

17 Dec 2013	<p>Stakeholder Comments: Information session was attended by 31 people.</p> <p>Feedback from attendees provided in attached document.</p>
<p>Email - Outgoing 13 Mar 2014</p>	<p>Summary: Email to all stakeholders regarding the Stage 2 Flood Mitigation Community Information Sessions- 19 March.</p> <p>Team Response: Dear Stakeholder,</p> <p>With the Stage 1 flood levee well underway, Council is now seeking your feedback on the proposed concept designs for the second stage of the Roma Flood Mitigation Project to be rolled out over time as funding becomes available.</p> <p>Come along to see the concept designs, ask questions, and hear about how Stage 1 and 2 aims to reduce flood levels at your property. We are keen to discuss potential improvements before taking the projects forward for funding.</p> <p>Stage 2 Community Information Sessions Where: Cultural Centre - Roma When: Wednesday 19 March, 2-4pm and 6-8pm. There is no need to RSVP. Just come along on the day.</p> <p>Drop in to see the GHD Engineers on 20 to 21 March Where: Cultural Centre - Roma When: Drop in any time between 9am-12pm and 1-3pm on 20 and 21 March</p> <p>For further information, reply to this email, visit www.maranoa.qld.gov.au/roma-flood-mitigation or contact the team on 1800 103 485.</p> <p>Kind regards, The Roma Flood Mitigation Team</p>

<p>Community Information Session (December) 17 Dec 2013</p>	<p>Summary: Community information session held on 17 December 2013 from 2pm to 4pm.</p> <p>Stakeholder Comments: Information session was attended by 31 people.</p> <p>Feedback from attendees provided in attached document.</p>
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	<p>Email - Outgoing 16 Apr 2014</p> <p>Summary: Email to all stakeholders from Roma Flood Mitigation regarding the Community Survey. Team Response: Notifying stakeholders that the Community Survey closes Thursday 17 April.</p> <p>Access survey online, attached pdf to fill out and email back or print out and deliver to a Council Customer Service Centre, or via hard copy at the Customer Service Centres.</p> <p>Community encouraged to fill out survey.</p>

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<p>Letter - Outgoing 19 Dec 2013</p>	<p>Summary: Letter sent to landholders affected by the Stage 2 infrastructure informing them of the Roma Flood Mitigation Stage 2 concept options.</p> <p>Team Response: Letter sent to landholders affected by the Stage 2 infrastructure informing them of the Roma Flood Mitigation Stage 2 concept options.</p> <p>The letter advised that the project team sought to telephone residents in close proximity to the proposed Stage 2 infrastructure to invite them to the community information sessions but that they were unable to contact everyone in person.</p> <p>The team advised that they would be happy to visit the landholders to talk you through the concept designs in the new year. Community-wide Information Sessions will also be held in February.</p>
<p>Email - Outgoing 13 Mar 2014</p>	<p>Summary: Email to all stakeholders regarding the Stage 2 Flood Mitigation Community Information Sessions- 19 March.</p> <p>Team Response: Dear Stakeholder,</p> <p>With the Stage 1 flood levee well underway, Council is now seeking your feedback on the proposed concept designs for the second stage of the Roma Flood Mitigation Project to be rolled out over time as funding becomes available.</p> <p>Come along to see the concept designs, ask questions, and hear about how Stage 1 and 2 aims to reduce flood levels at your property. We are keen to discuss potential improvements before taking the projects forward for funding.</p> <p>Stage 2 Community Information Sessions Where: Cultural Centre - Roma When: Wednesday 19 March, 2-4pm and 6-8pm. There is no need to RSVP. Just come along on the day.</p> <p>Drop in to see the GHD Engineers on 20 to 21 March Where: Cultural Centre - Roma When: Drop in any time between 9am-12pm and 1-3pm on 20 and 21 March</p> <p>For further information, reply to this email, visit www.maranoa.qld.gov.au/roma-flood-mitigation or contact the team on 1800 103 485.</p> <p>Kind regards, The Roma Flood Mitigation Team</p>
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Sch. 4(4)(6) - Disclosing personal information

