MOODY CREEK DRAINAGE MANAGEMENT PLAN

STAGE 2 REPORT – EVALUATION OF OBJECTIVES AND STRATEGY OPTIONS
ISSUE 2-FINAL

CAIRNS REGIONAL COUNCIL
PO BOX 359
CAIRNS QLD 4870

DECEMBER 2010

GC100099

VDM Consulting
Level 8, Australia Fair Tower, 42 Marine Parade
PO Box 3766, Australia Fair
Southport QLD 4215

Document Control Sheet

Moody Creek Drainage Management Plan Stage 2

Report Details:

Title: **Author(s):** **File reference:**	Moody Creek Drainage Management Plan Stage 2 Philip Bell Drainage Management Plan Stage 2 Final
Project Leader: **Phone:** **Email:**	Eddie Reynolds 07 4953 1055 Eddie.Reynolds@vdmgroup.com.au
Client: **Client Contact:**	Cairns Regional Council Ed Kulpa
Synopsis:	The Stage 2 report develops the Drainage Management Strategy to the business case stage, provides detailed cost estimates for the Implementation Plan and information for the Community Consultation Phase.

Revision History:

Issue	Date	Author	Reviewer	Approved
1 - Draft	1 December 2010	Philip Bell Principal Water Engineer	Eddie Reynolds Principal Engineer-Cairns	Philip Bell RPEQ 1802
2 - Final	16 December 2010	Philip Bell Principal Water Engineer	Eddie Reynolds Principal Engineer-Cairns	Philip Bell RPEQ 1802

Recipients are responsible for eliminating all superseded documents in their possession.

Contents

Moody Creek Drainage Management Plan Stage 2

Figures

Tables

Executive Summary

This Executive Summary has been prepared especially to provide information to the community in regard to the Moody Creek Drainage Management Strategy options considered, and to provide information on the evaluation process.

Cairns Regional Council has commissioned the Moody Creek Drainage Management Study to develop an understanding of the flooding problems in the catchment and to examine the options for improving flood immunity to property and infrastructure in the urban area.

This study included the following key phases:

- Flood model to understand flooding - flood mapping;
- Test alternative strategies to reduce flooding;
- Assess environmental values of the creek riparian area;
- Assess water quality in the creek;
- Community feed-back;
- Cost/benefit analysis of options;
- Damage cost model;
- Prepare a drainage infra-structure Implementation plan; and
- Stage 3 Report and Infrastructure Plan.

This summary provides an information package for the community to display the state of deliberations to date – Stage 2.

Feed-back from the community is welcomed.

Figure 1 is the map which describes all the catchment features and the location of the flood mitigation scheme.

The outputs from the flood model are described below.

Figure 2 is the 1 in 100 year flood event map which indicates that up to 1000 properties could be flooded.

Figure 3 is the 1 in 20 year flood event map which indicates that up to 500 properties could be flooded.

Figure 4 is the 1 in 2 year flood event map indicates that up to 120 properties could be flooded.

The 1 in 20year flood damage model indicates that the cost of flooding to private property owners over the next 20years could exceed $64m.

This is the basis, together with the community feed-back, for council considering a flood mitigation strategy to be encapsulated in this Drainage Management Strategy.

COMMUNITY CONSULTATION

A flyer mail-out to 700 householders in the flood affected areas in November 2010, yielded some 57 written responses to date describing the householders experiences with flooding, including photographs and videos which mainly focus on the February 2009 flood (the most recent severe flood in the catchment). These responses re-affirmed the findings of the flood study and in particular express a concern among the resident population that flooding is a serious social and economic issue in the Moody Creek catchment.

The flyer has also been posted in an online survey on the Cairns Regional Council website, and following adoption of the Stage 2 Report by Cairns Regional Council, this Executive Summary will be placed on

display for community and key stakeholder feedback. This will include public display in the Cairns Regional Council Office, Manunda Library, and online. A copy of the Executive Summary is to be sent to all the key stakeholders identified in the Community Engagement Strategy (prepared by VDM Consulting 2010).

The results of the community engagement process will be collated and presented in the Community Engagement Report (Stage 3 of the project).

STREAM MANAGEMENT OBJECTIVES

Following the development of the flood model, the water quality model and the stream environmental assessment several objectives have been shown to be achievable with careful planning.

Objective 1: Improve flood conveyance capacity of Moody Creek and tributary drains to contain the 1 in 20 year flood event

Objective 2: Improve street culvert capacity where possible to allow safe passing of vehicles where there is no safe alternative route for the 1 in 100 year event as described in QUDM.

