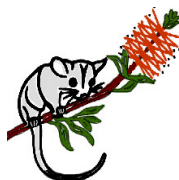# MANGROVE AND BANK STABILITY ASSESSMENT

PITT STREET PRECINCT, TAREE

Prepared for
SKM Pty Ltd & Greater Taree City Council

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1.0 INTRODUCTION

This report has been prepared by Ecotone Ecological Consultants Pty Ltd in response to a request Sinclair Knight Merz Pty Ltd (SKM). As part of the preparation of the rezoning proposal for the Pitt Street Waterfront Precinct, the Rezoning Consultation Group agreed that further investigation into mangrove distribution, bank stability and erosion potential at the Precinct was required.

This report details the results of field investigations and provides a brief assessment of potential impacts on mangrove assemblages and bank stability within the study area based on the current version of the Concept Masterplan. The study area is shown on **Figure 1** and comprises the Manning River riparian zone and the unnamed tributary. The current version of the Concept Masterplan is included as **Figure 2**.

The information provided in this report will assist the Masterplanner in locating maritime structures so as to minimise impacts on marine habitat and will assist the preparation of any formal impact assessment.

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Figure 1. Study Area

Mangrove and Stream Bank Assessment, Pitt St, Taree

Ecotone Ecological Consultants Pty Ltd

May 2008

Figure 2. Plan of Proposed Development

May 2008

Mangrove and Stream Bank
Assessment, Pitt St, Taree

Ecotone Ecological Consultants Pty Ltd

CONCEPT MASTERPLAN

Plan Source: Suters Architects Pty Ltd

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2.0 METHODS

2.1 Mangroves

A survey of mangrove assemblages within the study area was conducted by two people on the 16th and 17th of April, 2008. The survey was conducted predominantly by boat, however the unnamed tributary was surveyed on foot as this proved to be a more effective method in this area. The aim of the survey was to map and describe mangrove assemblages within the study area, including the density, species composition and general condition of each stand.

The survey was conducted in accordance with guidelines provided by SKM and the following attributes were recorded for each stand of mangroves:

- Species composition
- Trunk counts for each species
- Canopy density (average)
- Canopy height (average and maximum)
- Ecological condition (from 1-5, with 1 representing the best condition)
- Disturbance (the source and level of any disturbance)
- Habitat value

The locations of any significant fauna or flora species were also recorded using a hand-held GPS.

Mapping of the canopy extent for each mangrove stand was undertaken using a hand-held GPS, with points taken at the edge of the canopy and the canopy width recorded for each stand. GPS points were taken at approximately five metre intervals along each stand (including the start and end points for each stand). GPS points were also taken at sections where the canopy width changed. Each mangrove stand was mapped as a polygon overlaid on an aerial photo background using MapInfo and attributed with the survey information collected in the field.

One limitation of the survey was that the GPS accuracy varied between 5-10 metres and many of the mangrove stands were less than 10 metres in width, with stands at the western end averaging two metres in width. While the use of an aerial photo assisted in interpreting the field GPS points, the results of the mangrove mapping should only be considered accurate to within 5-10 metres.

2.2 Bank Stability and Erosion Potential

A survey of bank stability and erosion potential along the Manning River and unnamed tributary was undertaken by two people on the 16th and 17th of April, 2008. The survey was conducted predominantly by boat, however the unnamed tributary was surveyed on foot as this proved to be a more effective method in this area. The aim of the survey was to map and describe bank condition within the study area, including any areas of overhang, slumping, degradation and aggradation.

The survey was conducted in accordance with guidelines provided by SKM and the following attributes were recorded for each section of bank at approximately ten metre intervals:

- Presence and degree of erosion, overhang, slumping, or aggradation (see definitions below) as well as general degradation.

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- Height
- Slope
- Overall condition (from 1-5, with 1 representing the best condition)
- Weed infiltration (from 0-5, with 0 representing no weeds)
- Location of any point sources of disturbance (eg. drains, stormwater outflow pipes, jetties, maritime structures).

Definitions of the types of bank instability (modified from Department of Natural Resources and Water 2007) follow:

Erosion: The direct removal of soil and sediment from stream banks by flowing water;
Overhang: Undermining of the bank by wave action resulting in an overhanging section;
Slumping: The breaking off and collapse of sections of the bank into the stream as a consequence of stream bank erosion; and
Aggradation: The build-up of bank material at the bank base through the deposition of sediments by water and wave action.