Community Information Session (December)
17 Dec 2013

Summary: Community information session held on 17 December 2013 from 2pm to 4pm.
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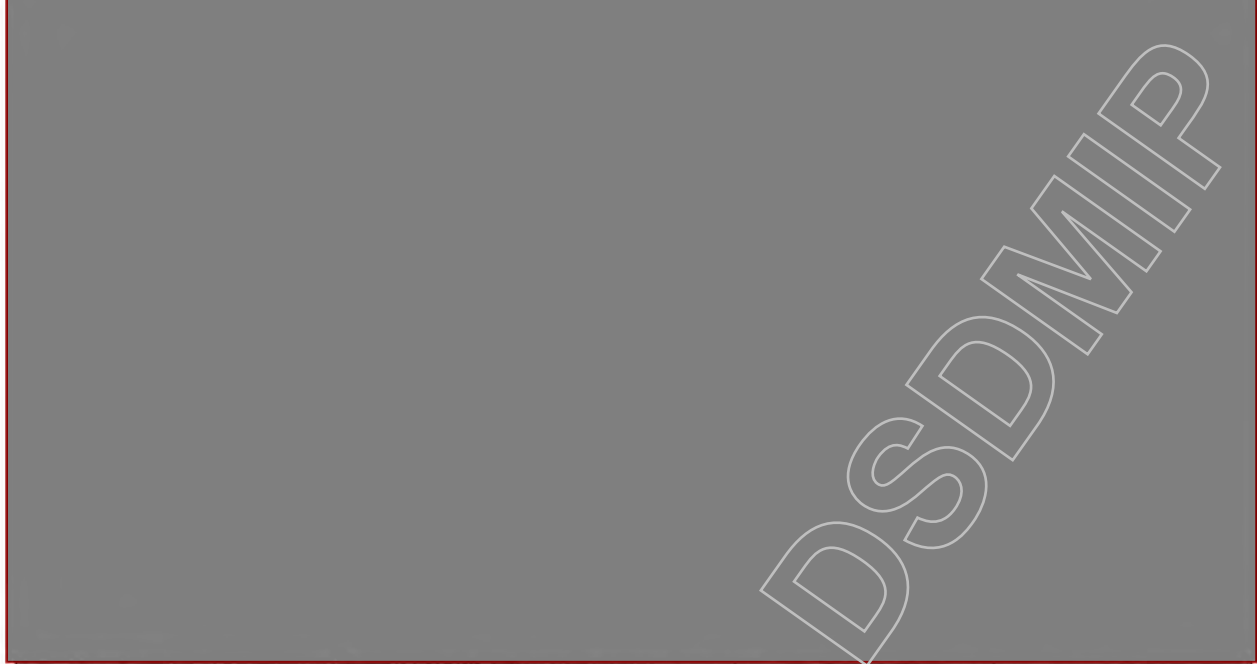
Sch. 4(4)(6) - Disclosing personal information

Email - Outgoing
13 Mar 2014

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Team Response: Dear Stakeholder,
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	<p>the proposed concept designs for the second stage of the Roma Flood Mitigation Project to be rolled out over time as funding becomes available.</p> <p>Come along to see the concept designs, ask questions, and hear about how Stage 1 and 2 aims to reduce flood levels at your property. We are keen to discuss potential improvements before taking the projects forward for funding.</p> <p>Stage 2 Community Information Sessions Where: Cultural Centre - Roma When: Wednesday 19 March, 2-4pm and 6-8pm. There is no need to RSVP. Just come along on the day.</p> <p>Drop in to see the GHD Engineers on 20 to 21 March Where: Cultural Centre - Roma When: Drop in any time between 9am-12pm and 1-3pm on 20 and 21 March</p> <p>For further information, reply to this email, visit www.maranoa.qld.gov.au/roma-flood-mitigation or contact the team on 1800 103 485.</p> <p>Kind regards, The Roma Flood Mitigation Team</p>
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Email - Outgoing
16 Apr 2014

Summary: Email to all stakeholders from Roma Flood Mitigation regarding the Community Survey.

Team Response: Notifying stakeholders that the Community Survey closes Thursday 17 April.

Access survey online, attached pdf to fill out and email back or print out and deliver to a Council Customer Service Centre, or via hard copy at the Customer Service Centres.

Community encouraged to fill out survey.

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<p style="font-size: 2em; opacity: 0.5; transform: rotate(-45deg);">SDMIP</p>	
<p>Community Information Session (December) 17 Dec 2013</p>	<p>Summary: Community information session held on 17 December 2013 from 6pm to 8pm.</p> <p>Stakeholder Comments: Information session was attended by 29 people.</p> <p>Feedback from attendees provided in attached document.</p>
<p>Email - Outgoing 13 Mar 2014</p>	<p>Summary: Email to all stakeholders regarding the Stage 2 Flood Mitigation Community Information Sessions- 19 March.</p> <p>Team Response: Dear Stakeholder,</p> <p>With the Stage 1 flood levee well underway, Council is now seeking your feedback on the proposed concept designs for the second stage of the Roma Flood Mitigation Project to be rolled out over time as funding becomes available.</p> <p>Come along to see the concept designs, ask questions, and hear about how Stage 1 and 2 aims to reduce flood levels at your property. We are keen to discuss potential improvements before taking the projects forward for funding.</p> <p>Stage 2 Community Information Sessions Where: Cultural Centre - Roma When: Wednesday 19 March, 2-4pm and 6-8pm. There is no need to RSVP. Just come along on the day.</p> <p>Drop in to see the GHD Engineers on 20 to 21 March Where: Cultural Centre - Roma When: Drop in any time between 9am-12pm and 1-3pm on 20 and 21 March</p> <p>For further information, reply to this email, visit www.maranoa.qld.gov.au/roma-flood-mitigation or contact the team on 1800 103 485.</p> <p>Kind regards, The Roma Flood Mitigation Team</p>
<p>Community Information Session (March) 19 Mar 2014</p>	<p>Summary: Community Information Session- Stage 2 on Wednesday 19 March 2014, 6-8pm.</p> <p>Stakeholder Comments: Information session was attended by 29 people.</p> <p>Feedback from attendees provided in attached document.</p>
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RTI RELEASE - DSDMIP