Objective 3: Implementation of 'Development Controls' to ensure that flooding and water quality outcomes are not worsened by the development of the Moody Creek catchment in accordance with CairnsPlan.

Objective 4: Develop a program to improve environmental health and water quality in the Moody Creek catchment

COMPONENTS OF THE DRAINAGE MANAGEMENT STRATEGY

There are three (3) components to the Drainage Management Strategy. These are:

1. Flood Mitigation Strategy;
2. Water Quality Improvement Strategy; and
3. Riparian Restoration Strategy.

1. Flood Mitigation Strategy

The Flood Mitigation component of the strategy consists of several components including:

- Stronger development controls to ensure that future development does not worsen the existing flooding problems;
- A flood mitigation dam upstream on Ramsey Drive to reduce peak flood flows and to reduce flooding generally in the catchment;
- Conveyance improvements along Moody Creek, Cochrane's Drain and Chinaman Creek Drain; and
- A tidal gate and major pump station downstream of Spence Street.

These measures when fully implemented will reduce the number of properties currently flooded by 100, and reduce the depth of flooding in a further 200 properties. These measures will improve the flood immunity to greater than 1 in 10 year events for most of the street culverts in the catchment.

A flood damage model has been prepared which indicates that flooding currently could cost the community up to $64.3m over the next 20 years.

The study also shows that if the strategy is implemented over the next 4 years at a capital cost of $4.4m the future flood damage bill will be reduced by $30.3m, and all existing street culverts will satisfy the flooding requirements of QUDM.

A stormwater pump station option was considered, but the additional $18m in capital cost yielded very little improvement to flooding and failed the cost/benefit test.

Figure 1 shows the location of the proposed flood mitigation works.

Note that numerous flood mitigation options and sites for flood mitigation dams have been considered. At Council's request the consultant has considered in more detail the option of raising the existing dam to maximum capacity identified as Site 1A. The results showed that the additional cost of approximately $600,000 yielded very little improvement in the depth of flooding and failed to pass the cost/benefit criteria.

2. Water Quality Improvement Strategy

Council has an ongoing water quality monitoring program. Water quality monitoring performed as part of the Stage 1 report indicates that most parameters measured fell below the QLD Healthy Waterways Guidelines for healthy ecosystems.

Maintaining the long term health of the waterway is in the public interest with respect to environmental and social opportunities. Council is legitimately considering a capital works program and an on-going maintenance program to improve the waterway health.

The Water Quality Improvement Strategy consists of three (3) components:

- **Strategy 1 :** Stronger Development Controls-
  To ensure new developments install water quality improvement devices to comply with QLD Healthy Waterways Guidelines for healthy ecosystems.

- **Strategy 2 :** Retrofit water quality improvement devices -
  Several water quality improvement devices have been proposed as part of the strategy to ensure that key water quality parameters are set on a track towards compliance with QLD Healthy Waterways Guidelines.

- **Strategy 3 :** Target Known Sources of Pollution-
  Identify point source pollution and instigate clean up and/or treatment.eg. bare sites subject to erosion, building sites, commercial premises with high litter production.

Figure 1 identifies the proposed sites for the installation of water quality improvement devices. These measures have been included in the Implementation Plan but with a lower priority than flood mitigation measures as indicated by the cost/benefit analysis. Table 1 below includes the provisions for water quality improvement devices.

3. Riparian Restoration Strategy

Riparian vegetation of the Moody Creek catchment is generally highly degraded and whilst the upper reaches of Moody Creek contain high levels of native vegetation cover and connectivity to forested areas, clearing and urban development have reduced regenerative potential particularly in the lower estuarine sections. It is recognised that whilst some areas have low resilience and are being further degraded by weeds, these areas are still recoverable through planting and other rehabilitation techniques. A Riparian Restoration Strategy has been prepared which outlines the general rehabilitation approach recommended for the Moody creek catchment, to a site level. This has been based upon:

- The Marine Plants Management Strategy produced by Cairns Regional Council, specifically the Site-Based Operational Plan for Chinaman Creek Catchment (Moody Creek, Spence St Drain and Swallow St Drain Waterway Management Units) for the tidal extent of the catchment; and
- Field assessment of restoration potential and priority for the freshwater sections in the upper catchment.

Treatment methods and priorities for the estuarine extent of the Moody Creek waterways have been derived from the Marine Plants Management Strategy and generally involve the removal, modification or retention of marine plants. Treatment methods and priorities for the freshwater sections of Moody Creek

are based on field assessments undertaken by VDM Consulting ecologists and broadly involve assisted natural regeneration (weed control), reconstruction or fabrication (planting) or a combination of these.

