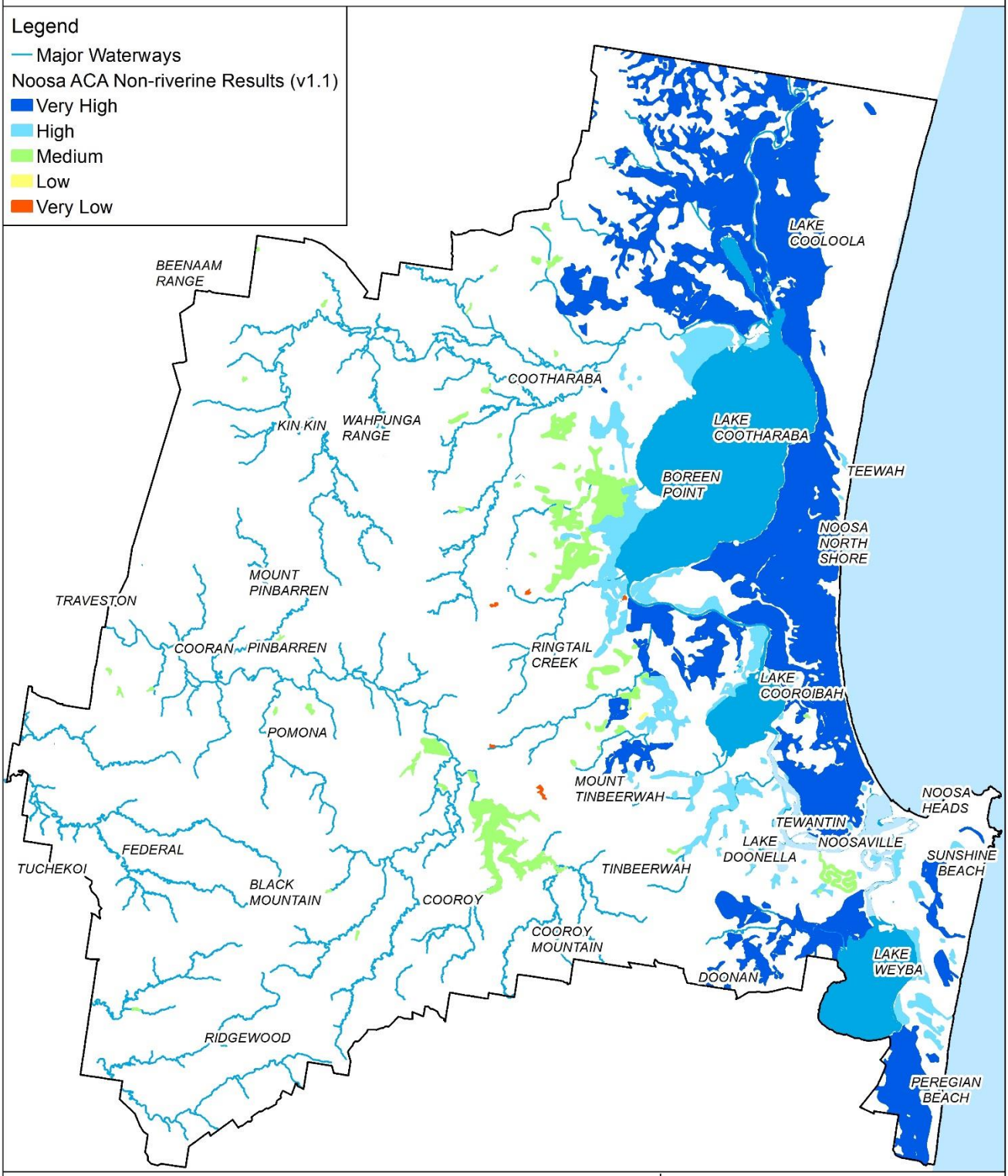
The criteria used for the non-riverine ACA assessment includes (Clayton 2006):
Criterion 1 - Naturalness Aquatic
Criterion 2 - Naturalness Catchment
Criterion 3 - Diversity & Richness
Criterion 4 - Threatened Species & Ecosystems
Criterion 5 - Priority Species & Ecosystems
Criterion 6 - Special Features
Criterion 7 – Connectivity
Criterion 8 – Representativeness

The ACA scores for Paperbark and Sedgeland Dominated Non-riverine Wetlands within the Noosa Shire are displayed in Map 6.

Map 6: Aquatic Conservation Assessment
Non-riverine Wetlands

Queensland Government

Healthy land & water



0 1 2 4 6 8 10 Kilometers

1:125,000 printed A3
GDA 1994 Zone 56
Data Sources: Queensland Government, Healthy Land and Water, Noosa Landcare, Mary River Catchment Coordinating Committee
10 cm Imagery 2016; Noosa LiDAR 2015

GDA

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Version: 4 September 2017

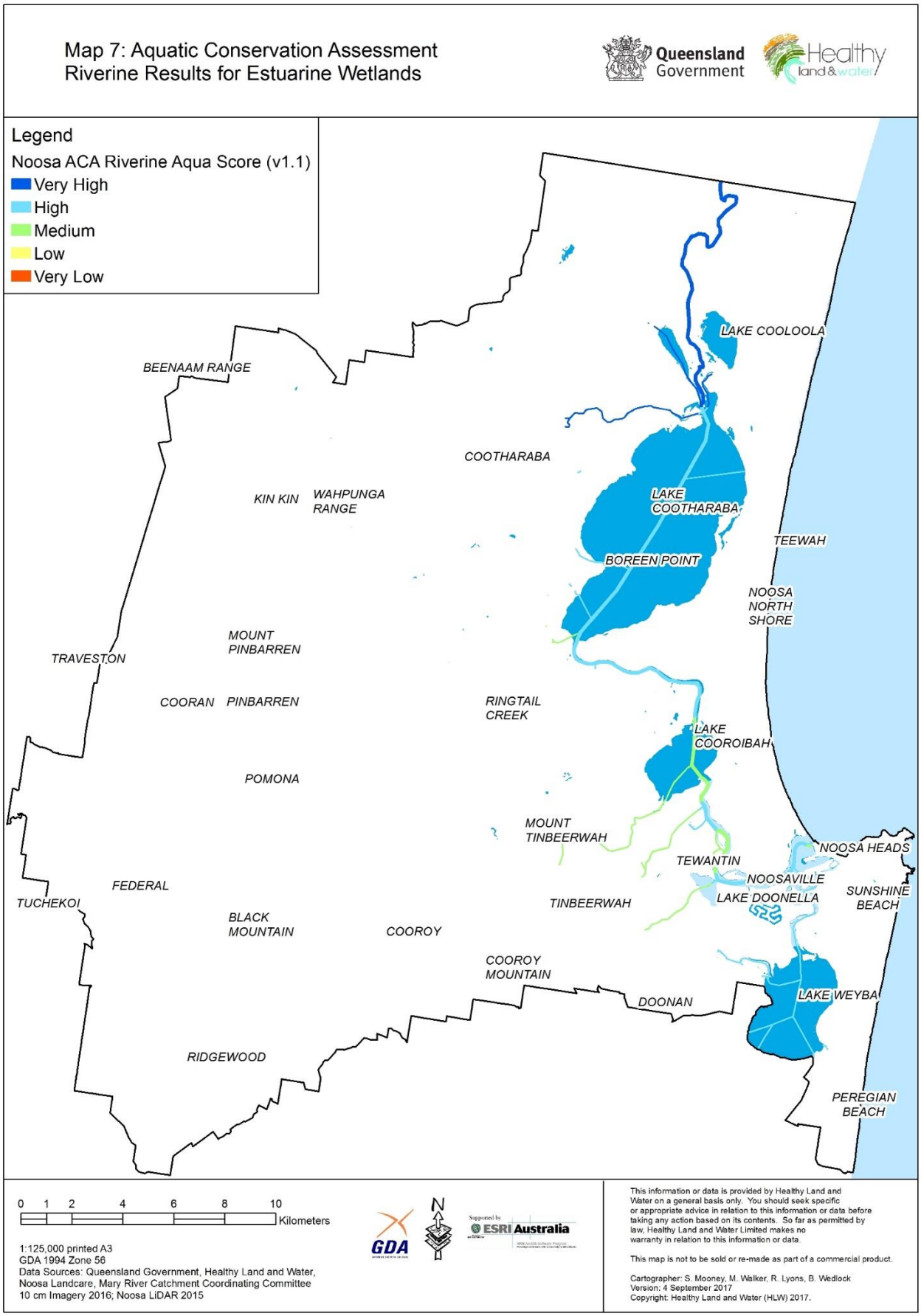
4.4 ESTUARINE AREAS

Similarly to Non-riparian wetlands, categorisation of estuarine wetlands for this study directly utilized Wetland Mapping Delineation (Queensland Wetlands Data 4.0) data.

After analysis of the available data, and with consideration of the timeframes and scale of this assessment, it was deemed most appropriate to adopt as the best available data, the *Queensland Wetland Program's Aquabamm methodology* and *Aquatic Conservation Assessment (ACA)* scores for ecological value prioritization of Estuarine Wetlands.

The criteria used for the riparian and estuarine ACA assessment includes (Clayton 2006):
Criterion 1 - Naturalness Aquatic
Criterion 2 - Naturalness Catchment
Criterion 3 - Diversity & Richness
Criterion 4 - Threatened Species & Ecosystems
Criterion 5 - Priority Species & Ecosystems
Criterion 6 - Special Features
Criterion 7 – Connectivity
Criterion 8 – Representativeness

The ACA scores for Estuarine Wetlands within the Noosa Shire are displayed in Map 7.


Map 7: Aquatic Conservation Assessment
Riverine Results for Estuarine Wetlands
Queensland Government
Healthy land & water
Legend
Noosa ACA Riverine Aqua Score (v1.1)
Very High
High
Medium
Low
Very Low
LAKE COOLOOLA
BEENAAM RANGE
COOTHARABA
KIN KIN
WAHPUNGA RANGE
LAKE COOTHARABA
TEEWAH
BOREEN POINT
NOOSA NORTH SHORE
MOUNT PINBARREN
TRAVESTON
COORAN
PINBARREN
RINGTAIL CREEK
LAKE COOROIBAH
POMONA
MOUNT TINBEERWAH
NOOSA HEADS
TEWANTIN
NOOSAVILLE
LAKE DOONELLA
SUNSHINE BEACH
FEDERAL
TUCHEKOI
BLACK MOUNTAIN
TINBEERWAH
COOROY
COOROY MOUNTAIN
DOONAN
LAKE WEYBA
RIDGEWOOD
PEREGIAN BEACH
0 1 2 4 6 8 10
Kilometers
N
GDA
Supported by ESRI Australia
1:125,000 printed A3
GDA 1994 Zone 56
Data Sources: Queensland Government, Healthy Land and Water, Noosa Landcare, Mary River Catchment Coordinating Committee
10 cm Imagery 2016; Noosa LiDAR 2015
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5.0 PLANNING SCHEME RECOMMENDATIONS

To follow are recommendations for consideration in the Noosa Plan

5.1 STEEP HEADWATERS

Steep Headwaters require holistic land zone management in addition to focused management of discrete drainage lines.

Historical clearing within the headwater areas of the Noosa Shire has resulted in mass movement through slips and slumps of the fragile Kin Kin Bed geology. Slips and slumps and the movement of soil downslope into riparian areas has impacted both riparian function and water quality of the various catchments.

Consequently, the following recommendations for the treatment of steep headwater areas are proposed for consideration during the drafting of the Noosa Plan review:

1) Inclusion of prohibition of vegetation clearing (including regrowth) within steep headwater zones. Deep rooted vegetation is necessary to assist in the stabilization of the phyllitic shale geology.
2) Stronger regulation and assessment of impact of cut and fill operational works due to high erosion / slip risk.
3) Stronger regulation and assessment of any development works which alters and concentrates surface storm water runoff.
4) Consideration of planning scheme measures to recommend sustainable livestock stocking rates based on local grazing land type booklets, particularly intensive agriculture, within steep headwater areas so to facilitate the greatest likelihood of retention of pasture cover at all times of year.
5) Provisions to encourage native regrowth retention including options for small scale native forestry ventures as an alternate and /or complementary property agricultural production system.
6) Provisions to facilitate and identify steep headwater areas as receiving sites for water quality, biodiversity, vegetation and carbon offsets.
7) Greater design consideration for road realignment and creation, particularly in relation to storm water channeling and runoff.

5.2 PARTLY CONFINED AND ALLUVIAL DOMINATED VALLEYS WMU'S

Water courses deemed 'partly confined' and 'alluvial valley' MWU's' meander through the landscape and can remain in high ecological function where local and adjoining threats and impacts are managed. To this extent,

the retention and installation of riparian buffers is the most appropriate Planning Scheme action that can be used to protect the integrity of waterways preserve or improve water quality.

Riparian buffers provide a wide variety of ecological benefits to waterways ranging from temperature mitigation of surface waters to riverbank stability.