Appendix C
Stakeholders who have expressed
an interest in being updated

Name:	Email Address:	Phone Number:	Postal Address (where relevant)	Preferred method of update
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Sch. 4(4)(6) - Disclosing personal information



Roma Flood Mitigation Community Update Newsletter

I would prefer to not receive further information

Email

Roma Flood Mitigation Community Update Newsletter

Council's website

Email

Email

Email

Email

I would prefer to not receive further information

Roma Flood Mitigation Community Update Newsletter

Council's website

Council's website

Email

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Email

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RTI RELEASE - DISCLOSED

Name:	Email Address:	Phone Number:	Postal Address (where relevant)	Preferred method of update
<small>Sch. 4(4)(6) - Disclosing personal information</small> <div style="text-align: center; font-size: 2em; opacity: 0.2; transform: rotate(-30deg); pointer-events: none;">RTI RELEASE - DSDMIP</div>				Roma Flood Mitigation Community Update Newsletter
				Email
				Council's website
				Roma Flood Mitigation Community Update Newsletter
				Council's website
				Email
				Email
				Email
				Via Post
				Email
				Email
				Email
				Council's website
				I would prefer to not receive further information
				Email
did not specify				
Email				
did not specify				
Council's monthly newsletter				

Name:	Email Address:	Phone Number:	Postal Address (where relevant)	Preferred method of update
<small>Sch. 4(4)(6) - Disclosing personal information</small> <div style="background-color: #cccccc; width: 100%; height: 100%; display: flex; align-items: center; justify-content: center;"> RTI RELEASE - DSDMIP </div>				did not specify
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Sch. 4(4)(6) - Disclosing personal information



Council's monthly newsletter

website

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Council's monthly newsletter

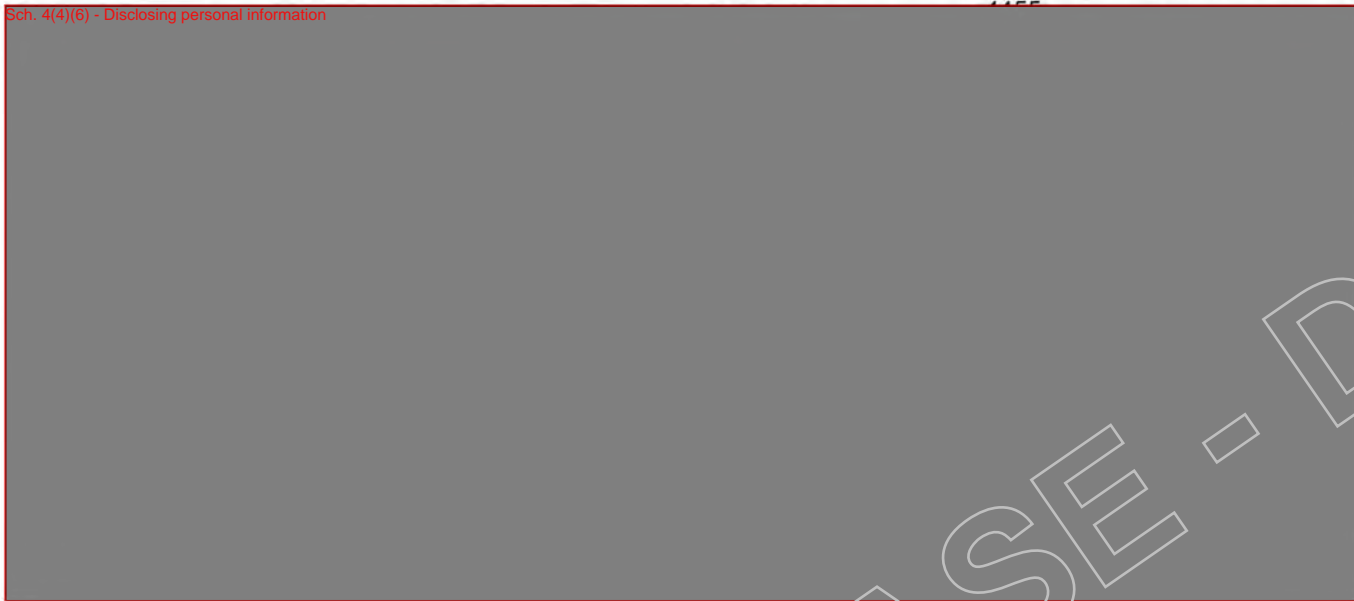
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Sch. 4(4)(6) - Disclosing personal information



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RTI RELEASE - DSDMIP

GHD

145 Ann Street Brisbane QLD 4000
GPO Box 668 Brisbane QLD 4001
T: (07) 3316 3000 F: (07) 3316 3333 E: bnemail@ghd.com

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A		[Redacted]				20/06/2014
0		[Redacted]				09/10/2014

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SARA technical agency assessment response

Technical agency (TA)— Department of Environment and Heritage Protection

DSDIP reference: SDA-0416-029601
DSDIP Role: referral agency
DSDIP regional office: SARA Darling Downs South West
DSDIP email: [NB. All responses are to be returned to this email address]
TA reference: SDA-0416-029601 / EPPR03917216
TA contact name: Dot Rosiak
TA contact details: Dorota.Rosiak@ehp.qld.gov.au
TA approver: Chris Mooney