The Riparian Restoration Strategy for Moody Creek is summarised in Section 6. The Draft Implementation Plan below recommeds the expenditure of some $300,000 over 5 years for revegetation and weed control.

Draft Implementation Plan

The Draft Implementation Plan is summarised in Table 1 below. The Draft Implementation strategy has been developed from exhaustive modelling and costing of alternatives and includes measures for:

- Flood mitigation;
- Water quality improvements; and
- Stream rehabilitation.

Based on the analysis in Section 11 the Priority Infrastructure Plan (PIP) version 2 is recommended as reproduced below as Table 1.

This PIP should deliver a net capital gain of $22m over 20 years.

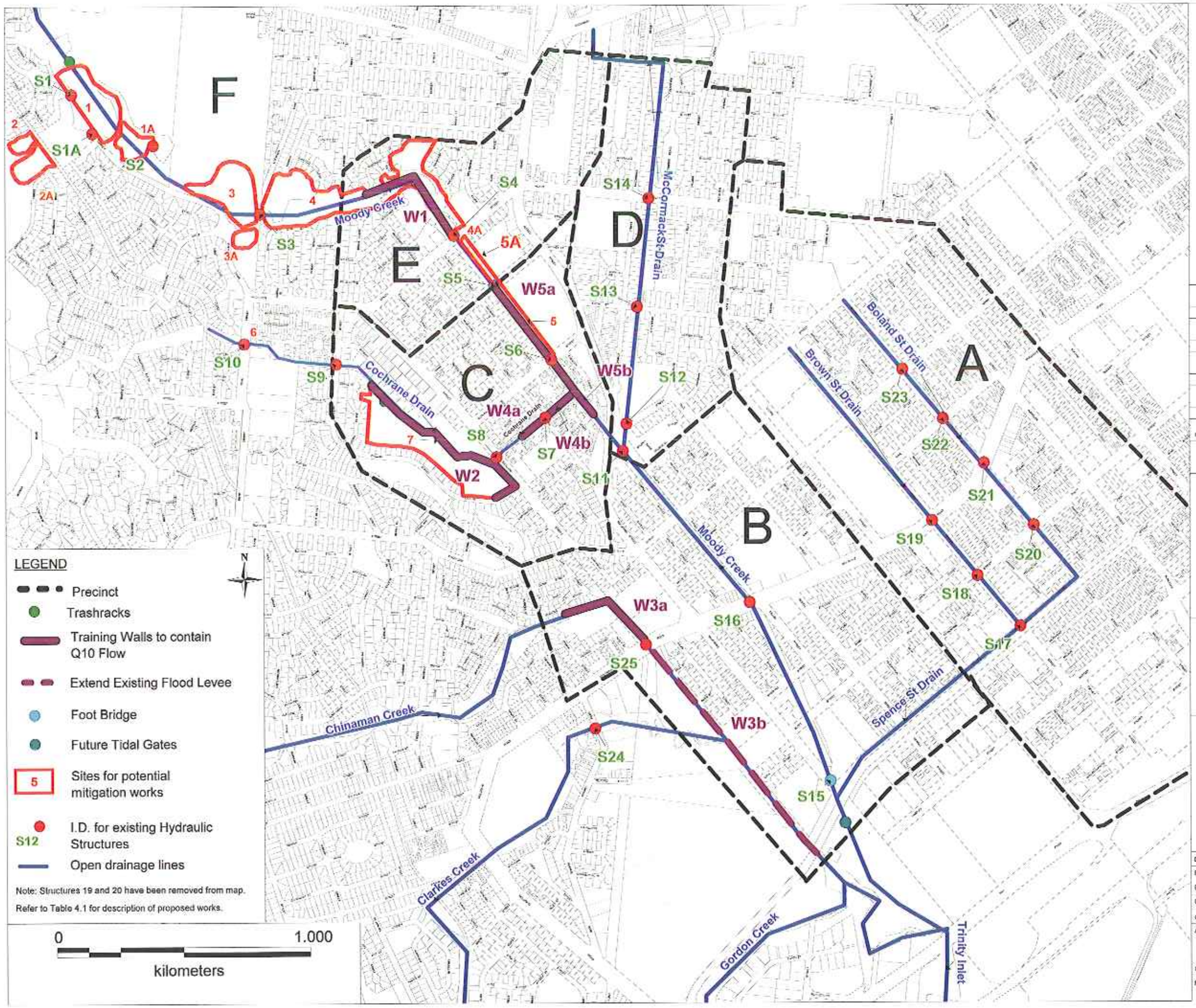
Table 1: Table of Works and Costs – P.I.P. Version 2