The Noosa Shire contains core habitat for the endangered Mary River Cod which requires a specific water temperature signal to trigger spawning in spring. This temperature signal has evolved over millions of years when the waterways were consistently shaded by riparian vegetation and water temperatures well regulated. As a consequence of riparian vegetation loss since European settlement, the important shading effect and water temperature regulation has changed and the signal may not occur in many years anymore. In the past the riparian shading ensured that the water temperatures in winter dropped to below 15 degrees (12 degrees is optimal) and in early Spring the water temperatures would rise above 15 degrees (to 18-19 degrees) – this temperature rise from below 15 degrees would trigger spawning. However due to loss of riparian vegetation water temperatures are not able to drop to below 15 degrees, therefore the temperature signal for spawning cannot occur leading to less recruitment of Mary River Cod into waterways. This is one reason the Mary River Cod is listed as an endangered species. Many native fish species behave in a similar way.

Programs such as the Mary River Cod recovery program and the Noosa Biosphere 'Bring back the fish' require good fish species diversity and importantly good populations of stream invertebrates that provide the backbone of the fisheries ecosystem.

A wetland buffer performs two clear roles and the buffer distance ideal for each role is best identified separately. These roles are to:

- Maintain and support the values located within the waterway/wetland; and,
- Protect the values of a waterway/wetland from both external and negative impacts.

Buffer distances recommended in literature vary widely and are largely dependent upon specific and localized geology, river styles and current and historical surrounding land use. The most summised version of waterway buffer distance is contained in Figure 17 taken from Bavens (2000).

FIGURE 17 - SUBSET OF BUFFER DISTANCED BY FUNCTION - ADAPTED FROM BAVENS (2000)

Buffer Function	Min. Buffer width range required for function (m)
Protection of fisheries species diversity and distribution: • Continuous lines of vegetation • Connectivity between marine and FW areas • Migration pathways	5-106
Protection of ecological buffer • Bank/ bordering / floodplain/ tidal vegetation • LWD (structure, carbon cycling) • Productivity inputs (leaf litter etc.)	5-100
Filtration of nutrients/pesticides/heavy metals • Sediment bound • Soluble • Spray drift	 9-61 5-262 40-300
Water quality • Sediment filter / control • Stormwater run-off filter/control • Provision of shading effects	 30-90 30-90 15-30
Stabilisation of bank erosion	5-125
Pedestrian access to fisheries resources	5-10
Provision of other wildlife habitat • Wildlife corridors • Protection of remnant vegetation	 15-45 5-100
Water Temperature Moderation	15-20
https://www.daf.qld.gov.au/__data/assets/pdf_file/0009/69786/FHG003-Fish-Habitat-Guideline.pdf	

Consideration also needs to include the vegetation type relative to the buffer function desired. As outlined in Figure 18 below taken from Bavens (2000), grass vegetation performs higher than tree vegetation for sediment and nutrient buffering, and tree vegetation performs better in the stablisation of banks and in-stream biological habitat.

Community Planting in Kin Kin to increase buffer width of Kin Kin Creek (KK 1)

FIGURE 18 – VEGETATION TYPE EFFECTIVENESS FOR BUFFER FUNCTIONS (BAVENS 2000)

	Vegetation Type		
Benefit	**Grass**	**Shrub**	**Tree**
Stabilisation of bank erosion	L	H	H
Sediment filter	H	L	L
Filtration of nutrients/pesticides			
Sediment bound	H	L	L
Soluble	M	L	M
Spray drift	L	H	M/H
Enhancement of aquatic habitat			
Water temperature moderation	L	M	H
Stormwater run-off filter	H	L	L
Flood protection	L	M	H
Aesthetics and visual diversity	L	M	H
Economic benefits	M	L	M
Provision of wildlife habitat			
Range/pasture wildlife	H	M	L
Forest/woodland wildlife	L	M	H

Relative effectiveness levels: L= Low; M= Medium; H= High

Additionally, road crossings in these valley settings generally under-estimate the flows observed during flood events and can become outflanked or degrade the waterway through streambed erosion. Fish passage can be a significant problem with accelerated stream flows through single or multi-pipe causeways that are beyond the capacity of native fish to allow passage. Often the streambed slopes are relatively (surprisingly) steep in these valley settings resulting in pools forming above the road crossing and steep slopes on the downstream side, which eventually leads to undermining and loss of the structure. An example is Waterford Creek on Cooroy Mountain Road. Options such as bridges or low-level road crossings should be investigated.

It is consequently recommended that Council consider the following recommendation for inclusion within the review of the Noosa Plan:

- A minimum of 100m vegetation buffers for the protection of waterways with existing vegetation within the 100m buffer area, expanded beyond 100m where floodplain vegetation is already existing.
- Installation of 50m buffers on confined WMU's and 100m vegetative buffers on partially confined and alluvial WMU's to waterways absent or restricted in riparian buffer for developments adjoining waterways.
- The prohibition or comprehensive storm water capture and treatment for developments with potential to generate soil disturbance or nutrient release within 250m of waterways, and throughout Water Supply Catchments.
- Specific consideration to fish passage and flow rates within road design with options such as bridges or low-level crossings preferential over single or multi-pipe causeways which exclude fish passage and degrade waterways through streambed erosion.

5.3 PAPERBARK AND SEDGELAND DOMINATED NON-RIVERINE WETLANDS & ESTUARINE WETLANDS

Existing and sufficient information and guidelines for Non-riverine and Estuarine wetland treatment within planning schemes and development assessment (waterway and vegetation management) exists and has provided sufficient legal precedent.

Within the current Vegetation Management Act, except where exemptions or *Accepted Development Vegetation Clearing Codes* apply, clearing both within and within 100m of a wetland (non-riparian and estuarine) conflicts with Acceptable Outcomes for assessable vegetation clearing.

Ideal Buffer distance recommendations for wetlands from a water quality perspective do however largely depend on the method of water input to the wetlands – either surface or groundwater infiltration and the geographical source of such waters. Specific information of this nature does not currently exist comprehensively and accurately across the shire and as such the generalization of 100m is recommended as per regulatory guidelines.

5.5 WATERWAY REHABILITATION RECOMMENDATIONS

5.1 STEEP HEADWATERS

Evidence of significant degraded Steep Headwater areas is substantiated within the '*Keeping it in Kin Kin – Applying LIDAR change to identify Erosion Hotspot'* report for the Kin Kin catchment. Other areas within the Shire containing the geology type of the Kin Kin Beds have comparable issues.

Using a triage approach typical of best practice resource optimization , keeping the existing intact vegetation in good condition is highest priority, followed by addressing areas without vegetation where broader ecosystem service benefit is highest.

A number of initiatives are potentially available that could result in the retention and reinstatement of deep rooted vegetation having the effect of stabilizing to the best of our ability the vulnerable steep headwater areas. These initiatives could include:

- Continued and targeted management of Cats Claw Creeper Vine (*Dolichandra (Macfadyena) unguis-cati*) and other transformer weeds in steep headwater areas.
- Mosaic treatment and gradual infill planting of large shallow rooted Lantana (*Lantana camara*) dominated patches where slips and erosion has or is likely to occur.
- Investigation and application of carbon, water quality, vegetation and biodiversity offsets where possible into steep headwater areas.
- Promotion of native forest management activities and regrowth retention in targeted areas.
- Implementation of large scale revegetation programs in steep headwater areas.
- Extension programs educating the grazing industry to adopt sustainable/ safe stocking rates using grazing land type booklets.

5.2 PARTLY CONFINED AND ALLUVIAL DOMINATED VALLEYS

Partly confined valley settings progressively transfer sediments downstream, with accumulation and floodplain formation occurring on the inside bend, and significant erosion and sediment removal occurring on the outside bends. Due to catchment clearing and changed hydrologic regimes accelerated erosion of outside bends are a key issue that needs careful attention with management focused on stabilising these areas through retention of vegetation on the toe of the waterway, riparian revegetation of the entire riparian zone, installation of large woody debris for habitat or bank stabilisation or toe stabilisation techniques.

Road crossings in these valley settings generally under-estimate the flows observed during flood events and can become outflanked or degrade the waterway through streambed erosion. Fish passage can be a significant problem with accelerated stream flows through single or multi-pipe causeways that are beyond the capacity of native fish to allow passage.

Undesirable road crossings and the priorities of the '*Noosa Catchment Biopassage Prioritisation Project'* should be evaluated for their suitability for replacement over time with bridges or low-level road crossings where possible.

Following the triage approach for resource optimization, priority remediation actions are prioritized in areas of high ecosystem recovery potential. High value reaches are the highest priority for resourcing in order to keep them in good condition. In accordance with the reach prioritization approach used within this assessment, priority in order of importance is as follows:

Priority 1 – Protected reaches in good condition throughout

Priority 2 – Unprotected reach of regional conservation significance

Priority 3 – Reach of local conservation value

Priority 4 – Deteriorating stream reach

Priority 5 – Linking reach and significant remnant section

Priority 6 – Reach with moderate recovery potential

Priority 7 – Reaches requiring significant levels of investment for recovery

Map 5 identifies the Noosa Shire priority reaches according to the above classification system.

Potential rehabilitation actions within priority reaches include but are not limited to:

- Targeted and strategic management of Cats Claw Creeper Vine (*Dolichandra (Macfadyena) unguis-cati*) and other transformer weeds.
- Retention of vegetation on the toe of the waterway.
- Exclusion of stock from riparian areas and the installation of off-stream watering points and location relevant fencing (including flood fencing techniques).
- Riparian revegetation of the entire riparian zone.
- Installation of large woody debris for habitat or bank stabilization, or toe stabilisation techniques.
- Investigation and application of carbon, water quality, vegetation and biodiversity offsets where relevant to riparian areas.

- Retrofitting and / or replacement of unsuitable creek crossing infrastructure items so to reduce upstream and downstream streambed impacts and to facilitate greater faunal passage use of the waterway.
- Detailed site base fluvial geomorphological assessment for problems areas, with more invasive remediation actions such as timber / concrete piles or other flow velocity reduction techniques potentially warranted in certain locations.
- Management of feral pig and deer populations that can significantly impact streambank stability and water quality.
- Storm water capture and treatment before entering the waterway to attenuate pulses of water flow.

Riverbank restoration work on private property in Wahpunga Creek (WAH 2) involving fencing, off-stream watering point installation and riparian revegetation.

5.3 PAPERBARK AND SEDGELAND DOMINATED NON-RIVERINE WETLANDS & ESTUARINE AREAS

Following the triage approach for resource optimization, priority remediation actions are prioritized in areas of high ecosystem recovery potential. High value wetlands are the highest priority for resourcing in order to keep them in good condition.

In accordance with the Queensland Wetland Programs AquaBAMM mapping methodology, the priority areas for rehabilitation therefore are firstly, Very High Aquascore sites, flowing through to sites identified as Very Low (Clayton 2006). These sites are identified on Maps 6 and 7.

A full description of the 42 score categories (filtered decisions) can be found in the Aquatic Biodiversity Assessment and Mapping Methodology Report (Clayton 2006)
https://wetlandinfo.ehp.qld.gov.au/resources/static/pdf/assessment-monitoring/aquabamm/method/aquabamm_2006_part_a.pdf

A number of initiatives are potentially available that could provide wetland value and water quality outcomes within non-riparian and estuarine wetlands. These initiatives could include:

- Actions to preserve wetland quality, in particular management of transformer weeds and feral animal pets, particularly feral pigs.
- Cattle access and fencing.
- Reinstatement of wetland vegetation, both within wetlands themselves and within desired wetland buffer areas.
- Reinstatement of surface freshwater flow and condition, in and around wetlands where channelization or alteration has occurred.
- Retrofitting and reconstruction of road crossings in wetland areas to reduce the effect of narrowing and concentrating flow causing both upstream and downstream riverbank and bed disturbance. Fish and aquatic fauna passage would also benefit directly from this activity.
- Engagement and or regulatory programs to upgrade effluent disposal systems and their impact on producing discharge into shallow aquifers in targeted areas such as Cootharaba.

6.0 FUTURE ACTIONS

This study had limited scope however through the analysis of the waterways and through discussions with those involved in the project, a number of key data gaps and actions warranting future attention and resources were identified. These included;

1) Further analysis on wetlands that are not classified as wetlands within the Wetland Mapping Delineation (Queensland Wetlands Data 4.0) due to being cleared of remnant vegetation. Existing data is available that could be used to identify non-vegetated wetlands that still behave as wetlands, including remote heat sensing data and existing soils mapping. Such data would require further desk top and ground-truthing to ensure it is accurate and is not picking up areas such as irrigated pasture, farm dams and aquaculture activities.

2) The highest and best offset receiving sites can be inferred from the data produced within this plan and that of the '*Keeping it in Kin Kin*' LIDAR analysis for the Kin Kin area. The Mary River & Tributaries Rehabilitation Plan has also identified priority reaches for investment. However, further more detailed identification and prioritization of offset sites in a multi-criteria analysis approach, incorporating terrestrial ecological corridors, highest carbon yield, in situ or potential wildlife / biodiversity benefit and waterway health, would be beneficial.