1.0 Application details

Street address: 2A Tiffin - Roma, Maranoa Regional - QLD; 2A Tiffin - Roma, Maranoa Regional - QLD; Miscamble - Roma, Maranoa Regional - QLD; Ge - Roma, Maranoa Regional - QLD;
Lot on plan: 21; 41; 96; 343; 342 R8614; R8614; M5398; R8614; WV219
Local government area: Maranoa Regional, Maranoa Regional, Maranoa Regional, Maranoa Regional, MARANOA REGIONAL
Applicant name: Maranoa Regional Council
Applicant contact details: planning@maranoa.qld.gov.au

2.0 Aspects of development and type of approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)	Code Assessment

3.0 Matters of interest to the state

The development application has the following matters of interest to the state under the following provisions of the Sustainable Planning Regulation 2009¹:

Schedule 6 Assessment manager for development applications and Schedule 7 Referral agencies and their jurisdictions — matters of interest specific to technical agency

Trigger ID	Description	Technical Agency
6.3.1	If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development	EHP

¹ MyDAS does not collect data on assessable development aspects under Schedule 3—this is a matter confirmed by DSDIP during the validation process.

4.0 Assessment

4.1 Considerations and assessment

- Maranoa Regional Council (MRC) has proposed an implementation of a Second Stage of flood mitigation measure for the township of Roma, which involves construction of a high flow diversion channel to the east of Bungil Creek.
- The proposal includes carrying out of extractive activity - ERA16-(2b) – extracting more than 100,000t but not more than 1,000,000t of material in a year, which is operationally related to the construction of the channel.
- The construction of the high flow diversion channel will involve clearing 75 meters of riparian vegetation along banks of Bungil Creek on Lot 21 Plan R8614, Lot 343 Plan R8614, Lot 96 Plan M5398 and Lot 342 Plan WV219; extracting and removing of 200,000t of material on Lot 21 Plan R8614, Lot 41 Plan R8614, Lot 42 Plan R8614 Lot 343 Plan R8614, Lot 96 Plan M5398 and Lot 342 Plan WV219. The extracted material will be stockpiled on another site, at the Roma landfill/refuse facility and will be used for cover/fill as well as for rehabilitation works.
- The high flow diversion channel will run from Bungil Creek (from end of Stage 1 levee) to Bungil Creek (at Creek Street). The length of the channel will be 1,200m; width – 60m and depth – 3.5m.
- The proposal has been assessed against the State Development Assessment Provisions (version 1.9), Module 4 – Environmentally relevant activities.
- The proposal has also been assessed against Environmental objectives and performance outcomes specified in Table 2 – Land use assessment under Schedule 5 of the *Environmental Protection Regulation 2008*.

5.0 Recommendations

5.1 Technical agency advice for SARA as concurrence agency

Our department:

- (a) recommends the following condition be attached to any development approval (SPA section 324(1)(b)):

SARA Model Conditions Version: 2.3 – 05 May 2016		
Aspect of development: Material Change of Use for ERA 16		
Compliance timing Unless specified in the issues below the timing for all conditions should be: Prior to the commencement of use and to be maintained at all times.		
No.	Condition ID	Issues to be addressed or variations to model condition
ERA 16 – extractive activity		
1.	AD01	The development must be carried out generally in accordance with the following plans: <ul style="list-style-type: none"> • Proposed Stage 2 <i>Regional Options Eastern Diversion Channel D - Details</i> prepared by GHD reference 41-25323-SK105 revision A.

5.2 Approved plans and specifications

Our department recommends that the following plans and specifications should be referenced in the response:

Drawing/Report Title	Prepared by	Date	Reference no.	Version/Issue
Aspect of development: Material change of use for ERA 16				
Proposed Stage 2 Regional Options Eastern Diversion Channel D - Details	GHD		41-25323-SK105	A

6.0 Endorsement

Officer	Dot Rosiak	Senior Environmental Officer	(07) 3330 6372	Dorota.Rosiak@ehp.qld.gov.au
Approver	Chris Mooney	Manager	(07) 3339 5839	Chris.Mooney@ehp.qld.gov.au

Chris Mooney



SARA technical agency assessment response

Technical agency (TA)—Department of Environment and Heritage Protection

DSDIP reference: SDA-0416-029601
DSDIP role: referral agency
DSDIP regional office: SARA Darling Downs South West
DSDIP email:

[NB. All responses are to be returned to this email address]

TA reference: 438271
TA contact name: Dot Rosiak
TA contact details: Dorota.Rosiak@ehp.qld.gov.au
TA approver: Chris Mooney

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4.0 Assessment

4.1 Considerations and assessment

The proposal seeks to construct a high flow diversion channel ("Eastern diversion") to the east of Bungil Creek on lots: 21 Plan R8614; 41 Plan R8614; 42 Plan R8614; 343 Plan R8614; 96 Plan M5398 and 342 Plan WV219.

The proposed development has been assessed against the criteria prescribed in Module 4 – *Environmentally relevant activities* of the State Development Assessment Provisions.