Priority	Description	Year Completed	Cost 2010 $	Actual Cost	Total Budget
A	Flood Mitigation Dam at Site 1	2012	$1.4m	$1.5m	**$1.72m**
	GPT for RainTrees Shopping Centre		$0.10m	$0.11m	
	Install Trash racks site 1 and 7		$0.08m	$0.10m	
B	Training walls W1,W2,W3	2014	$0.98m	$1.1m	**$1.34m**
	Moody Creek GPT & Nutrient Stripping area		$0.10m	$0.12m	
	Riparian Restoration phase 1		$0.10m	$0.12m	
C	Training Walls to Moody Creek adjacent to Cochrane St, and Cochrane's Drain adjacent to Moody Creek	2016	$0.78m	$0.95	**$1.08m**
	Riparian Restoration phase 2		$0.10m	$0.13m	
D	Riparian Restoration phase 3	2018	$0.10m	$0.14m	**$0.14m**
	TOTAL CAPITAL PIP VERSION 2				**$4.28m**

Options for funding are being considered currently by Council and further advice will be provided to the community as options are defined.

Figure 5 attached indicates the flood improvement for the 1 in 20 year event after implementation of priority C works. This can be compared with Figure 3 to gauge the level of flood improvement.

MOODY CREEK DRAINAGE MANAGEMENT STUDY FOR CAIRNS REGIONAL COUNCIL



November 2010	FOR INFORMATION ONLY	
JULY 2010	FOR INFORMATION ONLY	
REVISIONS		

VDM CONSULTING
Water & Environmental Consultants
Level 6, Australia Fair, 42 Marine Pde
Southport QLD 4215
Phone +61 7 5509 6400
Fax +61 7 5509 6411
Email goldcoast@vdmgroup.com.au