3) Detailed biopassage and waterway barrier assessment has been undertaken in the Noosa Catchment and Six Mile Creek sub-catchment of the Mary River Catchment. Further analysis is warranted in the Mary River Catchment. Due to the steep and short profile of the majority of the coastal catchments both north and south of the Noosa River Mouth, assessment for fish passage is less warranted. However in these areas, artificial hard surface intersection of wetland flow and passage way within wetlands, including groundwater flow systems may still be of warrant to examine.

4) Limited data regarding groundwater movement and volume exists within the Noosa Shire, yet it is a critical component of the surface expression of many of our wetlands and are potentially under threat from both overuse and pollution in specific areas of the shire including Lake Cootharaba and Cooroibah. Of particular concern is the fact that the same aquifers are infiltrated with effluent from rural residential settlement. With demand for bore water extraction only likely to increase as a result of increasingly reduced winter and spring rainfall due to climate change, this situation potentially will only worsen. A move to alternate, replacement and more advanced treatment of effluent and/or the regulation of aquifer extraction in these areas is warranted.

5) The nature of the erosion types, particularly within the Kin Kin catchment may require detailed site specific studies on fluvial geomorphological processes. Typically the reasons for specific riverbank and bed erosion at a particular point is actually generated from upstream flow and /or riverbank interference. On-site detailed assessment is occasionally warranted due to the scale of erosion and the complexity of Noosa's typically episodic flow patterns during high rainfall events.

6) A Noosa Shire water quality assessment study involving the compilation and analysis of water quality data using the relevant Water Quality Objectives (WQO's) based on the Waterway Management Units developed for the Noosa Shire during this study. This proposed study would build upon the biophysical data collected during this study to provide a clearer and more complete insight into the health of waterways, and demonstrate waterways with compliance issues (according to the WQOs). A study of this nature would also provide the opportunity for the development of locally-based sub-catchment WQOs.

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APPENDIX 1 – PRE-EXISTING DATASETS AND LITERATURE

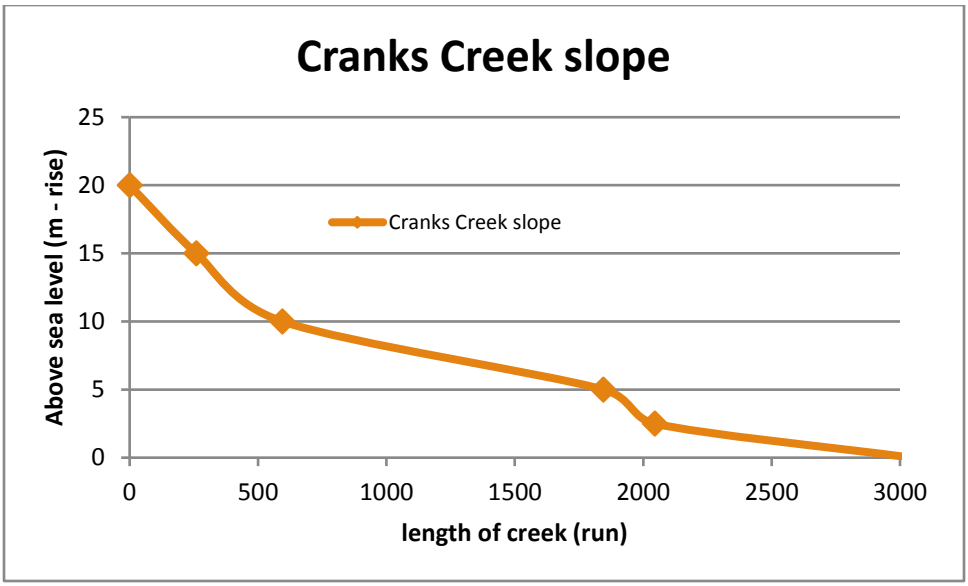
Available Datasets

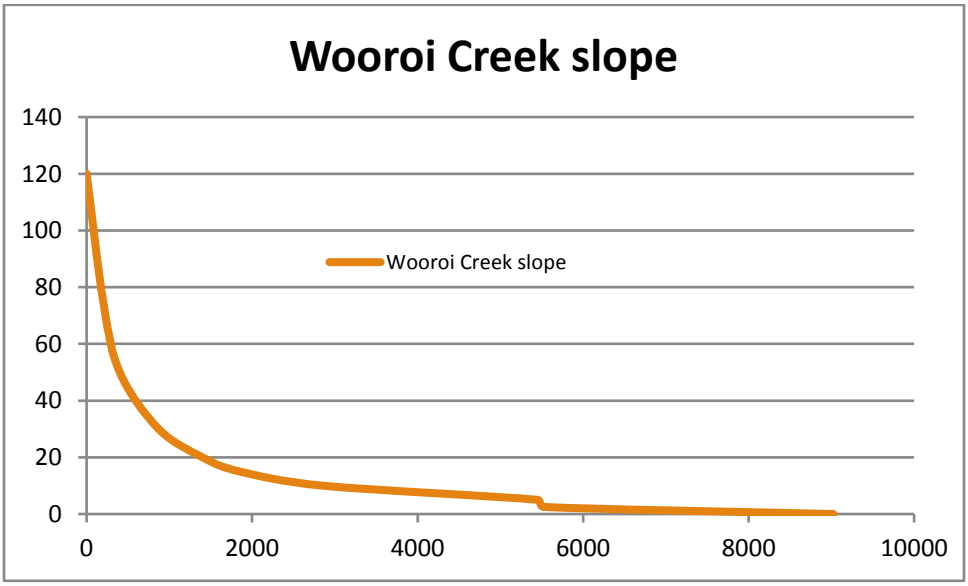
Dataset	Theme
NoosaShire.shp	Council Boundary
Noosa_Council_1kmbuffer.shp	Council Boundary 1km buffer
ACA_Riverine_Results_Noosa.shp	Aquatic Conservation Assessment - Areas
ACA_Riverine_StreamBuffers_Noosa.shp	Aquatic Conservation Assessment - Streams
Dams_Storages_QBWSA_2011_Noosa.shp	Dams and Water storages
Essent_Habitat_v4_Waterways_Noosa.shp	Essential Habitats
Floodplains_Alluvium_Noosa.shp	Geology based floodplains
GDE_SubSurface_Terrestrial_Noosa.shp	Groundwater Dependent Ecosystems – Subsurface
GDE_Surface_Area_Noosa.shp	Groundwater Dependent Ecosystems – Surface
GDE_Surface_Point_MtCooroySpring.shp	Groundwater Dependent Ecosystems – Spring
Remnant_Vegetation_RE15v10_Waterways_Noosa.shp	Remnant Vegetation intersecting Waterways
Remnant_Vegetation_Endangered_RE15v10_Waterways_Noosa.shp	Remnant Vegetation intersecting Waterways – Endangered
Watercourse_Lines_Noosa.shp	Waterways 50cm
Watercourse_Lines_RS_Noosa.shp	Waterways and Riverstyles Noosa
Riverstyles_WMU_Sites_Noosa.shp	Riverstyles Sites Noosa
Watercourse_WMU_Lines_MRCCC.shp	Waterways and Riverstyles Mary
Wetlands_v42016_Noosa.shp	Wetlands
Wetlands_Riverine_Floodplain_RE_Noosa.shp	Riverine and Floodplain Regional Ecosystems from Wetlands Mapping

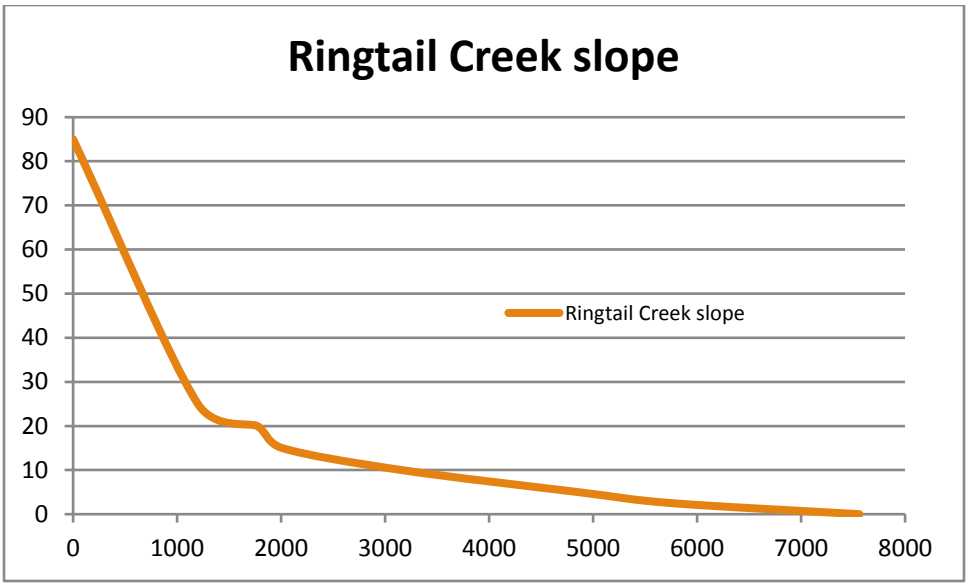
Literature review

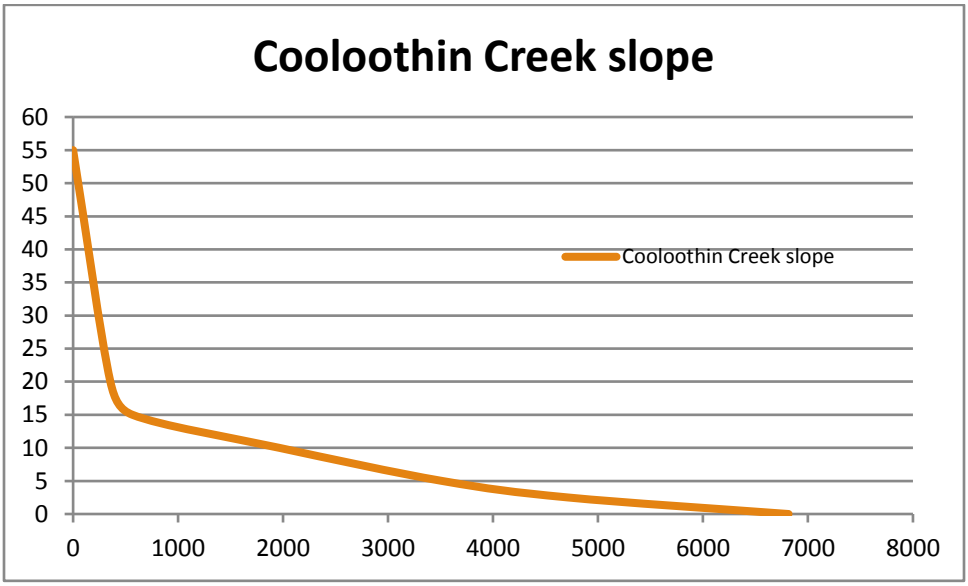
Year	Title	Author	Catchment
2002	*Sub-Catchment Stream Rehabilitation Plan – Kin Kin Creek*,	Earth Tech	Kin Kin
2013	*Sunshine Coast FarmFLOW Water Quality Monitoring - Kin Kin Creek Catchment*	Noosa & District Landcare Group Inc	Kin Kin
2013	*Noosa River Catchment and Estuary Action Plan (2013-15).*	Sunshine Coast Regional Council	Noosa
2008	*The Noosa River Catchment Management Strategy*	Noosa Integrated Catchment Association Inc. (NICA)	Noosa
2012	*Lake Cootharaba sediment and nutrient dynamics: towards asystem model*	Grinham, A, Gibbes, B, & Dunbabin, M,	Noosa
2012	*Sources and Speciation of Dissolved Inorganic Nutrients in Lake Cootharaba and the Noosa River Catchment*	Tully, N,	Noosa
2011	*A Characterisation of Sediment Nutrient Transport and Depositional Dynamics in the Lake Cootharaba Catchment Post European Settlement*	Lamb, K, et al	Noosa
2011	*Tracing Sources & Dating Sediments of Lake Cootharaba, South East Queensland*	Lamb, K,	Noosa
2001	*Noosa River Loads and Impacts Study Interim Report*	Jones, A, et al	Noosa
1998	*Condition of Riparian lands in the Noosa River Catchment*,	Burrows, D	Noosa
1998	*Management of Riparian Lands within the Noosa River Catchment through the Noosa Shire Council Planning Scheme – Stage 2 Planning Study*	Mary Maher & Associates Pty Ltd & Buckley Vann	Noosa
1995	*Noosa River System Bed and Bank Habitat*	Thorogood, J,	Noosa
2001 & 2005 Part Revision	*Mary River & Tributaries Rehabilitation Plan*	Stockwell, B & Wedlock, B	Mary