Mapping of bank condition within the study area was undertaken using a hand-held GPS, with points taken at approximately every ten metres or where bank condition was observed to change. Each section of bank was mapped as a line feature overlaid on an aerial photo background using MapInfo and attributed with the survey information collected in the field.

The overall condition of the bank in each section was determined using a modified form of the methodology outlined in the *Queensland Community Waterway Monitoring Manual* (Department of Natural Resources and Water 2007) (Method 1).

As for the mangrove survey, GPS accuracy was a limiting factor and the results of the bank condition mapping should only be considered accurate to within 5-10 metres.

2.3 Water

The latest Concept Masterplan was provided by SKM for comment regarding potential impacts on water quality and nutrient enrichment. Since the current Concept Masterplan is very basic, only general comments on potential point sources of water pollution post construction and water management issues during construction were able to be made.
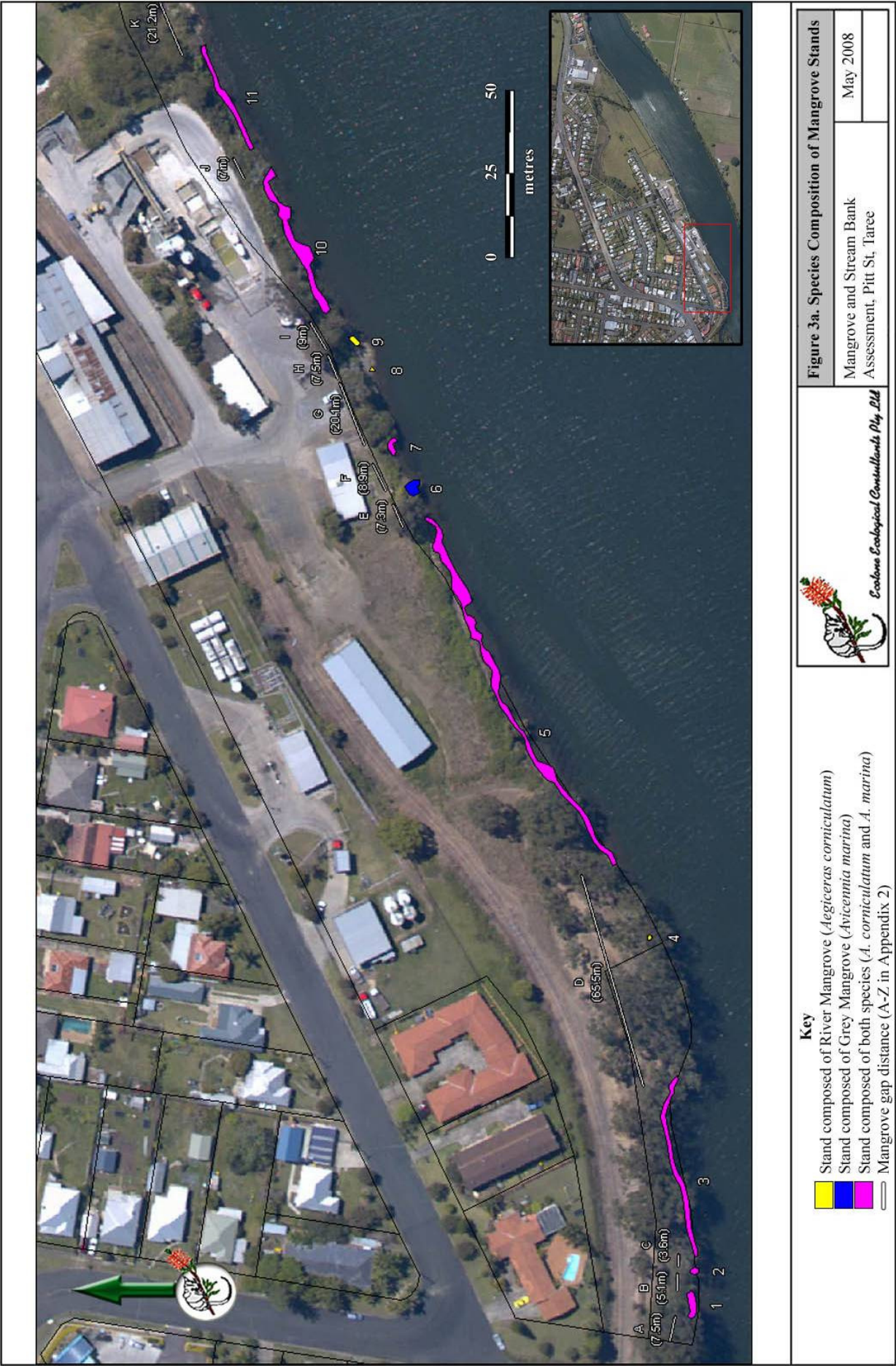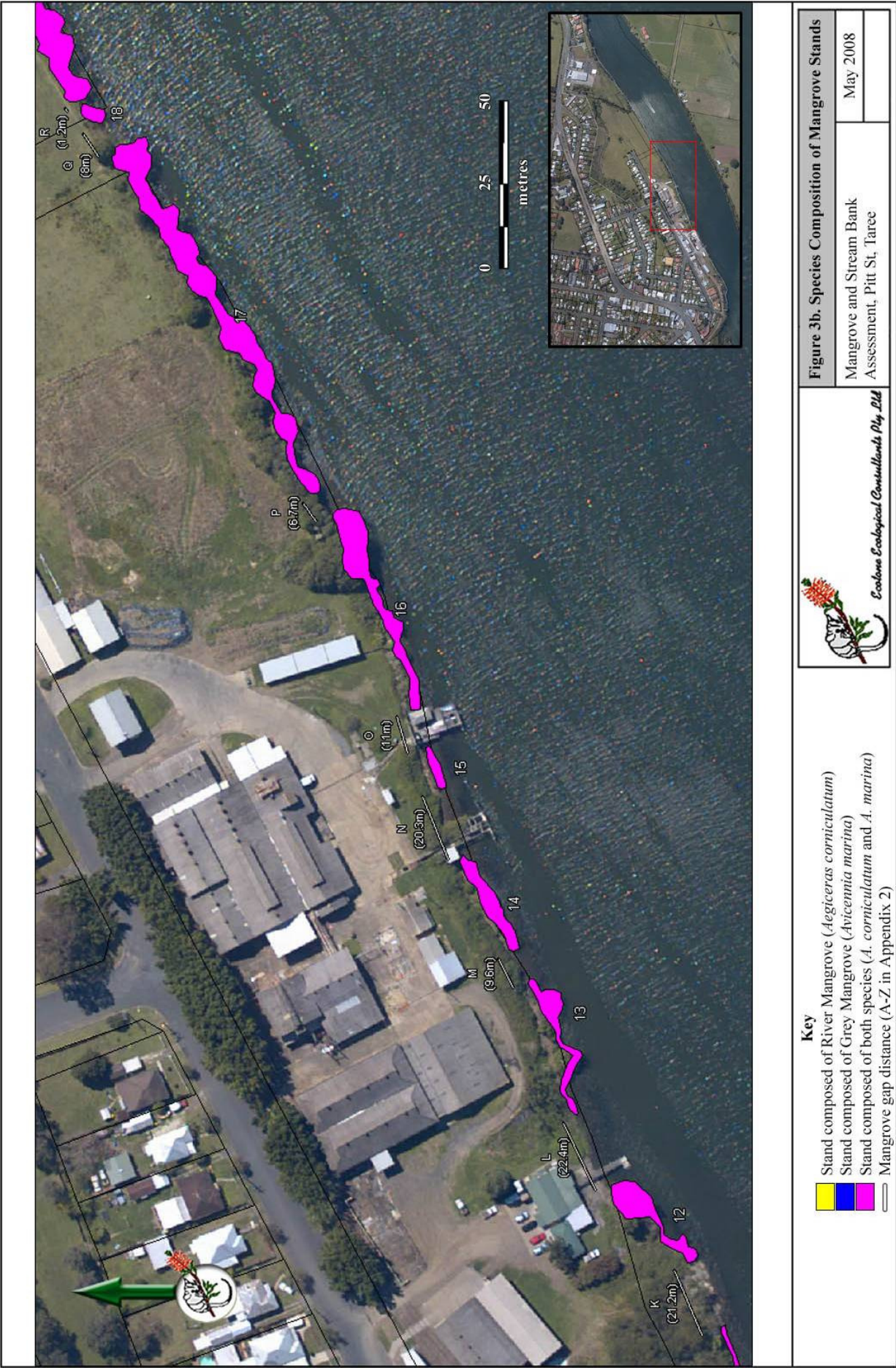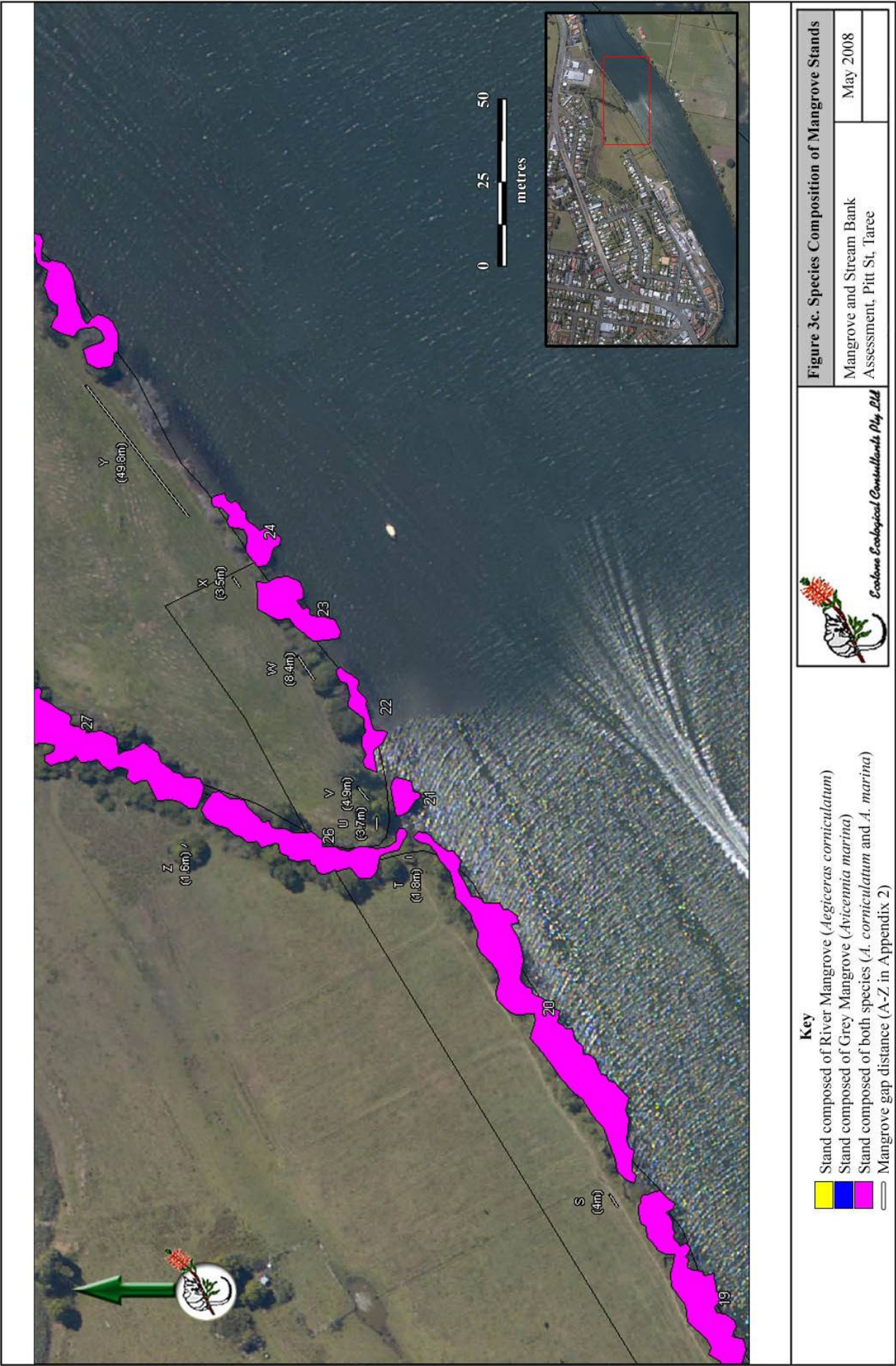
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3.0 RESULTS