DRAWING TITLE

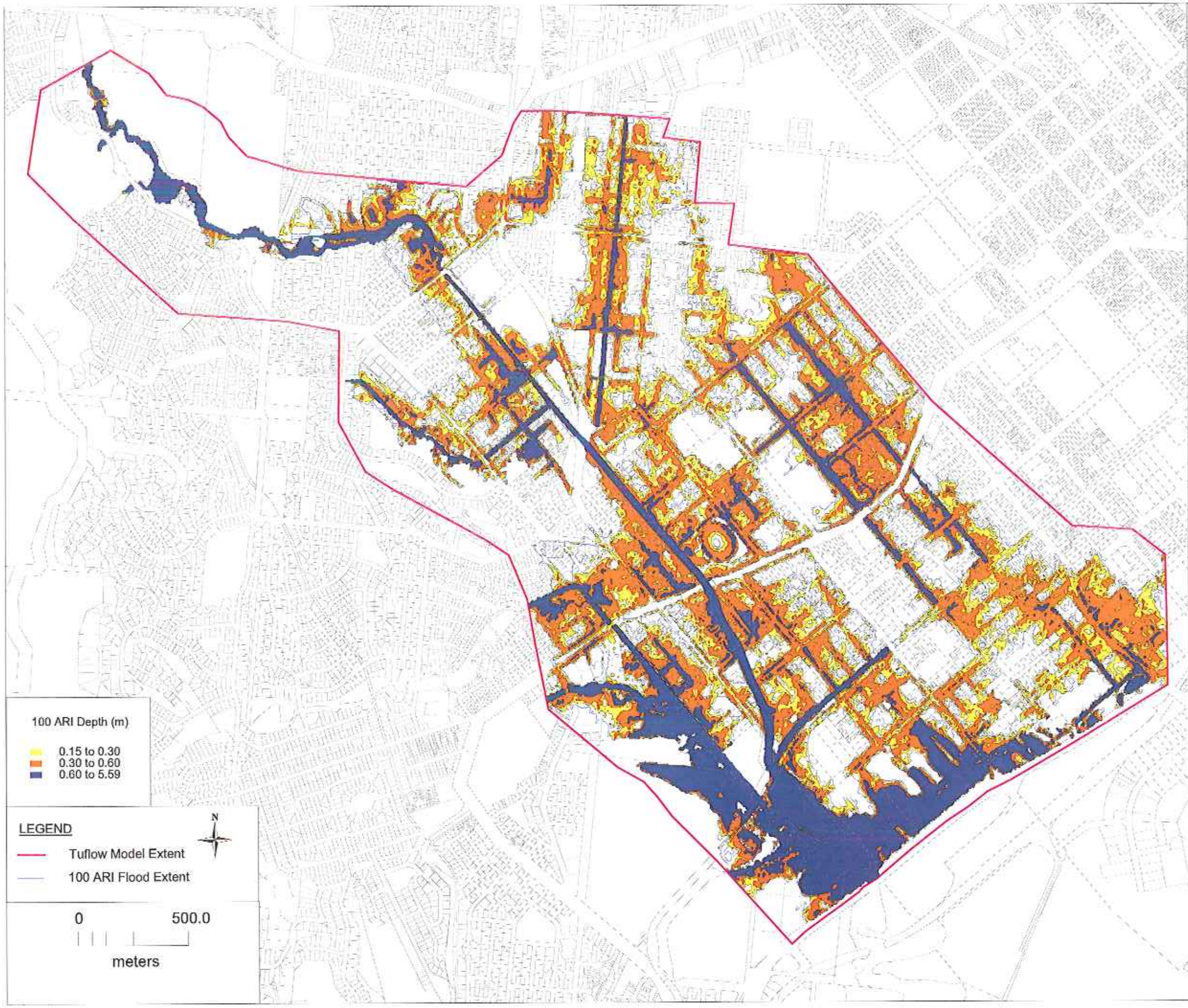
FIGURE 1

MITIGATION & SQIDs

INVESTIGATION SITES

DEVEL. APPLIC. No. :	DATE : 28.11.10
PROJECT LEADER : PB	
DESIGNER : BS	
DRAFTSPERSON : AK	
CHECKED : PB	
APPROVED FOR AND BEHALF OF VDM CONSULTING	
	R.P.E.Q. No :

SCALE :	DATUM :	FULL SIZE : A3
PROJECT No. : GC10-0099	DRAWING No. : N500	REVISION : C



MOODY CREEK DRAINAGE MANAGEMENT STUDY FOR CAIRNS REGIONAL COUNCIL

JULY 2018	FOR INFORMATION ONLY	
REVISIONS		

VDM CONSULTING
Water & Environmental Consultants
Level 8, Australia Fair, 42 Marine Pde
Southport QLD 4215
Phone +61 7 5509 6400
Fax +61 7 5509 6411
Email goldcoast@vdmgroup.com.au