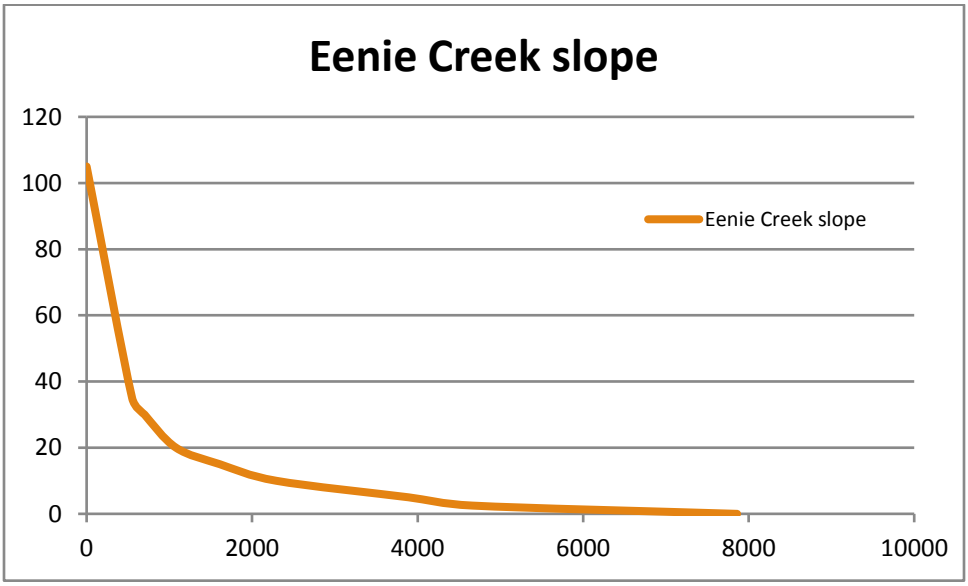
APPENDIX 2 - LONG PROFILES OF SEVERAL NOOSA SHIRE WATERWAYS

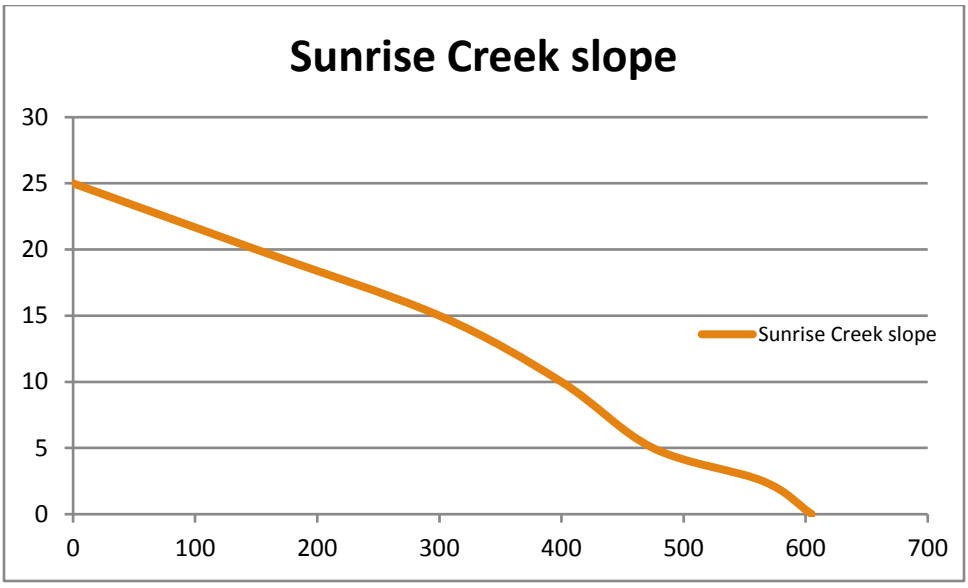


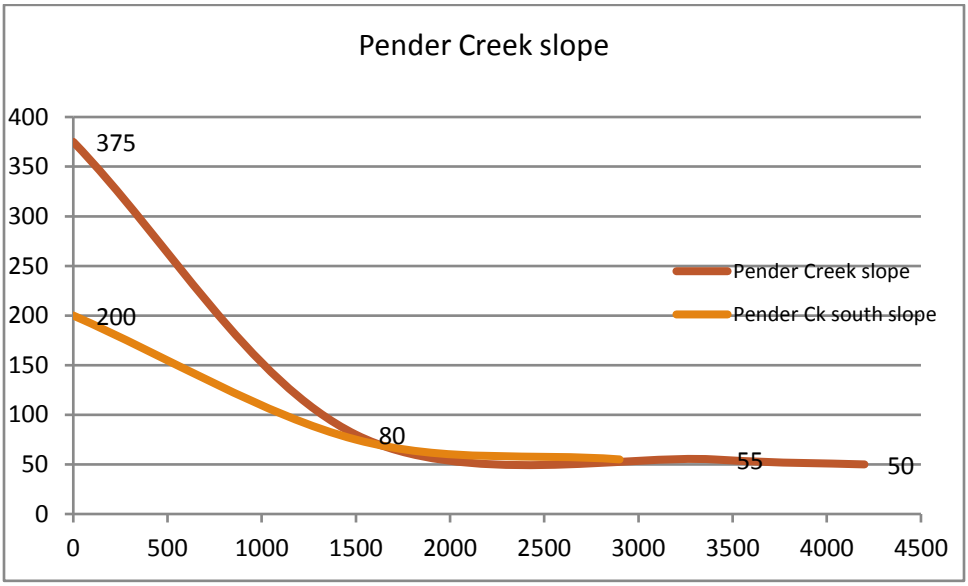


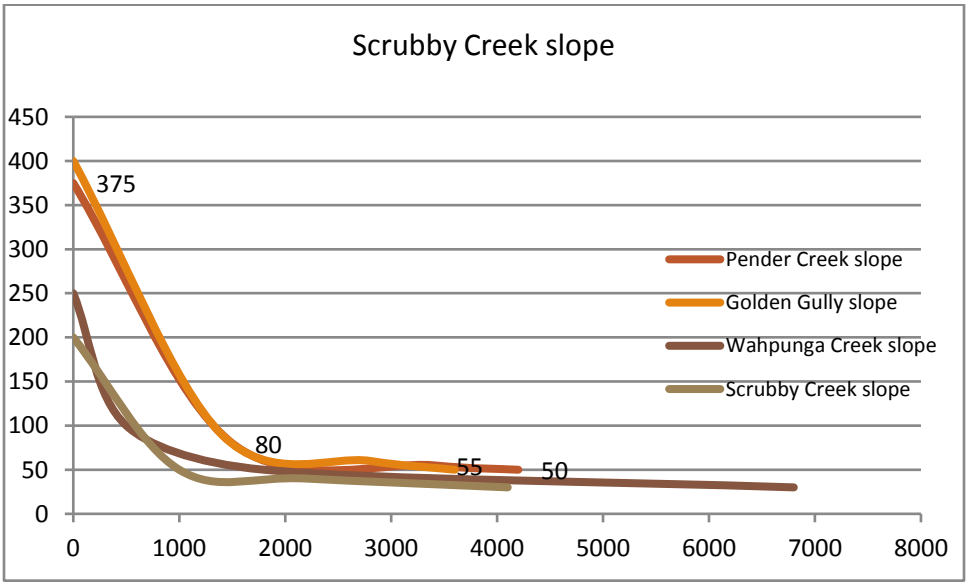

Ringtail Creek slope
90
80
70
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
6000
7000
8000
Ringtail Creek slope

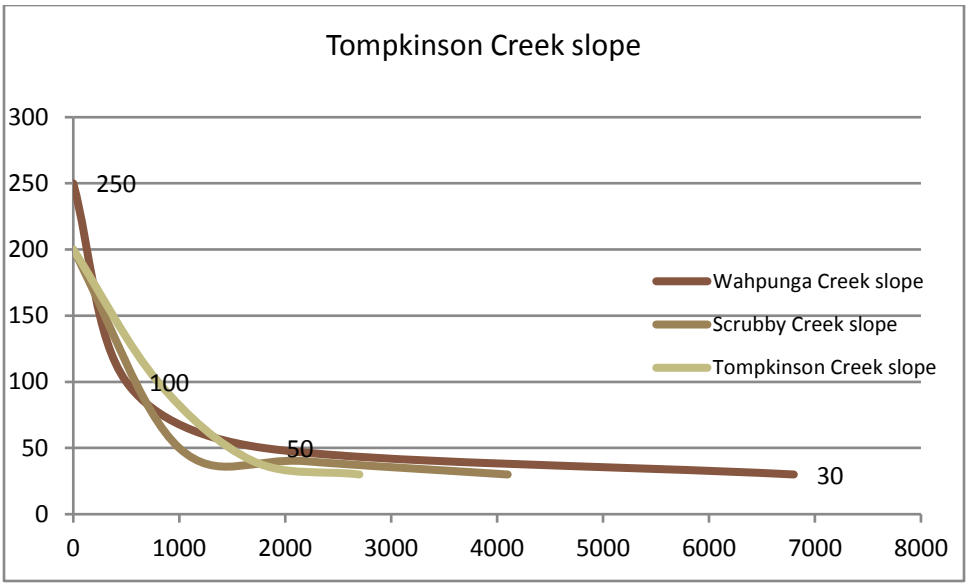

Cooloothin Creek slope
60
55
50
45
40
35
30
25
20
15
10
5
0
0
1000
2000
3000
4000
5000
6000
7000
8000
Cooloothin Creek slope


Eenie Creek slope
120
100
80
60
40
20
0
0
2000
4000
6000
8000
10000
Eenie Creek slope


Sunrise Creek slope
30
25
20
15
10
5
0
0
100
200
300
400
500
600
700
Sunrise Creek slope


Pender Creek slope
400
350
300
250
200
150
100
50
0
375
200
80
55
50
0
500
1000
1500
2000
2500
3000
3500
4000
4500
Pender Creek slope
Pender Ck south slope


Scrubby Creek slope
450
400
350
300
250
200
150
100
50
0
375
80
55
50
0
1000
2000
3000
4000
5000
6000
7000
8000
Pender Creek slope
Golden Gully slope
Wahpunga Creek slope
Scrubby Creek slope


Tompkinson Creek slope
300
250
200
150
100
50
0
250
100
50
30
0
1000
2000
3000
4000
5000
6000
7000
8000
Wahpunga Creek slope
Scrubby Creek slope
Tompkinson Creek slope

APPENDIX 3 – WMU ISC SCORING

Tributary	Cooloothin Creek
WMU	COT1
WMU boundaries	Headwaters starts on escarpment near Tewantin National Park, flattens onto freehold land above Louis Bazzo Drive
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	2
Cover of exotic vegetation	4
Aquatic Ecology	2
total	21
Score	66%
notes	difficult access, desktop analysis with some field interpretation from roads etc where access permits

Tributary	Cooloothin Creek
WMU	COT2
WMU boundaries	Louis Bazzo Drive to McKinnon Drive, in pine plantation
Sample Site Location	Pine plantation
Date of Assessment	4/4/2017
Representative Site Name	Pine plantation
Position in Catchment	freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	29
Score	91%
notes	good riparian buffer retained in pine plantation

Tributary	Cooloothin Creek	
WMU	COT3	
WMU boundaries	From McKinnon Drive through old township to Noosa River	
Sample Site Location	old township	
Date of Assessment		4/4/2017
Representative Site Name	old Cooloothin township	
Position in Catchment	estuarine	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	30
Score	94%
notes	

Tributary	Ringtail Creek
WMU	RIN1
WMU boundaries	starts near Old Tewantin Rd on escarpment to base of escarpment
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	3
Cover of exotic vegetation	4
Aquatic Ecology	3
total	26
Score	81%
notes	difficult access, desktop assessment, have working knowledge of this reach
	good riparian connection from NP to Noosa River via Broadmeadows (Tronson)

Tributary	Ringtail Creek
WMU	RIN2
WMU boundaries	from base of escarpment to northern boundary of National Park
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	3
Cover of exotic vegetation	4
Aquatic Ecology	3
total	26
Score	81%
notes	difficult access, desktop assessment, have working knowledge of this reach
	good riparian connection from NP to Noosa River via Broadmeadows (Tronson)

Tributary	Ringtail Creek
WMU	RIN3
WMU boundaries	from northern boundary of National Park to McKinnon Drive
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	3
Cover of exotic vegetation	4
Aquatic Ecology	3
total	26
Score	81%
notes	difficult access, desktop assessment, have working knowledge of this reach
	good riparian connection from NP to Noosa River via Broadmeadows (Tronson)

Tributary	Ringtail Creek	
WMU	RIN4	
WMU boundaries	From McKinnon Drive to Tronson Canal	
Sample Site Location		
Date of Assessment		4/4/2017
Representative Site Name		
Position in Catchment	freshwater	
Attribute		
Physical Form		
Bed Stability Rating (ISC)		4
Artificial Barriers		4
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		4
Upland Habitat Condition		
Longitudinal Continuity		2
Width Rating		3
Cover of exotic vegetation		4
Aquatic Ecology		3
total		26
Score		81%
notes	difficult access, desktop assessment, have working knowledge of this property and reach which is in good condition	

Tributary	Ringtail Creek	
WMU	RIN5	
WMU boundaries	From Tronson Canal to Noosa River	
Sample Site Location		
Date of Assessment		4/4/2017
Representative Site Name		
Position in Catchment	estuarine	
Attribute		
Physical Form		
Bed Stability Rating (ISC)		4
Artificial Barriers		4
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		4
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		3
Cover of exotic vegetation		4
Aquatic Ecology		3
total		28
Score		88%
notes	difficult access, desktop assessment, have working knowledge of this property and reach which is in good condition	