1. The acceptable outcome (AO1.1) requires that the activity does not have an adverse effect beyond the site.

The proposed environmentally relevant activity (ERA) 16-(2b) – extractive activity is likely to cause an adverse impact on the acoustic environment, air quality, surface water quality and land.

- When making an application for an activity that is likely to cause an adverse impact on the acoustic environment, the applicant needs to address requirements stipulated in the *Environmental Protection Act 1994* as well as consider acoustic quality objectives for sensitive receptors and the management hierarchy for noise stated in the *Environmental Protection (Noise) Policy 2009*. It has been noted that the information provided by the applicant is lacking those considerations.
 - When making an application for an activity that is likely to cause an adverse impact on air quality (e.g. dust emissions), the applicant needs to address requirements stipulated in the *Environmental Protection Act 1994* as well as consider air quality objectives for sensitive receptors and the management hierarchy for air emissions stated in the *Environmental Protection (Air) Policy 2009*. It has been noted that the information provided by the applicant is lacking those considerations.
 - When making an application for an activity that is likely to cause an adverse impact on water quality (e.g. a release of contaminated stormwater to waters), the applicant needs to address requirements stipulated in the *Environmental Protection Act 1994* as well as consider water quality objectives for environmental values and the water management hierarchy stated in the *Environmental Protection (Water) Policy 2009*. It has been noted that the information provided by the applicant is lacking those considerations.
 - When making an application for an activity that is likely to cause an adverse impact to land (e.g. a release of contaminants to land, disturbance of acid sulfate soils), the applicant needs to demonstrate how any potential adverse impacts to land will be managed. It has been noted that the information provided by the applicant is lacking those considerations.
2. When deciding an application, EHP is required to assess the application against requirements stipulated in the *Environmental Protection Act 1994*, as well as considerations stated in the *Environmental Protection Regulation 2008*. It has been

noted that the environmental objectives and performance outcomes prescribed in Schedule 5, table 1 and 2 of the *Environmental Protection Regulation 2008* has not been addressed and provided to the department.

5.0 Recommendations

5.1 Information request

Our department:

- (a) recommends the following information be requested from the applicant to enable the assessment to be finalised:

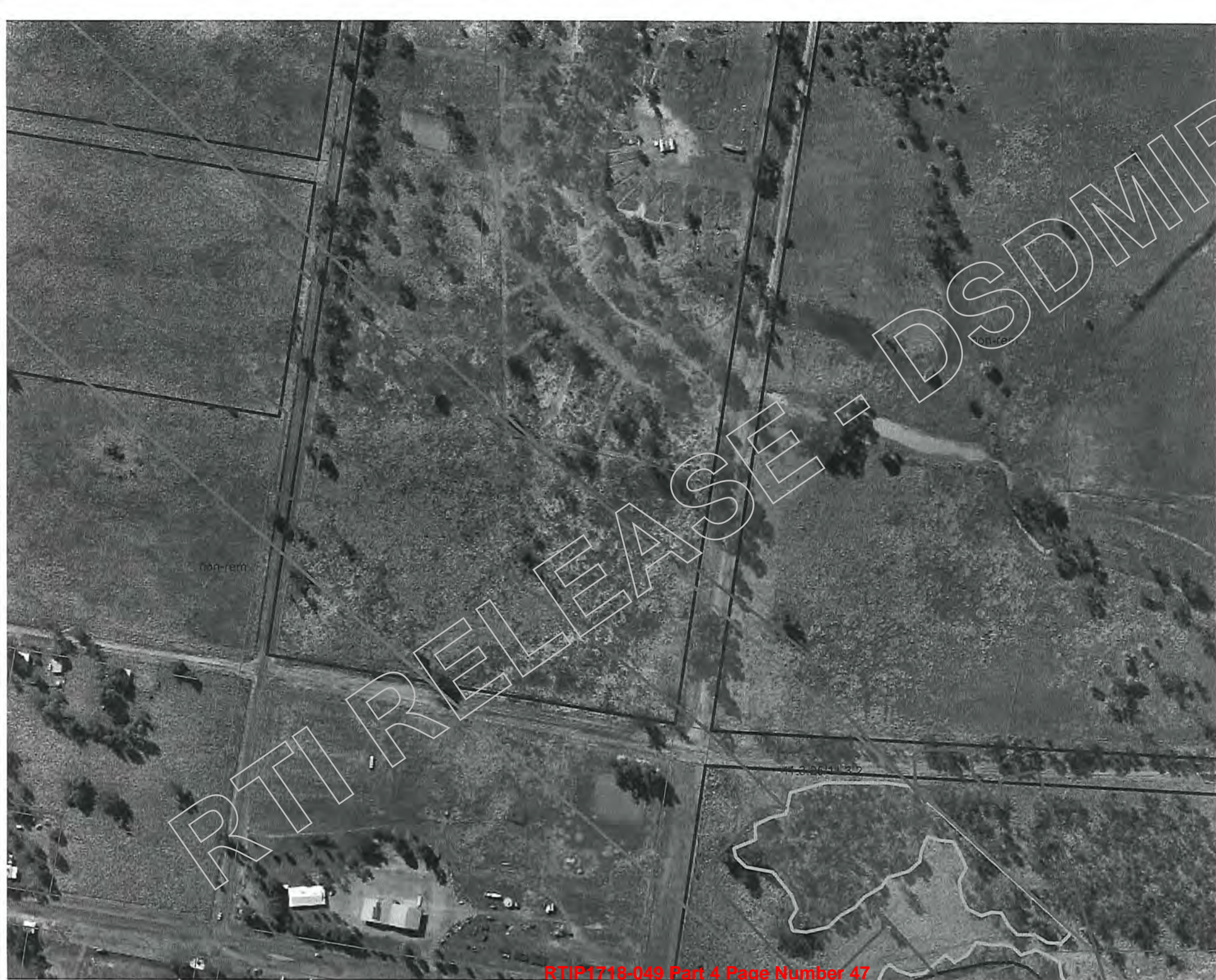
Item	Information requested
ERA 16-(2b) - extractive	
1.	<p>Identify all sensitive receptors existing in the vicinity to the site, possible impacts to those values and proposed noise mitigation strategies to protect acoustic values. Demonstrate how the relevant requirements stated in the <i>Environmental Protection Act 1994</i> and <i>Environmental Protection (Noise) Policy 2008</i> (acoustic quality objectives for sensitive receptors and a management hierarchy for noise) have been considered.</p> <p>The technical guideline explaining how to provide the necessary information can be accessed through the following link: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-noise-impacts.pdf</p>
2.	<p>Identify all the environmental values of the site and surrounding areas including any nearby sensitive places, the potential impacts which are likely to arise from the proposed activity and mitigation measures to address the risk. Demonstrate how the relevant requirements stated in the <i>Environmental Protection Act 1994</i> and <i>Environmental Protection (Air) Policy 2008</i> (air quality objectives for sensitive receptors and the management hierarchy for air emissions) have been considered.</p> <p>The technical guideline explaining how to provide the necessary information can be accessed through the following link: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-air-impacts.pdf</p>
3.	<p>Identify the environmental values of receiving waters existing on the site and in the vicinity. Determine the potential impacts which are likely to arise from the proposed activity and describe mitigation strategies to address the risk. Demonstrate how the relevant requirements stated in the <i>Environmental Protection Act 1994</i> and <i>Environmental Protection (Water) Policy 2008</i> (water quality objectives for environmental values and the water management hierarchy) have been considered.</p> <p>The technical guideline explaining how to provide the necessary information can be accessed through the following link: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-water-impacts.pdf</p>
4.	<p>Identify environmental values of the site where the activity has been proposed, possible impacts to those values and proposed management practices to mitigate those impacts. Demonstrate the proposed rehabilitation measures to be used after the relevant activity ceases.</p> <p>The technical guideline explaining how to provide the necessary information can be accessed through the following link: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-land-impacts.pdf</p>
5.	<p>Address environmental objectives and performance outcomes for the ERA prescribed in Schedule 5, table 1 and 2 of the <i>Environmental Protection Regulation 2008</i>.</p>



