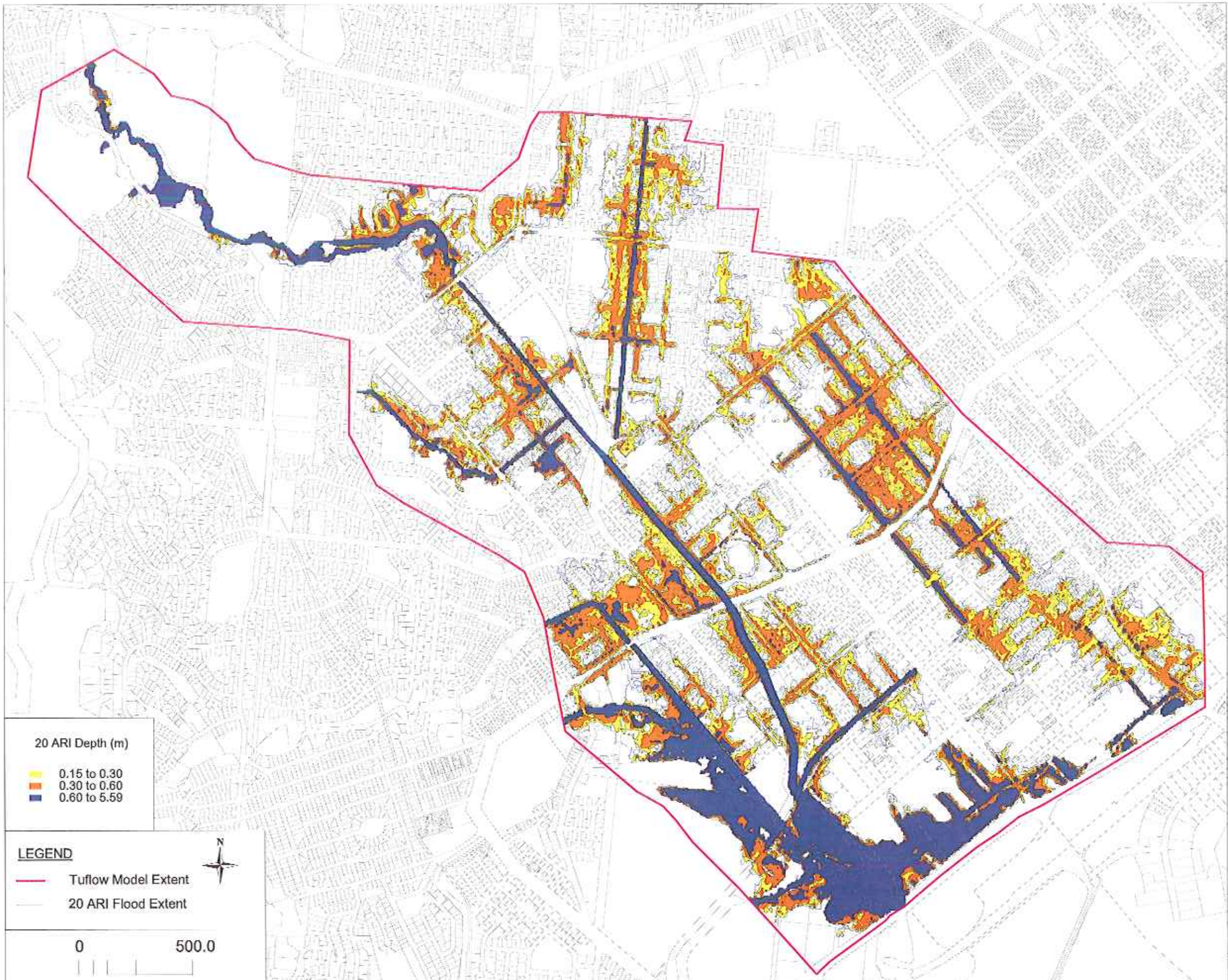
DRAWING TITLE

FIGURE 2

Q100 EXISTING CURRENT SCENARIO
PEAK FLOOD DEPTH CATEGORIES

2040 PLANNING HORIZON
Q100 TAILWATER LEVEL = 2.625m AHD

DEVEL. APPLIC. No.:	DATE:	
PROJECT LEADER: PB		
DESIGNER: RS		
DRAFTSPERSON: MN		
CHECKED: PB		
APPROVED FOR AND BEHALF OF VDM CONSULTING		
R.P.E.Q. No.:		
SCALE:	DATUM:	FULL SIZE: A3
PROJECT No.: GC10-0099	DRAWING No.: N505	REVISION: A



MOODY CREEK DRAINAGE MANAGEMENT STUDY FOR CAIRNS REGIONAL COUNCIL

JULY 2010	FOR INFORMATION ONLY

REVISIONS

VDM CONSULTING
Water & Environmental Consultants
Level 8, Australia Fair, 42 Marine Pde
Southport QLD 4215
Phone +61 7 5509 6400
Fax +61 7 5509 6411
Email goldcoast@vdmgroup.com.au