Tributary	Cooroibah Creek
WMU	COH1
WMU boundaries	starts near Mt Tinbeerwah, headwaters contained within Tewantin National Park - escarpment
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	30
Score	94%
notes	

Tributary	Cooroibah Creek
WMU	COH2
WMU boundaries	From edge of escarpment to "Forest Drive" (firebreak in NP)
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	30
Score	94%
notes	

WMU	COH3	
WMU boundaries	From "Forest Drive" in National Park to near McKinnon Drive	
Sample Site Location	upstream of McKinnon Drive, Tewantin	
Date of Assessment		4/4/2017
Representative Site Name	upstream of McKinnon Drive, Tewantin	
Position in Catchment	Lower Freshwater	
Attribute		
Physical Form		
Bed Stability Rating (ISC)		4
Artificial Barriers		2
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		4
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		4
Cover of exotic vegetation		4
Aquatic Ecology		4
total		30
Score		94%
notes	high sinuosity creek contained within rainforest	
	culvert under McKinnon Drive may provide some minor fish passage issues	
	the creek immediately downstream of culvert has been badly channelised and is likely to be a greater fish barrier - needs some rehabilitation	
	healthy aquatic ecosystem upstream of McKinnon Drive	
	timber riffles and pools	

Tributary	Cooroibah Creek
WMU	COH4
WMU boundaries	From near McKinnon Drive to Noosa River
Sample Site Location	Four Ways Reserve, McKinnon Dv, Tewantin
Date of Assessment	4/4/2017
Representative Site Name	Four Ways Reserve, McKinnon Dv, Tewantin, -26.373379 152.010747
Position in Catchment	Upper estuary

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	30
Score	94%
notes	mangrove present, very healthy undercut banks present boatwash may be an issue? roots in water providing fish habitat reeds/rushes present Bloodwood, paperbark dominant
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	A
overall	A

Tributary	Wooroi Creek
WMU	WOO1
WMU boundaries	starts in SF 959 (Tewantin National Park) to Tewantin Rd off the escarpment
Sample Site Location	Near Cooroy - Tewantin Road, Tewantin
Date of Assessment	4/4/2017
Representative Site Name	Cooroy Tewantin Road (-26.398691 / 153.007150)
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	2
Artificial Barriers	0
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	4
Aquatic Ecology	2
total	20
Score	63%
notes	large woody debris not obvious apart from recently fallen timber
	exposed banks, possible bed erosion due to de-snagging? Downstream of Cooroy Rd
	Flooded gum, cabbage palm
	some broad leaved paspalum (weed grass)
	assessment conducted downstream of Cooroy Rd - whereas the majority of this reach is contained in NP and is virtually score 100% (artificial barriers a concern)

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	B
Level of weed infestation	B
overall	A- to B+

Tributary	Wooroi Creek
WMU	WOO2
WMU boundaries	From Tewantin Rd through Heritage Park to Golf Course Drive
Sample Site Location	Heritage Park, Tewantin
Date of Assessment	4/4/2017
Representative Site Name	Heritage Park, Tewantin; -26.395400 152.008904
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	2
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	1
Cover of exotic vegetation	3
Aquatic Ecology	3
total	24
Score	75%
notes	paperbark wetland no gravel riffles, forced timber riffles revegetation obvious weeds low, very minor singapore daisy
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Wooroi Creek
WMU	WOO3
WMU boundaries	From Golf Course Drive to near McKinnon Drive
Sample Site Location	Downstream of Golf Course Drive; upsteam of McKinnon Dv, Lake Cooroibah
Date of Assessment	4/4/2017
Representative Site Name	downstream of Golf Course Drive; Tewantin; -26.390292 152.014472
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	3
Cover of exotic vegetation	3
Aquatic Ecology	3
total	28
Score	88%
Notes	backwater pools (tannin stained) no gravel riffles, timber forced riffles flood channels reeds, rushes, lomandra excellent canopy cover and shading excellent habitat Flooded gum; cabbage palm, swamp mahogany some camphor laurel singapore daisy common upstream of Golf Course Dv

Tributary	Wooroi Creek
WMU	WOO4
WMU boundaries	From near McKinnon Drive to Noosa River
Sample Site Location	Wooroi Creek reserve, George St, Tewantin
Date of Assessment	4/4/2017
Representative Site Name	Wooroi Ck reserve -26.381304 152.025263
Position in Catchment	Upper estuary

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	4
total	31
Score	97%
notes	mangrove present, healthy aquatic ecosystem
	mangroves line the water edge immediately transitioning to native grass understorey - single line of trees with no shrub layer
	no shrub layer present due to historic slashing
	Kangaroo grass dominant groundcover layer
	Swamp oak regenerating due to no slashing
	swamp oak likely to colonise and dominate site without slashing

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	B
Shade over water & buffer width	B
Bank stability	A
Level of weed infestation	B
overall	B+

Tributary	Cranks Creek	
WMU	CRA1	
WMU boundaries	National Park to Beckmans Rd	
Sample Site Location		
Date of Assessment		4/4/2017
Representative Site Name		
Position in Catchment	Lower Freshwater	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	30
Score	94%
notes	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	B
Shade over water & buffer width	B
Bank stability	B
Level of weed infestation	B
overall	B

Tributary	Cranks Creek
WMU	CRA2
WMU boundaries	From Beckmans Rd to end of Finney Drive, Noosaville
Sample Site Location	Cranks Creek Park (via 35 Burgess Dv)
Date of Assessment	4/4/2017
Representative Site Name	Cranks Creek Park (via 35 Burgess Dv); -26.4059009 152.026281
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	2
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	1
Cover of exotic vegetation	3
Aquatic Ecology	2
total	19
Score	59%
notes	bed erosion caused by stormwater drains
	narrow buffer width - single line of trees along creek
	regeneration dominated by Alex palms
	bank undercuts present - good habitat
	artificial riffle created by exposed pipeline
	large woody debris lacking - desnagging?
	few lomandra, dominated by broad leaved paspalum
	Paperbark, Pink Euodia, Cheesetree dominant
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	B
Shade over water & buffer width	B
Bank stability	B
Level of weed infestation	B
overall	B

Tributary	Cranks Creek
WMU	CRA3
WMU boundaries	From end of Finney Drive (off Burgess Drive) Noosaville to Lake Doonella
Sample Site Location	Alec Loveday Park, Noosaville
Date of Assessment	4/4/2017
Representative Site Name	Alec Loveday Park, Noosaville near 51 Hooper Dv, Noosaville
Position in Catchment	Upper estuary

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	3
Cover of exotic vegetation	4
Aquatic Ecology	4
total	30
Score	94%
notes	iron flocculate obvious leaching near mangroves - natural some bank instability - boat wash or fisherman on bank mangroves form edge of streamside zone saltwater couch flats behind mangroves Swamp oak and River Mangrove dominant

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	B
Level of weed infestation	A
overall	A- to B+

Tributary	Eenie Creek
WMU	EEN1
WMU boundaries	Starts near Pacific View Drive through Livistona Park to Livistona Drvie
Sample Site Location	Livistona Park, Livistona Drive
Date of Assessment	4/4/2017
Representative Site Name	Livistona Park, Livistona Drive; -26.425909 153.015448
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	26
Score	81%
notes	rainforest stream

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Eenie Creek
WMU	EEN2
WMU boundaries	From Livistona Drive, Doonan to upstream of Eumundi - Noosa Road
Sample Site Location	Livistona Park, Livistona Drive
Date of Assessment	4/4/2017
Representative Site Name	Livistona Park, Livistona Drive; -26.425909 153.015448
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	26
Score	81%
notes	rainforest stream
	cohesive clay bank material with sand bar deposition
	natural gravel riffle
	sand bar on inside bend
	Piccabean palms and Lawyer vine

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Eenie Creek
WMU	EEN3
WMU boundaries	From upstream of Eumundi - Noosa Road to Lake Entrance Blvd Noosaville
Sample Site Location	Lake Entrance Blvd, Noosaville at Lake Entrance Park
Date of Assessment	4/4/2017
Representative Site Name	Lake Entrance Park; -26.4223710 152.037997
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	26
Score	81%
notes	good canopy cover and shading of waterway good large woody debris content in waterway undercut banks present healthy tannin stained aquatic ecosystem sand splays and undercut banks present - good diversity of habitats series of connected waterholes - could be a form of channelised fill reeds, rushes and good lomandra instream tree ferns and climbing pandanii Blackbutt - Bloodwood - Paperbark dominant Culvert on Lake Entrance Blvd could be an fish passage issue
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Eenie Creek
WMU	EEN4
WMU boundaries	From Lake Entrance Blvd with low sinuosity long straights to confluence with Lake Weyba
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	29
Score	91%
notes	good canopy cover and shading of waterway
	generally desktop analysis, some inspection of lower reach by kayak, potential WQ issues from industrial estate

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Keyser Creek
WMU	KEY1
WMU boundaries	starts in wetlands near Walter Hay Road flowing northwards to Lot2 RP160983
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	29
Score	91%
notes	good canopy cover and shading of waterway difficult access, observation from Tidswell Rd and Walter Hay Rd only in good condition throughout catchment except for Lot11 SP250714 where riparian vegetation cleared

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Keyser Creek
WMU	KEY2
WMU boundaries	Estuary starts on Lot2 RP160983 with low sinuosity long straights to Lake Weyba
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	29
Score	91%
notes	good canopy cover and shading of waterway generally desktop analysis, lower reaches kayaked

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Weyba Creek
WMU	WEY1
WMU boundaries	Starts above Annie Drive, with riparian zone and channel almost entirely contained with a reserve that links with Lake Weyba foreshore
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	4
total	29
Score	91%
notes	good canopy cover and shading of waterway

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Murdering Creek
WMU	MUR1
WMU boundaries	Starts as a heathland system above Murdering Creek Road in Noosa National Park
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	32
Score	100%
notes	good canopy cover and shading of waterway contained in NP

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Murdering Creek
WMU	MUR2
WMU boundaries	From upstream of Murdering Creek Park to Lake Weyba a series of waterholes is present
Sample Site Location	
Date of Assessment	4/4/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	32
Score	100%
notes	good canopy cover and shading of waterway contained in NP

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Kin Kin Creek East branch		
WMU	KKE1		
WMU boundaries	Escarpment of Eastern Branch creek		
Sample Site Location			
Date of Assessment	May-17		
Representative Site Name			
Position in Catchment	freshwater		

Attribute			
Physical Form	Expert Panel Contribution		nb. higher score = poor condition (out of 45)
Bed Stability Rating	Equates to a) Bed Material Character & e) Bed Stability		8
Artificial Barriers		0	
Bank Stability	Equates to g) Bank Stability		5
Habitat & Ecological Condition			
Lowland Habitat Condition	Equates to b) In-stream geomorphic diversity		4
Upland Habitat Condition		0	
Longitudinal Continuity	Equates to i) canopy cover		5
Width Rating	Equates to h) land use influences		5
Cover of exotic vegetation	Equates to f) Vegetation Structure and Condition		5
Aquatic Ecology	Equates to p) large woody debris abundance and q. Bank Overhang * Bank undercuts		10
total			42
Score			7%

Tributary	Kin Kin Creek, western branch or could be Paynes Creek	
WMU	KKW1	
WMU boundaries	Escarpment of Western Branch Creek	
Sample Site Location	Geitz property - Lot2 RP179077	
Date of Assessment		2008
Representative Site Name	Geitz property	
Position in Catchment	Lower Freshwater	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	2
total	21
Score	66%
expert panel score	35.5
	79%

Tributary	Kin Kin Ck western branch		
WMU	KKW2		
WMU boundaries	Reach starts 500m south of Williams Rd to the confluence of eastern Branch		
Sample Site Location	McVeigh property - Lot112 MCH118		
Date of Assessment		2008	
Representative Site Name	McVeigh property		
Position in Catchment	Lower Freshwater		
Attribute			
Physical Form			
Bed Stability Rating (ISC)		4	
Artificial Barriers		2	
Bank Stability		4	
Habitat & Ecological Condition			
Lowland Habitat Condition		3	
Upland Habitat Condition			
Longitudinal Continuity		1	
Width Rating		2	
Cover of exotic vegetation		1	
Aquatic Ecology		2	
total		19	
Score		59%	
expert panel score		35.00	out of 45
		78%	

Tributary	Kin Kin Creek western branch	
WMU	KKW2	
WMU boundaries	Reach starts 500m south of Williams Rd to the confluence of eastern Branch	
Sample Site Location	McKella property	
Date of Assessment		2008
Representative Site Name	McKella property; Lot 2 RP207949	
Position in Catchment	Lower Freshwater	
Attribute		
Physical Form		
Bed Stability Rating (ISC)		2
Artificial Barriers		2
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		3
Upland Habitat Condition		
Longitudinal Continuity		1
Width Rating		2
Cover of exotic vegetation		1
Aquatic Ecology		2
total		15
Score		47%
expert panel		35.00
		78%