3.1 Mangroves

Species Composition

During field survey work, mangroves were found to occur throughout the entire study area, though occurred in wider stands and greater numbers in the western half of the study area. Two mangrove species, the river mangrove (*Aegiceras corniculatum*) and grey mangrove (*Avicennia marina*), were found to occur.

The eastern half of the study area contained mostly scattered small clumps of immature river mangroves. Very few grey mangroves were found to occur at the eastern end of the study area, with numbers of grey mangroves increasing further west. Large stands of mature grey mangroves were recorded in the western half of the study area along the Manning River and unnamed tributary. During the field survey it was noted that very few immature grey mangroves occurred anywhere along the study area while numerous clumps of immature river mangroves were observed. Figures 3a to 3d show the species composition of each mangrove stand within the study area. As can be seen from the figures, most of the stands contained both species of mangroves. However stands at the eastern end were composed mostly of river mangroves, with only very few grey mangroves recorded. The bulk of grey mangroves were recorded in the western half of the site, with river mangroves also more numerous in this area. The number of each species recorded within each mangrove stand is included in **Appendix 1**. A table detailing the gap distances between the canopies of adjacent mangrove stands is included in **Appendix 2**.

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Figure 3a. Species Composition of Mangrove Stands

Mangrove and Stream Bank Assessment, Pitt St, Taree

May 2008

Ecotone Ecological Consultants Pty Ltd

Key

Stand composed of River Mangrove (*Aegiceras corniculatum*)

Stand composed of Grey Mangrove (*Avicennia marina*)

Stand composed of both species (*A. corniculatum* and *A. marina*)

Mangrove gap distance (A–Z in Appendix 2)

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Figure 3b. Species Composition of Mangrove Stands

Mangrove and Stream Bank Assessment, Pitt St, Taree

May 2008

Ecotone Ecological Consultants Pty Ltd

Key

Stand composed of River Mangrove (*Aegiceras corniculatum*)

Stand composed of Grey Mangrove (*Avicennia marina*)

Stand composed of both species (*A. corniculatum* and *A. marina*)

Mangrove gap distance (A–Z in Appendix 2)

Figure 3c. Species Composition of Mangrove Stands

Mangrove and Stream Bank
Assessment, Pitt St, Taree

May 2008

Ecotone Ecological Consultants Pty Ltd

Key
Stand composed of River Mangrove (*Aegiceras corniculatum*)
Stand composed of Grey Mangrove (*Avicennia marina*)
Stand composed of both species (*A. corniculatum* and *A. marina*)
Mangrove gap distance (A-Z in Appendix 2)

Figure 3d. Species Composition of Mangrove Stands

Mangrove and Stream Bank Assessment, Pitt St, Taree

May 2008

Ecotone Ecological Consultants Pty Ltd

Key

Stand composed of River Mangrove (*Aegiceras corniculatum*)

Stand composed of Grey Mangrove (*Avicennia marina*)

Stand composed of both species (*A. corniculatum* and *A. marina*)

Mangrove gap distance (A-Z in Appendix 2)

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<u>Mangrove Density</u>

Mangrove density was found to be greater in those areas containing a greater proportion of river mangroves. River mangroves were found to occur in dense clumps, with numerous stems occupying a relatively small area. Grey mangroves predominantly occur as large mature trees with a wide canopy spread (with individual trees reaching a height of up to 13 metres and a canopy width of 15 metres).

Figures 4a to 4d show the density of each mangrove stand based on the number of stems per unit area. Given the structural differences of the two mangrove species, these figures provide a skewed picture of mangrove density within the study area. While stands of mangroves in the western half of the study area appear to have a low density according to the figures, this is due entirely to the wider canopy of the greater numbers of grey mangroves in this area.

Based on the actual number of stems counted, numbers of both mangrove species were greater in the western half of the study area, with the eastern half of the study area containing far fewer plants. Full details of stem counts and mangrove density within each stand are included in **Appendix 1**.

<u>Ecological Condition</u>

The ecological condition of mangrove stands was found to be generally good throughout most of the study area. Dieback of mature grey mangroves was observed along an approximately 350 metre stretch of the Manning River (starting 100 metres west of the tributary mouth and running west). Figures 5a to 5d show the ecological condition of mangrove stands within the study area. Details of the ecological condition of each stand are included in **Appendix 1**.

<u>Disturbance</u>

A number of potential sources of disturbance were recorded within the study area, including weeds, rubbish, drain outlets and artificial structures (jetties, pylons, etc.). The main weeds recorded were lantana and balloon vine, with the latter completely covering the canopy in some areas. Rubbish was observed to have accumulated at a number of locations, mostly consisting of plastic bags and bottles, with some larger items also observed (eg. shopping trolley, bike).

Point source disturbance factors recorded within the study area include culverts, drains, jetties, pylons and disused boat ramps. The locations of these features are shown in Figures 6a to 6d. The impact of these structures on mangroves within the study area is difficult to determine without conducting a long-term study. However pollutants and nutrients from drains and stormwater outlets could potentially affect mangroves by impacting water quality and structures such as jetties and pylons could affect water flow and wave action, thus indirectly impacting nearby mangroves.

Towards the eastern end of the study area, an approximately 150 metre stretch of bank has been concreted in the past, probably to control erosion in this area. As mangroves were recorded along this stretch, it is uncertain to what extent the concreted bank has affected mangrove stands in this area. Details of each point source disturbance attribute recorded within the study area are included in **Appendix 3**.

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