DRAWING TITLE

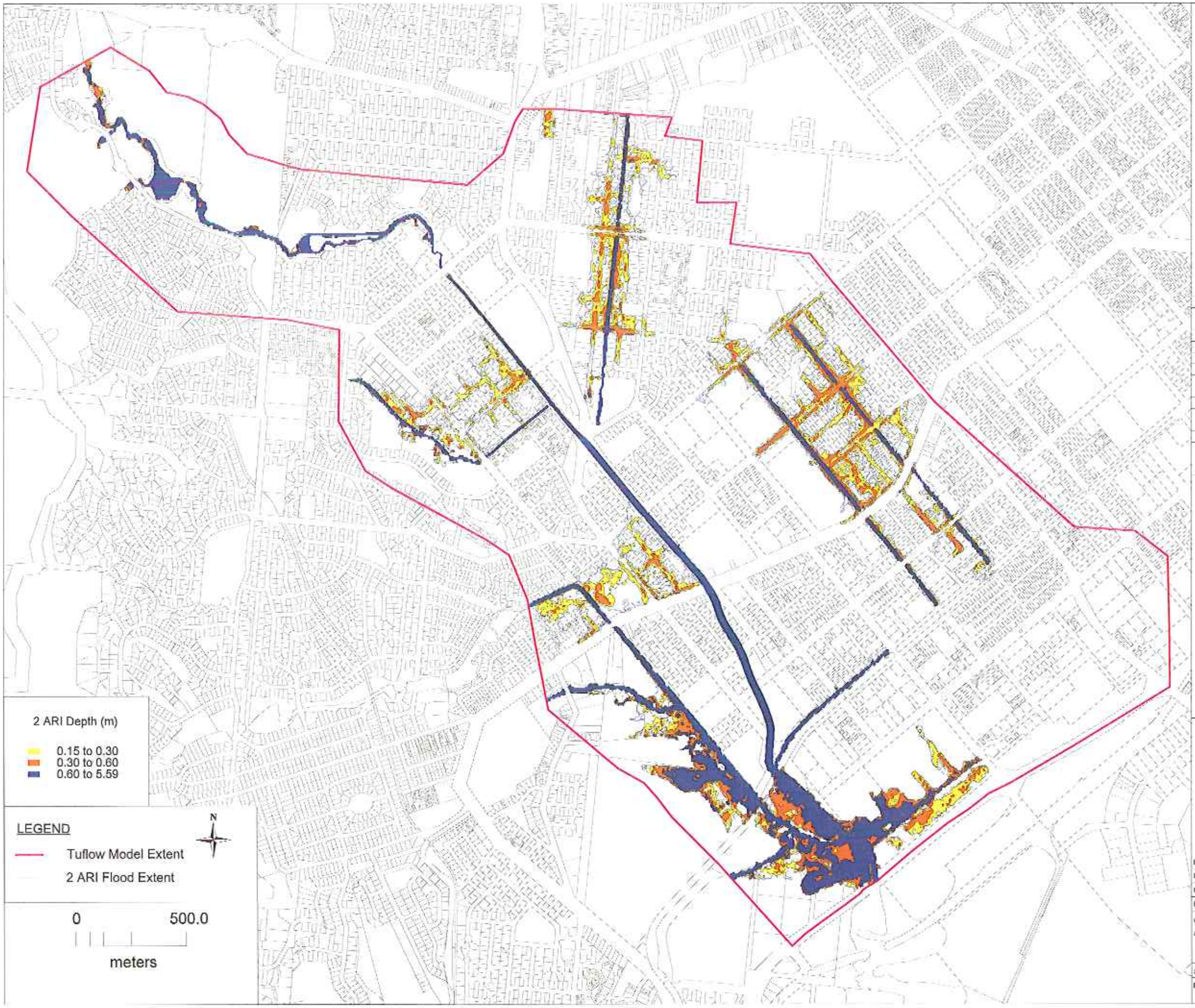
FIGURE 3

Q20 EXISTING CURRENT SCENARIO
PEAK FLOOD DEPTH CATEGORIES

2040 PLANNING HORIZON
Q20 TAILWATER LEVEL = 1.78m AHD

DEVEL. APPLIC. No. :	DATE :
PROJECT LEADER : PB	
DESIGNER : BB	
DRAFTSPERSON : MN	
CHECKED : PB	
APPROVED FOR AND BEHALF OF VDM CONSULTING	
R.P.E.Q. No. :	

SCALE :	DATUM :	FULL SIZE : A3
PROJECT No. : GC10-0099	DRAWING No. : N503	REVISION : B



MOODY CREEK DRAINAGE MANAGEMENT STUDY FOR CAIRNS REGIONAL COUNCIL

JULY 2010	FOR INFORMATION ONLY	

REVISIONS

VDM CONSULTING
Water & Environmental Consultants
Level 8, Australia Fair, 42 Marine Pde
Southport QLD 4215
Phone +61 7 5509 6400
Fax +61 7 5509 6411
Email goldcoast@vdmgroup.com.au