Tributary	Kin Kin Creek
WMU	KK1
WMU boundaries	This reach commences at the junction of Eastern and Western Branch and flows northwards to finish downstream of the Pender Creek Confluence near Perserverence Rd.
Sample Site Location	Vidler property, Sister Tree Ck Rd
Date of Assessment	2008
Representative Site Name	Vidler property, Sister Tree Ck Rd; Lot4 RP187352
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	2
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	0
Width Rating	2
Cover of exotic vegetation	2
Aquatic Ecology	1
total	15
Score	47%

Tributary	Kin Kin Creek
WMU	KK2
WMU boundaries	This reach of Kin Kin Creek commences downstream of the confluence of Pender Creek and concludes approx 1km downstream of Wahpunga Park / pinch point.
Sample Site Location	Rawlins property
Date of Assessment	2008
Representative Site Name	Rawlins property; Lot1 RP167790
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	1
Width Rating	3
Cover of exotic vegetation	3
Aquatic Ecology	3
total	24
Score	75%
expert panel score	57%

Tributary	Kin Kin Creek
WMU	KK3
WMU boundaries	Starts below Wahpunga Park to the junction of Noosa River upstream of Kinaba. National Park is at the lower end of this reach with some salt intrusion.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		
Score	0%	
expert panel	79%	
		reach mixed with NP at downstream end, and freehold land at upstream end

Tributary	Sister Tree Creek		
WMU	ST1		
WMU boundaries	Escarpment (near Mt Teitsel) of Sister Tree Creek to easement off Cedar Pocket Rd.		
Sample Site Location			
Date of Assessment			
Representative Site Name			
Position in Catchment	Lower Freshwater		

Attribute			
Physical Form			
Bed Stability Rating (ISC)			
Artificial Barriers			
Bank Stability			
Habitat & Ecological Condition			
Lowland Habitat Condition			
Upland Habitat Condition			
Longitudinal Continuity			
Width Rating			
Cover of exotic vegetation			
Aquatic Ecology			
total			
Score		0%	
expert panel	no knowledge		out of 45

Tributary	Sister Tree Creek
WMU	ST2
WMU boundaries	From Easment off Cedar Pocket Rd to 700m upstream of Sister Tree Creek rd Crossing.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute			
Physical Form			
Bed Stability Rating (ISC)			
Artificial Barriers			
Bank Stability			
Habitat & Ecological Condition			
Lowland Habitat Condition			
Upland Habitat Condition			
Longitudinal Continuity			
Width Rating			
Cover of exotic vegetation			
Aquatic Ecology			
total			
Score		0%	
expert panel	no knowledge		out of 45

Tributary	Sister Tree Creek		
WMU	ST2		
WMU boundaries	From Easment off Cedar Pocket Rd to 700m upstream of Sister Tree Creek rd Crossing.		
Sample Site Location			
Date of Assessment			
Representative Site Name			
Position in Catchment	Lower Freshwater		

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		
Score	0%	
expert panel	24	out of 45
	47%	

Tributary	Wahpunga Creek
WMU	WAH1
WMU boundaries	Escarpment above the Sheppersen's Quarry site - flows north
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	46%

Tributary	Wahpunga Creek
WMU	WAH2
WMU boundaries	Shepperson's Quarry to Shepperson's Park (Noosa Trail intersection)
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	47%

Tributary	Wahpunga Creek
WMU	WAH3
WMU boundaries	Reach from Shepperson's Park to confluence of Kin Kin Creek near Wahpunga Lane.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	46%

Tributary	Kinmond Creek
WMU	KIN1
WMU boundaries	Escarpment od Kinmond creek on the eastern side of the Wahpunga Range commencing near Simpson's Rd and concluding approximately 500m downstream of commencement of mapped watercourse as the slope reduces.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	100%

Tributary	Kinmond Creek
WMU	KIN2
WMU boundaries	Lower escarpment of Kidmond Creek commencing 500m downstream of the mapped watercourse and concluding 250m west of the end of the Richards Rd road reserve.
Sample Site Location	Blundell property, Richards Rd
Date of Assessment	2008
Representative Site Name	Blundell property, Richards Rd; Lot380 M371234
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	1
Width Rating	2
Cover of exotic vegetation	2
Aquatic Ecology	2
total	19
Score	59%

Tributary	Kinmond Creek
WMU	KIN3
WMU boundaries	This reach commences 250m west of the end of the Richmond's Rd Road Reserve and concludes 800m upstream of the Kinmond Creek Rd dogleg and un-named road reserve junction
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	63%

Tributary	Kinmond Creek
WMU	KIN4
WMU boundaries	This section of Kidmond Creek breaks out from the Eastern Valley confinelment of the Wahpunga Ranges and flows through floodplain to the confluence with Kin Kin Creek / Sandy Creek. The bed material is dominated by mud.
Sample Site Location	Travers- Brooks property, Kinmond Ck Rd
Date of Assessment	2008
Representative Site Name	Travers- Brooks property, Kinmond Ck Rd; Lot395 M371153
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	2
total	22
Score	69%

Tributary	Sandy Creek
WMU	SAND1
WMU boundaries	Escarpment of Sandy Creek commences 100m north of Louis Bazzo Drive and concludes 1.3km downstream along the mapped watercourse.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	100%

Tributary	Sandy Creek
WMU	SAND2
WMU boundaries	Reach commences 1.3km downstream from mapped watercourse start and concludes 300m upstream of Cootharaba Rd crossing.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	83%

Tributary	Sandy Creek
WMU	SAND3
WMU boundaries	This section of Snady Creek commences 300m upstream of Cootharaba Rd crossing and meanders through floodplain and concludes 800m east of the end of Hempsall rd.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	44%

Tributary	Sandy Creek
WMU	SAND4
WMU boundaries	This section of Sandy Creek breaks out of the confinement of the valley and flows through the floodplain of the confluence with Kinmond Creek and Kin Kin Creek.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	24%

Tributary	Eulama Creek
WMU	EUL
WMU boundaries	Eulama Creek originates in the northern Wolvi Range and drains southeast through a swampy floodplain to the confluence with Kin Kin Creek. The creek is incised into the floodplain alluvium. The bed material is dominated by mud.
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
Expert Panel Score	72%

Tributary	Scrubby Creek
WMU	SBB1
WMU boundaries	Starts on ridgeline of the Simpson Road reserve (Noosa Trail) to Maravista macadamia farm
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	0
Width Rating	1
Cover of exotic vegetation	1
Aquatic Ecology	1
total	15
Score	47%
	no assessment

Tributary	Scrubby Creek
WMU	SBB2
WMU boundaries	At Maravista the creek flows into a series of farm dams and flows under Kinmond Creek Road
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	
	no assessment, series of farm dams

Tributary	Scrubby Creek
WMU	SBB3
WMU boundaries	From Kinmond Creek Road to the confluence with Sandy Creek
Sample Site Location	Merchant property,
Date of Assessment	2008
Representative Site Name	Merchant property, Lot228 MCH458
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	0
Width Rating	1
Cover of exotic vegetation	1
Aquatic Ecology	1
total	15
Score	47%

Tributary	Pender Creek
WMU	PEN1
WMU boundaries	Starts on Hills Road reserve in Woondum National Park in steep headwaters to the National Park boundary
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		32
Score		100%
	no data - WMU contained in NP	

Tributary	Pender Creek
WMU	PEN2
WMU boundaries	From national park boundary to near confluence with South Pender Creek (near intersection with Stratton Road)
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	1
Cover of exotic vegetation	1
Aquatic Ecology	1
total	15
Score	47%

Tributary	Pender Creek
WMU	PEN3
WMU boundaries	From South Pender Creek confluence to Kin Kin Creek
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	1
Cover of exotic vegetation	1
Aquatic Ecology	1
total	15
Score	47%

Tributary	South Pender Creek
WMU	PDS1
WMU boundaries	South Pender Creek starts on the Upper Pinbarren Creek Road ridgeline dropping to Arthur Stubbins Road
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		0
Score		0%
	no data	

Tributary	South Pender Creek
WMU	PDS2
WMU boundaries	From Arthur Stubbins Road the valley is confined with occasional floodplain pockets along the Pender Creek Road reserve until the confluence with Pender Creek
Sample Site Location	Sproule property - Lot2 RP202356
Date of Assessment	2008
Representative Site Name	Sproule property, Pender Creek Road
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	1
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	2
total	22
Score	69%

Tributary	Golden Gully
WMU	GOL1
WMU boundaries	
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	2
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	0
Width Rating	3
Cover of exotic vegetation	2
Aquatic Ecology	2
total	15
Score	47%

Tributary	Golden Gully
WMU	GOL2
WMU boundaries	
Sample Site Location	Tidswell property, Golden Gully Rd
Date of Assessment	2008
Representative Site Name	Tidswell property, Golden Gully Rd - Lot288 MCH3862
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	2
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	0
Width Rating	3
Cover of exotic vegetation	2
Aquatic Ecology	2
total	15
Score	47%

Tributary	Golden Gully	
WMU	GOL3	
WMU boundaries	From above Sister Tree Creek Road to the confluence with Kin Kin Creek	
Sample Site Location	Tidswell property, Golden Gully Rd	
Date of Assessment		2008
Representative Site Name	Tidswell property, Golden Gully Rd - Lot288 MCH3862	
Position in Catchment	Lower Freshwater	
Attribute		
Physical Form		
Bed Stability Rating (ISC)		2
Artificial Barriers		2
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		0
Width Rating		3
Cover of exotic vegetation		2
Aquatic Ecology		2
total		15
Score		47%
	used biophysical score from GOL2 above	

Tributary	Banyan Creek
WMU	BAN1
WMU boundaries	Banyan Creek commences below the Cooloola Way in State Forest
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total	0	
Score	0%	
expert panel score	0	
		contained in State
	100%	Forest

Tributary	Banyan Creek
WMU	BAN2
WMU boundaries	From Bates Road creek crossing through vegetation until downstream of remaining remnant vegetation on Baynan Creek - broad wetland, channelled sections across floodplain on lower end of WMU
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	0%
expert panel	71%

Tributary	Banyan Creek
WMU	BAN3
WMU boundaries	From remnant vegetation the creek flows easterly within an apparently excavated channel to the confluence with Kin Kin Creek
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
expert panel	50%

Tributary	Sandy Creek left branch
WMU	SDL1
WMU boundaries	Sandy Creek left branch commences below the ridgeline of Cootharaba Road flowing due east in predominantly cleared country
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		
Score		0%
expert panel		60%

Tributary	Sandy Creek left branch
WMU	SDL2
WMU boundaries	This reach is located downstream on SDL1, further east from Cootharaba Rd,
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	0%
expert panel	50%

Tributary	Sandy Creek left branch
WMU	SDL3
WMU boundaries	This reach is located downstream on SDL2, further east from Cootharaba Rd
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	0%
expert panel	50%

Tributary	Tompkinson Creek
WMU	TOM1
WMU boundaries	The headwaters of Tompkinsons Creek starts on the ridgeline of Cootharaba Road flowing due east in the valley
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		
Score		0%
	no data	

Tributary	Tompkinson Creek
WMU	TOM2
WMU boundaries	no descriptor - south of Cootharaba Rd
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
expert panel score	50%

Tributary	Tompkinson Creek
WMU	TOM3
WMU boundaries	no descriptor - south of Cootharaba Rd
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	0
Score	0%
expert panel score	70%

Tributary	Fern Creek
WMU	FC1
WMU boundaries	Fern Creek starts below the ridgeline of Simpsons Road reserve dropping towards Kinmond Creek Road
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		
Artificial Barriers		
Bank Stability		
Habitat & Ecological Condition		
Lowland Habitat Condition		
Upland Habitat Condition		
Longitudinal Continuity		
Width Rating		
Cover of exotic vegetation		
Aquatic Ecology		
total		
Score		0%
	no data	

Tributary	Fern Creek
WMU	FC2
WMU boundaries	From near the Kinmond Creek Road crossing to the confluence with Sandy Creek
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	0%
expert panel	50%

Tributary	Blackfellows Creek (South)
WMU	BLF1
WMU boundaries	From Old Ceylon Road to State Forest boundary
Sample Site Location	Jorgensons Road, Barker Rehab Property
Date of Assessment	Nov-04
Representative Site Name	Jorgensons Road, Barker Rivercare Rehabilitation Property
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	27
Score	84%

Tributary	Blackfellows Creek (South)
WMU	BLF2
WMU boundaries	From State Forest boundary to confluence with Blackfellows Creek (North)
Sample Site Location	no assessment - access difficult
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	3
total	31
Score	97%

Tributary	Blackfellows Creek (North)
WMU	BLF3
WMU boundaries	From headwaters near Belli Creek Road to confluence with Blackfellows Creek (south)
Sample Site Location	no assessment - access difficult
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	22
Score	69%