6.0 Endorsement

Officer	Dot Rosiak	A/Team Leader	(07) 3330 6372	Dorota.Rosiak@ehp.qld.gov.au
Approver	Chris Mooney	Manager	(07) 3330 5581	Chris.Mooney@ehp.qld.gov.au

Chris Mooney 28/4/16

RTI RELEASE - DSDMIP



-  Ground_Truthe
-  Area_subject_t
-  Watercourses
-  property_5ga_;
-  Qld DCDB
-  GBR (Remnant
-  Category X
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-  Category C are
-  Essential Habit
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-  Category C are
-  Non-remnant
-  Water
-  Area not categor

Map Date:
 Author:
 DNR Ref:
 SARA Ref:



This Plan is intended to provide information for use in the attached covering assessment. This Plan cannot be used without the written permission of the Director.

Users of the information are

SARA technical agency assessment response

Technical agency (TA)—Department of Natural Resources and Mines

DSDIP reference: SDA-0416-029601
 DSDIP role: referral agency
 DSDIP regional office: SARA Darling Downs South West
 DSDIP email: [NB. All responses are to be returned to this email address]
 TA reference: 2016\002280
 TA contact name: Brian McAlister
 TA contact details: 3894 8123
 TA approver: Michael Gordon

1.0 Application details

Street address: 2A Tiffin - Roma, Maranoa Regional - QLD; 2A Tiffin - Roma, Maranoa Regional - QLD; Miscamble - Roma, Maranoa Regional - QLD; Ge - Roma, Maranoa Regional - QLD;
 Lot on plan: 21; 41; 96; 343; 342 R8614; R8614; M5398; R8614; WV219
 Local government area: Maranoa Regional, Maranoa Regional, Maranoa Regional, Maranoa Regional, MARANOA REGIONAL
 Applicant name: Maranoa Regional Council
 Applicant contact details: planning@maranoa.qld.gov.au

2.0 Aspects of development and type of approval being sought

3.0 Matters of interest to the state

The development application has the following matters of interest to the state under the following provisions of the *Sustainable Planning Regulation 2009*¹:

Schedule 6 Assessment manager for development applications and Schedule 7 Referral agencies and their jurisdictions — matters of interest specific to technical agency

Trigger ID	Description	Technical Agency
6.3.1	If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development	EHP
6.3.2	If tables 1 and 2 do not apply and the application is for - (a) operational work for the clearing of native vegetation; and (b) no other assessable development	NRM

¹ MyDAS does not collect data on assessable development aspects under Schedule 3—this is a matter confirmed by DSDIP during the validation process.