DRAWING TITLE

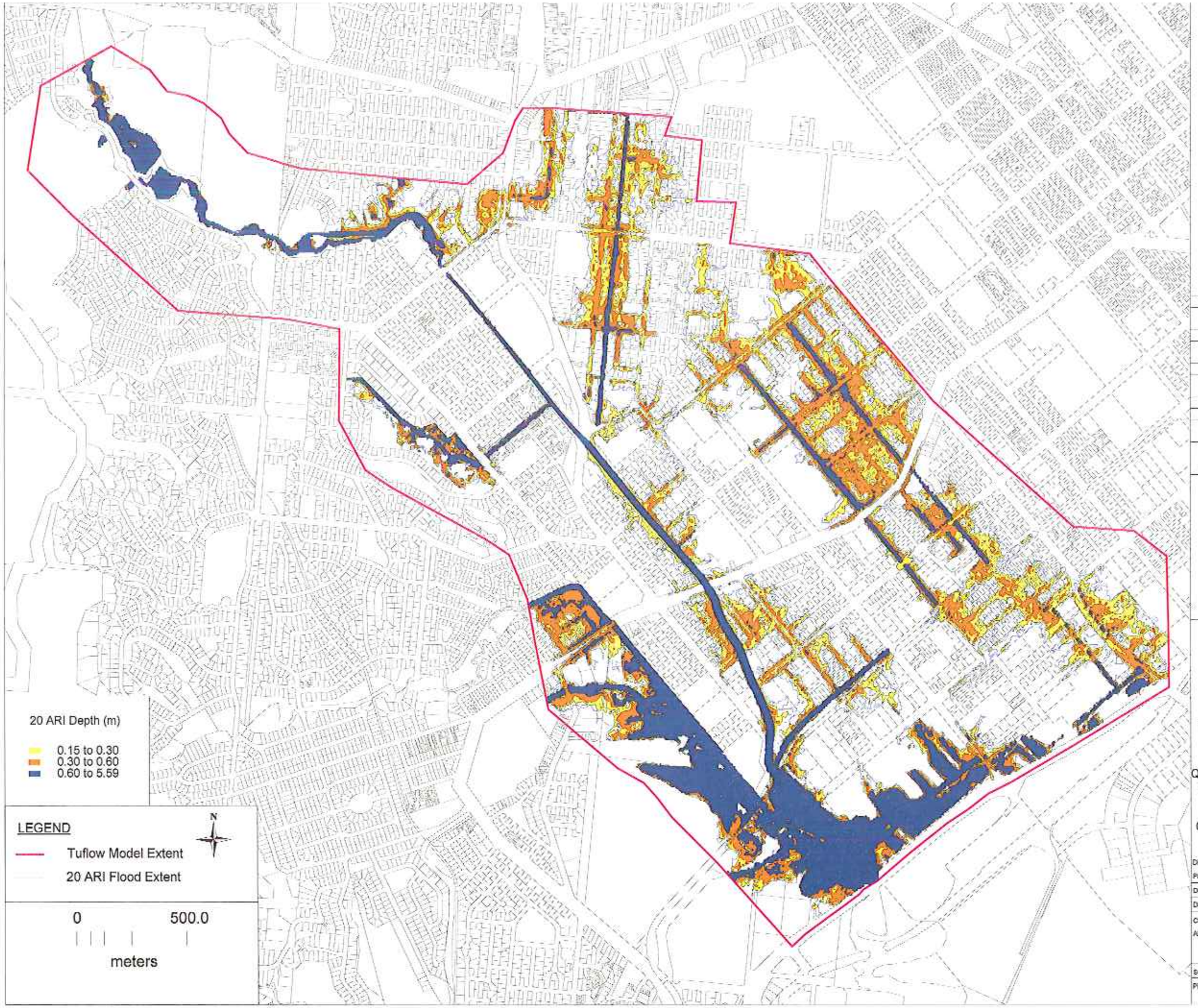
FIGURE 4

Q2 EXISTING CURRENT SCENARIO
PEAK FLOOD DEPTH CATEGORIES

2040 PLANNING HORIZON
Q2 TAILWATER LEVEL = 0.93m AHD

DEVEL. APPLIC. No. :	DATE :
PROJECT LEADER : PB	
DESIGNER : BS	
DRAFTSPERSON : MN	
CHECKED : PB	
APPROVED FOR AND BEHALF OF VDM CONSULTING	
R.P.E.Q. No :	

SCALE :	DATUM :	FULL SIZE : A3
PROJECT No. : GC10-0099	DRAWING No. : N500	REVISION : A



MOODY CREEK DRAINAGE MANAGEMENT STUDY FOR CAIRNS REGIONAL COUNCIL (P.I.P. VERSION 2)

JULY 2010	FOR INFORMATION ONLY

REVISIONS

VDM CONSULTING
Water & Environmental Consultants
Level 8, Australia Fair, 42 Marine Pde
Southport QLD 4215
Phone +61 7 5509 6400
Fax +61 7 5509 6411
Email goldcoast@vdmgroup.com.au

DRAWING TITLE

FIGURE 5 (PRIORITY C)

Q20 MITIGATED CURRENT SCENARIO PEAK FLOOD DEPTH CATEGORIES

2040 PLANNING HORIZON
Q20 TAILWATER LEVEL = 1.78m AHD

DEVEL. APPLIC. No. :	DATE :
PROJECT LEADER : PB	
DESIGNER : BS	
DRAFTSPERSON : MN	
CHECKED : PB	
APPROVED FOR AND BEHALF OF VDM CONSULTING	
R.P.E.Q. No :	

SCALE :	DATUM :	FULL SIZE : A3
PROJECT No. : GC10-0099	DRAWING No. : N618	REVISION : A