Tributary	Blackfellows Creek
WMU	BLF4
WMU boundaries	From confluence of north/south Blackfellows Creek to confluence with Belli Creek
Sample Site Location	Skyring Creek Road, and inspection of Mount Joy property (Carter)
Date of Assessment	May-05
Representative Site Name	Skyring Creek Road
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	23
Score	72%

Tributary	Coles Creek
WMU	COL1
WMU boundaries	From Cooroora State Forest to Bruce Highway
Sample Site Location	Schreibers Road, Coles Creek Road
Date of Assessment	
Site Name	Schreibers Road, Coles Creek Road
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	2
	21
Score	66%

Tributary	Coles Creek	
WMU	COL2	
WMU boundaries	From Bruce Highway to Mary River confluence	
Sample Site Location	Carlson Road	
Date of Assessment		Sep-04
Site Name	Carlson Road	
Position in Catchment	Lower Freshwater	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	1
Cover of exotic vegetation	1
Aquatic Ecology	2
	18
Score	56%

Tributary	COO1	
WMU	Cooroora Creek	
WMU boundaries	From Yurol State Forest to near Hill St Pomona	
Sample Site Location	Yurol State Forest	
Date of Assessment		2004
Representative Site Name	Yurol State Forest	
Position in Catchment	Lower Freshwater	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	3
total	28
Score	88%

Tributary	COO2
WMU	Cooroora Creek
WMU boundaries	From near Hill Street to near Mill Street, Pomona
Sample Site Location	Cooroora Park, Pomona
Date of Assessment	2004
Representative Site Name	Cooroora Park, Pomona
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	26
Score	81%

Tributary	COO3
WMU	Cooroora Creek
WMU boundaries	From Mill Street, Pomona to confluence with Six Mile Creek
Sample Site Location	Louis Bazzo Dv, Pomona
Date of Assessment	2004
Representative Site Name	Louis Bazzo Dv, Pomona
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	26
Score	81%

Tributary	Cooroy Creek
WMU	COR1
WMU boundaries	From end of Musavale Road to Wust Road
Sample Site Location	Cooroy - Belli Ck Rd, Cooroy
Date of Assessment	May-05
Representative Site Name	Cooroy Belli Ck Rd, Cooroy
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	1
Cover of exotic vegetation	3
Aquatic Ecology	3
total	24
Score	75%

Tributary	Cooroy Creek
WMU	COR2
WMU boundaries	From Wust Road to Cooroy
Sample Site Location	Noosa Christian College, Cooroy
Date of Assessment	May-05
Representative Site Name	Noosa Christian College, Cooroy
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	1
Cover of exotic vegetation	2
Aquatic Ecology	2
total	20
Score	63%

Tributary	Cooroy Creek
WMU	COR3
WMU boundaries	From Cooroy to confluence with Six Mile Creek (left branch)
Sample Site Location	Soccer oval, Cooroy, Squash Courts Cooroy, Lower Mill site, Cooroy
Date of Assessment	May-05
Representative Site Name	Lower Mill site, Cooroy
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	1
Cover of exotic vegetation	2
Aquatic Ecology	2
total	17
Score	53%

Tributary	Happy Jack Creek
WMU	HAP1
WMU boundaries	From confluence of two gorges to near Skyring Creek Road
Sample Site Location	Guthrie Rehabilitation Property, Black Mt and Hill Rehabilitation Property on Happy Jack Creek Road
Date of Assessment	Jan-04
Representative Site Name	Guthrie Rehabilitation Property
Position in Catchment	Upper Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	3
Longitudinal Continuity	3
Width Rating	3
Cover of exotic vegetation	3
Aquatic Ecology	3
total	27
Score	84%

Tributary	Happy Jack Creek
WMU	HAP2
WMU boundaries	From near Skyring Creek Road to confluence with Mary River
Sample Site Location	Happy Jack Creek Road
Date of Assessment	Feb-05
Representative Site Name	Happy Jack Creek Road
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	2
Cover of exotic vegetation	2
Aquatic Ecology	3
total	22
Score	69%

Tributary	Middle Creek
WMU	MID1
WMU boundaries	From headwaters near Black Mountain Road to Andersons Road
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	Data exists - held by MRCCC not available at time of publishing
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	78%

Tributary	Middle Creek
WMU	MID2
WMU boundaries	From Andersons Road to confluence with Skyring Creek
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	Data exists - held by MRCCC not available at time of publishing
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	59%

Tributary	Pinbarren Creek
WMU	PIN1
WMU boundaries	From headwaters to near Binalong Road, Pinbarren
Sample Site Location	Upper Pinbarren Creek Road rainforest remnant
Date of Assessment	Mar-05
Representative Site Name	Upper Pinbarren Creek Road, Pinbarren
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	1
Width Rating	1
Cover of exotic vegetation	3
Aquatic Ecology	2
total	17
Score	53%

Tributary	Pinbarren Creek
WMU	PIN2
WMU boundaries	From Binalong Road, Pinbarren to confluence with Six Mile Creek
Sample Site Location	Pinbarren - Greenridge Road, Cooran; Binalong Road (including Mildner property)
Date of Assessment	Feb-05
Representative Site Name	Pinbarren - Greenridge Road, Cooran
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	25
Score	78%

Tributary	Six Mile Creek		
WMU	SIX1		
WMU boundaries	Rocky headwater waterways from Cooroy Mt to Lake Macdonald Dam		
Sample Site Location	Cooroy Mountain Road		
Date of Assessment		Apr-05	
Representative Site Name	Cooroy Mountain Road		
Position in Catchment	Lower Freshwater		

Attribute			
Physical Form		Apr-05	4-Apr-17
Bed Stability Rating (ISC)		4	4
Artificial Barriers		0	0
Bank Stability		4	4
Habitat & Ecological Condition			
Lowland Habitat Condition		4	3
Upland Habitat Condition			
Longitudinal Continuity		3	4
Width Rating		1	1
Cover of exotic vegetation		3	1
Aquatic Ecology		3	3
total		22	20
Score		69%	63%
MRCCC riparian condition assessment	A-B-C-D		4/4/2017
Vegetation layer structure			B
Shade over water & buffer width			B
Bank stability			B
Level of weed infestation			C
overall			B to B-

Tributary	Six Mile Creek
WMU	SIX2
WMU boundaries	Lake Macdonald spillway to Pomona (downstream of Louis Bazzo Drive)
Sample Site Location	Lake Macdonald Drive, Louis Bazzo Drive, Ringtail State Forest
Date of Assessment	Apr-05
Representative Site Name	Lake Macdonald Drive
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	3
total	28
Score	88%

Tributary	Six Mile Creek
WMU	SIX3
WMU boundaries	Downstream of Louis Bazzo Drive to Falls Creek confluence (Cooran)
Sample Site Location	Grahams Road, Pomona; Cemetry Bridge Kin Kin Rd, Pomona; Yellow Belly Hole reserve, Cooran
Date of Assessment	Feb-05
Representative Site Name	Grahams Road, Pomona
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	26
Score	81%

Tributary	Six Mile Creek
WMU	SIX4
WMU boundaries	Falls Creek confluence at Cooran to Woondum Creek confluence
Sample Site Location	Old Noosa Road, Cooran; Howe Road, Traveston; Woondum Road, Woondum
Date of Assessment	Feb-05
Representative Site Name	Howe Road, Traveston
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	4
Aquatic Ecology	3
total	26
Score	81%

Tributary	Six Mile Creek
WMU	SIX5
WMU boundaries	Woondum Creek confluence to Mary River confluence (MAR9) at Gympie
Sample Site Location	Keefton Road, Gympie; Six Mile Creek Rest Area, Gympie.
Date of Assessment	Nov-04
Representative Site Name	Six Mile Creek Rest Area, Gympie
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	3
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	2
Aquatic Ecology	3
total	26
Score	81%

Tributary	Skyring Creek
WMU	SKY1
WMU boundaries	Skyring Creek Headwaters to Bruce Highway
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	Data exists and is held by MRCCC - not available at time of publishing
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	72%

Tributary	Skyring Creek
WMU	SKY2
WMU boundaries	Bruce Highway to Federal Hall
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	Data exists and is held by MRCCC - not available at time of publishing
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	59%

Tributary	Skyring Creek
WMU	SKY3
WMU boundaries	Federal Hall to Mary River confluence
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	

Attribute	Data exists and is held by MRCCC - not available at time of publishing
Physical Form	
Bed Stability Rating (ISC)	
Artificial Barriers	
Bank Stability	
Habitat & Ecological Condition	
Lowland Habitat Condition	
Upland Habitat Condition	
Longitudinal Continuity	
Width Rating	
Cover of exotic vegetation	
Aquatic Ecology	
total	
Score	53%

Tributary	Dath Henderson Creek
WMU	DHE1
WMU boundaries	Dath Henderson Creek starts above Sunrise Road
Sample Site Location	
Date of Assessment	5/6/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		3
Habitat & Ecological Condition		
Lowland Habitat Condition		1
Upland Habitat Condition		
Longitudinal Continuity		0
Width Rating		0
Cover of exotic vegetation		0
Aquatic Ecology		2
total		10
Score		31%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Dath Henderson Creek
WMU	DHE2
WMU boundaries	
Sample Site Location	
Date of Assessment	5/6/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		3
Habitat & Ecological Condition		
Lowland Habitat Condition		1
Upland Habitat Condition		
Longitudinal Continuity		0
Width Rating		0
Cover of exotic vegetation		0
Aquatic Ecology		2
total		10
Score		31%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Sample Site Location	Dath Henderson Rd	
Date of Assessment		5/6/2017
Representative Site Name	Dath Henderson Rd	
Position in Catchment	Lower Freshwater	

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		3
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		2
Cover of exotic vegetation		3
Aquatic Ecology		3
total		23
Score		72%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Waterford Creek
WMU	WAT1
WMU boundaries	From Sunrise Road to Cooroy Mt Road, Mt Cooroy
Sample Site Location	Solar Road, Cooroy Mt
Date of Assessment	4/4/2017
Representative Site Name	Solar Road, Cooroy Mt (-26.43996 / 152.96749)
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		3
Habitat & Ecological Condition		
Lowland Habitat Condition		1
Upland Habitat Condition		
Longitudinal Continuity		0
Width Rating		0
Cover of exotic vegetation		0
Aquatic Ecology		2
total		10
Score		31%
notes	many riffles, steep riffles no shade over water no buffer width tightly meandering, indicating steepness ferns, reeds on outside bend camphor laurel only tree on creekbanks	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Waterford Creek
WMU	WAT2
WMU boundaries	Starts at Beauty Spot reserve to confluence with Six Mile Creek downstream of Cooroy Mt Rd
Sample Site Location	Cooroy Mt Rd
Date of Assessment	4/4/2017
Representative Site Name	Cooroy Mt Rd
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		3
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		1
Width Rating		1
Cover of exotic vegetation		2
Aquatic Ecology		3
total		16
Score		50%
notes	many riffles, steep riffles	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Six Mile Creek left branch
WMU	SXL1
WMU boundaries	Starts below the ridgeline on Lawnville Road and Cooroy Belli Creek Road to near Mary River Road
Sample Site Location	Melsted Park
Date of Assessment	7/8/1905
Representative Site Name	Melsted Park
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		3
Upland Habitat Condition		
Longitudinal Continuity		2
Width Rating		1
Cover of exotic vegetation		2
Aquatic Ecology		3
total		19
Score		59%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Six Mile Creek left branch
WMU	SXL2
WMU boundaries	From near Mary River Road to near Liane Drive off Lake Macdonald Drivethe creek flows north through forested country with low sinuosity to Elm Street bridge where the creek meanders and becomes more sinuous behind Wimmers (ex PGH Brick factory)
Sample Site Location	Elm St Cooroy; Lawnville Rd
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		3
Width Rating		2
Cover of exotic vegetation		2
Aquatic Ecology		2
total		17
Score		53%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Six Mile Creek left branch
WMU	SXL3
WMU boundaries	From near Liane Drive off Lake Macdonald Drive the creek flows through forested country to the confluence with Six Mile Creek in State Forest
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		2
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		3
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		2
Cover of exotic vegetation		3
Aquatic Ecology		3
total		25
Score		78%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Frogmouth Creek
WMU	FRG1
WMU boundaries	Frogmouth Creek starts on the western side of the Bruce Highway near Holts Road ending on the eastern side of the Bruce Highway near the North Coast railway line on Nandroya Road
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		1
Width Rating		1
Cover of exotic vegetation		2
Aquatic Ecology		3
total		15
Score		47%
notes	access difficult, Nandroya Rd only available, may not be representative	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Frogmouth Creek
WMU	FRG2
	From the North Coast railway line the creek displays a high degree of sinuosity in a partly confined valley setting ending at the Noosa
WMU boundaries	Cooroy Road
Sample Site Location	Cooroy Mt Rd
Date of Assessment	
Representative Site Name	Cooroy Mt Rd
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		1
Width Rating		1
Cover of exotic vegetation		2
Aquatic Ecology		3
total		15
Score		47%
notes		