RTI RELEASE - DSDMIP

4.0 Assessment

4.1 Evidence or other material on which the findings were based:

- 4.1.1 Application and common material included therein received by DNRM on the 21st April 2016.
- 4.1.2 Pre-lodgement advice dated 4th September 2015.
- 4.1.3 Smart Map
- 4.1.4 Electronic Land and Vegetation Administration System (eLVAS).
- 4.1.5 *Vegetation Management Act 1999* (VMA).
- 4.1.6 *Vegetation Management Regulation 2012* (VMR).
- 4.1.7 *Sustainable Planning Act 2009* (SPA).
- 4.1.8 *Sustainable Planning Regulation 2009* (SPR).
- 4.1.9 Module 8 - State Development Assessment Provisions (SDAP) v1.7, dated 23 November 2015.
- 4.1.10 Regulated Vegetation Management Map, version 1.28.
- 4.1.11 Vegetation Management Supporting Map, version 1.28.
- 4.1.12 Vegetation Management Watercourse Map 250000K, version 13
- 4.1.13 Vegetation Management Wetland Map, version 28
- 4.1.14 Essential Habitat Mapping, version 28
- 4.1.15 Aerial Photography
- 4.1.16 Regional Ecosystem Technical Descriptions, Queensland Herbarium – Department of Science, Information technology, Innovation and the Arts

4.2 Considerations and assessment

- 4.2.1 Lot 21 R8614 is tenured as Freehold
- 4.2.2 Lot 41 R8614 is tenured as Freehold
- 4.2.3 Lot 96 M5398 is tenured as Freehold
- 4.2.4 Lot B SP127242 is tenured as Lands Lease (Grazing)
- 4.2.5 Lot 342 WV219 is tenured as Reserve (Rubbish)
- 4.2.6 Road Segment/Parcel 32614/77
- 4.2.7 Road Segment/Parcel 32614/70
- 4.2.8 Road Segment/Parcel 32614/82
- 4.2.9 Road Segment/Parcel 32614/102
- 4.2.10 The regulated vegetation management map identifies the lots above contain category B and category X areas.
- 4.2.11 The vegetation management supporting map identifies that the subject lots contains category B areas consisting of:
 - 4.2.11.1 Least Concern 11.3.25; and
 - 4.2.11.2 Of Concern 11.3.2; and
 - 4.2.11.3 Category X native vegetation
 - 4.2.11.4 Watercourse (Bungil Creek) stream order 5 watercourse
- 4.2.12 The operational works application is assessable against the Performance Outcomes (PO) of SDAP Module 8 Native vegetation clearing:
 - 4.2.12.1 Table 8.1.3 PO2 & PO3; and
 - 4.2.12.2 Table 8.1.4 PO1 to PO10
- 4.2.13 The vegetation management supporting map overlaid with the submitted plan of development indicates:
 - 4.2.13.1 Clearing of category B areas will occur as a result of the development; and
 - 4.2.13.2 Clearing of category X areas will occur on state land tenure will occur as a result of the development
- 4.2.14 Sufficient information has been provided to enable assessment of PO2 & PO3 of SDAP Module 8 Table 8.1.3
- 4.2.15 The following PO from SDAP Module 8 Table 8.1.4 will require further clarification:

4.2.15.1 PO6 Soil erosion

To comply with the soil erosion performance outcome the applicant proposes a condition be drafted that requires a sediment and erosion control plan to be provided prior to construction. To ensure clearing does not result in soil erosion the performance outcome may be met by clearing in accordance with a sediment and erosion control plan (AO6.1). To satisfy the acceptable outcome a sediment and erosion control plan is required to be reviewed to ensure completeness and appropriateness for the scale of works proposed. It is recommended that an erosion and sediment control plan be compiled by a suitably qualified person and in accordance with the following document:

Best Practice Erosion and Sediment Control, IECA 2008 International Erosion Control Association (Australia), Picton NSW

Consideration should also be given to the effect the diversion channel will have on hydraulic flow and potential scour within the bed and banks of Bungil Creek.

5.0 Recommendations

5.1 Information request

Our department recommends the following information be requested from the applicant to enable the assessment to be finalised:

Item	Information requested
5.1.1	<i>PO3 Watercourses and drainage features</i>
1.	It is recommended that an erosion and sediment control plan be provided, compiled by a suitably qualified person and in accordance with the following document: Best Practice Erosion and Sediment Control, IECA 2008 International Erosion Control Association (Australia), Picton NSW Consideration should also be given to the effect the diversion channel will have on hydraulic flow and potential scour within the bed and banks of Bungil Creek.