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Frogmouth Creek
WMU	FRG3
WMU boundaries	From the Noosa Cooroy Road to Lake Macdonald
Sample Site Location	Gumtree Dv
Date of Assessment	
Representative Site Name	Gumtree Dv
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		2
Width Rating		2
Cover of exotic vegetation		3
Aquatic Ecology		3
total		18
Score		56%
notes	immediately above Lake Macdonald	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	School Creek
WMU	SCH1
WMU boundaries	From above Roberts Road, School Creek flows north-easterly towards the Bruce Highway ending at Noosa District High School
Sample Site Location	Roberts Rd
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		1
Upland Habitat Condition		
Longitudinal Continuity		2
Width Rating		1
Cover of exotic vegetation		2
Aquatic Ecology		2
total		14
Score		44%
notes		

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	School Creek
WMU	SCH2
WMU boundaries	From Noosa District High School the creek flows through the Cooroy Golf Course, the North Coast railway line, Miva Street to the confluence with Ferrells Creek
Sample Site Location	Noosa District High pool carpark; or Miva St
Date of Assessment	
Representative Site Name	Miva Street
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		3
Width Rating		3
Cover of exotic vegetation		2
Aquatic Ecology		2
total		18
Score		56%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Ferralls Creek
WMU	FR1
WMU boundaries	From the end of Ferrells Road to near Tree Frog Lane
Sample Site Location	Ferralls Road
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		1
Upland Habitat Condition		
Longitudinal Continuity		2
Width Rating		1
Cover of exotic vegetation		2
Aquatic Ecology		1
total		13
Score		41%
notes		
MRCCC riparian condition assessment	A-B-C-D	
Vegetation layer structure	C	
Shade over water & buffer width	D	
Bank stability	C	
Level of weed infestation	C	
overall	C to C-	

Tributary	Ferralls Creek
WMU	FR2
WMU boundaries	From near Silverleaf Lane to the Bruce Highway
Sample Site Location	Roberts Drive
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		2
Upland Habitat Condition		
Longitudinal Continuity		3
Width Rating		2
Cover of exotic vegetation		2
Aquatic Ecology		3
total		18
Score		56%
notes		

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Ferralls Creek
WMU	FR2a
WMU boundaries	Above Bruce Highway interchange to Cooroy Golf Course (stream realignment)
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form	0 to 4 (best score)	
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		2
Habitat & Ecological Condition		
Lowland Habitat Condition		1
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		2
Cover of exotic vegetation		3
Aquatic Ecology		1
total		17
Score		53%
notes	stream realignment	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Ferralls Creek
WMU	FR2b
WMU boundaries	From Cooroy Golf Course to confluence with Frogmouth Creek (towards the confluence the valley margin tightens, reflecting a confined valley setting)
Sample Site Location	Miva St
Date of Assessment	
Representative Site Name	Miva St
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	0 to 4 (best score)
Bed Stability Rating (ISC)	4
Artificial Barriers	0
Bank Stability	2
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	3
Width Rating	3
Cover of exotic vegetation	3
Aquatic Ecology	2
total	19
Score	59%
notes	starts in the golf course with minimal buffer width good buffer and vegetation downstream of Miva St

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	C
Shade over water & buffer width	D
Bank stability	C
Level of weed infestation	C
overall	C to C-

Tributary	Burgess Creek
WMU	BUR1
WMU boundaries	Starts from heathland wetland in Noosa National Park near Cooyar Street
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	32
Score	100%
notes	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	D
Shade over water & buffer width	C
Bank stability	A
Level of weed infestation	D
overall	C-

Tributary	Burgess Creek
WMU	BUR2
WMU boundaries	From upstream of Eenie Creek Road to a series of waterholes in Noosa National Park
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	4
Aquatic Ecology	4
total	32
Score	100%
notes	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	D
Shade over water & buffer width	C
Bank stability	A
Level of weed infestation	D
overall	C-

Tributary	Burgess Creek
WMU	BUR3
WMU boundaries	From upstream of boardwalk crossing (Rainbow Park) Burgess Creek near Rainbow Crescent to downstream of David Low Way where the creek enters the Pacific Ocean
Sample Site Location	Boardwalk crossing in Rainbow Park, Sunshine Beach
Date of Assessment	4/18/2017
Representative Site Name	Boardwalk crossing in Rainbow Park; -26.42499689 153.10251369
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	1
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	1
Cover of exotic vegetation	2
Aquatic Ecology	1
total	19
Score	59%
notes	creek dominated by weedy groundcover, no canopy canopy destroyed by severe mile a minute infestation no shade over the water good creekflow - excessive due to STP inputs some paperbark, ferns Ludwigia and large leaved Persicaria (white flower) dominant Easter cassia

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	D
Shade over water & buffer width	C
Bank stability	A
Level of weed infestation	D
overall	C-

Tributary	Sunrise Creek
WMU	SUN1
WMU boundaries	stormwater drain, starts near Heathland Pk,
Sample Site Location	
Date of Assessment	5/1/2017
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	0
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	0
Upland Habitat Condition	
Longitudinal Continuity	2
Width Rating	0
Cover of exotic vegetation	0
Aquatic Ecology	0
total	10
Score	31%
notes	creek influenced strongly by stormwater inputs lacking instream features significant weed infestation

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	D
Shade over water & buffer width	C
Bank stability	A
Level of weed infestation	D
overall	D

Tributary	Sunrise Creek
WMU	SUN2
WMU boundaries	From below David Low Way the creek exits stormwater drain near Swan Ave and flows through a confined valley created by sand dunes to the Pacific Ocean on Sunrise Beach
Sample Site Location	Swan Street, below David Low Way roundabout
Date of Assessment	4/18/2017
Representative Site Name	Swan Street, below David Low Way roundabout; -26.409756° 153.107127°
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	0
Cover of exotic vegetation	3
Aquatic Ecology	2
total	23
Score	72%
notes	creek influenced strongly by stormwater inputs lacking some instream features eg. significant large woody debris small sand and gravel bars forming river reed (Phragmites dominant)

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	B
Shade over water & buffer width	B
Bank stability	A
Level of weed infestation	B
overall	B

Tributary	Seaview Creek
WMU	SEV1
WMU boundaries	Starting in the Noosa National Park and entering Dolphin Bay Park, ending at Seaview Terrace
Sample Site Location	Dolphin Bay Park boardwalk
Date of Assessment	4/18/2017
Representative Site Name	Dolphin Bay Park boardwalk; -26.397708 153.111284
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	0
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	1
Cover of exotic vegetation	4
Aquatic Ecology	3
total	24
Score	75%
notes	excellent perched swamp - wallum creek habitat steep waterway flowing out of National Park Paperbark, Cheesetree, Bleeding heart, brush box, Melastoma, sword sedge, climbing maiden hair fern, sedges & reeds Significant fish passage issue below on Seaview Tce, however unlikely that fish will be moving into this stream from the ocean Houses built close to waterway on right bank, however good buffer exists on left hand bank
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	B
Bank stability	A
Level of weed infestation	A
overall	A- to B+

Tributary	Seaview Creek
WMU	SEV2
WMU boundaries	From above Seaview Terrace to Sunshine Beach
Sample Site Location	Above Seaview Terrace in Dolphin Bay reserve
Date of Assessment	4/4/2017
Representative Site Name	Above Seaview Terrace; -26.399033 153.112544
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		0
Upland Habitat Condition		
Longitudinal Continuity		0
Width Rating		0
Cover of exotic vegetation		4
Aquatic Ecology		0
total		12
Score		38%
notes	no habitat values steep rock lined channel to Seaview Tce appears to have been significant subsidence in the past appear stable now	

Tributary	Castaways Creek
WMU	CAS1
WMU boundaries	Castaways Creek commences in heathland wetland in the Noosa National Park to near Moonbeam Park (Moonbeam Crescent)
Sample Site Location	Upstream of Moonbean Park
Date of Assessment	4/18/2017
Representative Site Name	National Park
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	4
total	30
Score	94%
notes	healthy waterway
	sedges and paperbark dominant, some Banksia robur
	sand bar forming - possibly due to interference from bridge maintenance - naturally trying to constrict

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A-

Tributary	Castaways Creek
WMU	CAS2
WMU boundaries	From near Moonbean Park, crossing David Low Way entering the Pacific Ocean at Marcus Beach Park
Sample Site Location	David Low Way, under bridge on concrete path
Date of Assessment	4/18/2017
Representative Site Name	David Low Way, under bridge on concrete path; -26.438324 153.104303
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	4
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	4
total	30
Score	94%
notes	healthy waterway Singapore daisy and mile a minute present confined section of creek, with no open body of water sedges and paperbark dominant, some Banksia robur sand bar forming - possibly due to interference from bridge maintenance - naturally trying to constrict
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A-

Tributary	Marcus Creek
WMU	MCS1
WMU boundaries	Marcus Creek commences in a broad valley of heathland wetland in Noosa National Park behind the Marcus Beach village
Sample Site Location	National Pak upstream of Marcus Beach village
Date of Assessment	4/18/2017
Representative Site Name	National Park
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		4
Artificial Barriers		0
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		4
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		4
Cover of exotic vegetation		3
Aquatic Ecology		3
total		26
Score		81%
notes	dominated by paperbark	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Marcus Creek
WMU	MCS2
WMU boundaries	From near Peppertree Close, changing direction of flow to the north-east upstream of David Low Way where the creek enters the Pacific Ocean at Marcus Beach in a small ICOL
Sample Site Location	David Low Way, Marcus Beach
Date of Assessment	4/18/2017
Representative Site Name	David Low Way, Marcus Beach (upstream of culvert); -26.450871 153.101799
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	0
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	4
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	4
Cover of exotic vegetation	3
Aquatic Ecology	3
total	26
Score	81%
notes	dominated by paperbark some open water above culvert, river reed (Phragmites) present Channel filled with sand, relatively confined by sand dune to north Umbrella tree present downstream of road bad culvert with 1m+ head loss, and weedy
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Lorikeet Creek
WMU	LOR1
WMU boundaries	Starting in the Noosa National Park to David Low Way, Peregian
Sample Site Location	
Date of Assessment	
Representative Site Name	
Position in Catchment	Lower Freshwater

Attribute		
Physical Form		
Bed Stability Rating (ISC)		4
Artificial Barriers		2
Bank Stability		4
Habitat & Ecological Condition		
Lowland Habitat Condition		4
Upland Habitat Condition		
Longitudinal Continuity		4
Width Rating		4
Cover of exotic vegetation		3
Aquatic Ecology		4
total		29
Score		91%
notes	in National Park above David :Low Way	

MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Lorikeet Creek
WMU	LOR2
WMU boundaries	From David Low Way to Pacific Ocean - channelised fill under DL Way and Lorikeet Dv flowing into paperbark wetland formed by sand dune into confined channel to ocean
Sample Site Location	Below Lorikeet Drive, Peregian - closed road culvert (-26.49870203 153.09311498)
Date of Assessment	4/18/2017
Representative Site Name	Lorikeet Drive, Peregian - closed road culvert (-26.49870203 153.09311498)
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	2
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	3
Cover of exotic vegetation	3
Aquatic Ecology	3
total	26
Score	81%
notes	Paperbark backwater swamp behind sand dune
	Old road crossing closed, culvert revegetated
	Old crossing altered hydrology by constricting flows - previously a paperbark swamp
	no standing water observed
	reed beds and paperbark
	Paragrass on apron of culvert and Elephant ear vine
	Mile a minute establishing
	Tall sedges, climbing maiden hair fern, Blechnum fern
	?Tributary of Stumers Creek - flowing parallel with beach into creek
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Peregian Creek
WMU	PER1
WMU boundaries	Commencing in National Park to upstream of David Low Way
Sample Site Location	Persimmon Drive, Peregian
Date of Assessment	4/18/2017
Representative Site Name	Persimmon Drive, Peregian -26.45859494 152.09612022
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	0
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	3
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	3
Aquatic Ecology	3
total	23
Score	72%
notes	wetland dominated by paperbark and ferns no open water, and not very deep weedy near stormwater drain, otherwise very healthy Paragrass, broad leaved peppertree, lantana Climbing maidenhair fern Culvert could be barrier - altered hydrologic regime by confining flows under road - previously a broad wetland
MRCCC riparian condition assessment	A-B-C-D
Vegetation layer structure	A
Shade over water & buffer width	A
Bank stability	A
Level of weed infestation	B
overall	A- to B+

Tributary	Peregian Creek
WMU	PER2
WMU boundaries	From upstream of David Low Way to Pacific Ocean
Sample Site Location	David Low Way, Peregian - upstream side of culvert
Date of Assessment	4/18/2017
Representative Site Name	David Low Way, Peregian - upstream side of culvert -26.461320 153.098287
Position in Catchment	Lower Freshwater

Attribute	
Physical Form	
Bed Stability Rating (ISC)	4
Artificial Barriers	0
Bank Stability	4
Habitat & Ecological Condition	
Lowland Habitat Condition	2
Upland Habitat Condition	
Longitudinal Continuity	4
Width Rating	2
Cover of exotic vegetation	2
Aquatic Ecology	2
total	20
Score	63%
notes	dominated by Singapore daisy Phragmites present Paperbark dominant tree layer, some Umbrella tree culvert fish passage issues