6.0 Endorsement

Officer	Brian McAlister	Natural Resource Management Officer	3894 8123
Approver	Michael Gordon	Senior Natural resource Management Officer	4529 1389

SARA technical agency assessment response

Technical agency (TA)—Department of Natural Resources and Mines

DSDIP reference: SDA-0416-029601
 DSDIP Role: referral agency
 DSDIP regional office: SARA Darling Downs South West
 DSDIP email: ToowombaSARA@dlqp.qld.gov.au
 TA reference: 2016/002280
 TA contact name: Patrina Birt
 TA contact details: 3894 8120
 TA approver: Michael Gordon

1.0 Application details

Street address: 2A Tiffin, Miscamble, George - Roma
 Lot on plan: 21; 41; 96; 343; 342 R8614; R8614; M5398; R8614; WV219
 Local government area: Maranoa Regional
 Applicant name: Maranoa Regional Council
 Applicant contact details: planning@maranoa.qld.gov.au

2.0 Aspects of development and type of approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)	Code Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma	Impact Assessment

3.0 Matters of interest to the state

The development application has the following matters of interest to the state under the

following provisions of the Sustainable Planning Regulation 2009¹:

Schedule 6 Assessment manager for development applications and Schedule 7 Referral agencies and their jurisdictions — matters of interest specific to technical agency

Trigger ID	Description	Technical Agency
6.3.1	If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development	EHP
6.3.2	If tables 1 and 2 do not apply and the application is for - (a) operational work for the clearing of native vegetation; and (b) no other assessable development	NRM

¹ MyDAS does not collect data on assessable development aspects under Schedule 3—this is a matter confirmed by DSDIP during the validation process.

RTI RELEASE - DSDIP

4.0 Assessment

4.1 Evidence

- 4.1.1 Application and common material included therein received by DNRM on the 21 April 2016.
- 4.1.2 Pre-lodgement advice dated 4th September 2015
- 4.1.3 Smartmap (SMIS).
- 4.1.4 Electronic Land and Vegetation Administration System (eLVAS).
- 4.1.5 Statute including:
 - 4.1.5.1 *Vegetation Management Act 1999 (VMA)*;
 - 4.1.5.2 *Vegetation Management Regulation 2009 (VMR)*;
 - 4.1.5.3 *Sustainable Planning Act 2009 (SPA)*;
 - 4.1.5.4 *Sustainable Planning Regulation 2009 (SPR)*.
- 4.1.6 Module 8: Native vegetation clearing – State Development Assessment Provisions (SDAP), v1.7.
- 4.1.7 DNRM datasets including:
 - 4.1.7.1 Assessable Vegetation (VEGMGT.QLD_VEG_RVM_100K_CUR and VEGMGT.QLD_VEG_RVMREREM_CODE_CUR)
 - 4.1.7.2 Property Map of Assessable Vegetation - VEGMGT.QLD_VEG_PMAV
 - 4.1.7.3 Aerial Ortho Imagery
 - 4.1.7.4 Essential Habitat Mapping - VEGMGT.QLD_VEG_EHAB_CODE_CUR
 - 4.1.7.5 Watercourse mapping - VEGMGT.QLD_VEG_REMNANTDRN_CUR
 - 4.1.7.6 Wetland mapping - VEGMGT.QLD_VEG_REMNANTWETL_100K_CUR
 - 4.1.7.7 Wildnet Data and Commonwealth Protected Matters Data.
- 4.1.8 Spatial Information Network (bore log data Bore card 58277, 58291 & 58061).
- 4.1.9 Significant Residual Impact Guideline (for MSES and prescribed activities assessable under SPA).
- 4.1.10 Aerial Photography.
- 4.1.11 Regional Ecosystem Technical Descriptions, Queensland Herbarium – Department of Science, Information technology, Innovation and the Arts.
- 4.1.12 Applicant's response to the Information Request received 28 June 2016.
- 4.1.13 Further information submitted by applicant received 20 July 2016.
- 4.1.14 Maranoa Regional Council Planning Scheme.

4.2 Considerations and assessment

- 4.2.1 The operational works application is for clearing vegetation to facilitate the construction of a diversion channel for flood mitigation over the following parcels of land:
- 4.2.1.1 Lot 21 R8614 Freehold
 - 4.2.1.2 Lot 41 R8614 Freehold
 - 4.2.1.3 Lot 96 M5398 Freehold
 - 4.2.1.4 Lot B SP127242 Lands Lease (Grazing)
 - 4.2.1.5 Lot 342 WV219 Reserve (Rubbish)
 - 4.2.1.6 Road Segment/Parcel 32614/77; 32614/70; 32614/82; 32614/102
 - 4.2.1.7 Bungil Creek Seg/Par 10700/008 and 32614/105
- 4.2.2 The regulated vegetation management map identifies the land parcels above contain category B and category X areas.
- 4.2.3 The vegetation management supporting map identifies the category B areas contain:
- 4.2.3.1 Least Concern 11.3.25
 - 4.2.3.2 Of Concern 11.3.2
 - 4.2.3.3 Category X native vegetation
 - 4.2.3.4 Watercourse (Bungil Creek) is identified as a stream order 5 watercourse at 100K.
- 4.2.4 The application indicates an assessment of the Category B areas was undertaken to delineate the boundaries of the least concern and of concern regional ecosystems on ground within the mixed polygon. These new boundaries were accepted by DNRM (refer Diagram 1 and the applicant's submitted Ecological Assessment Report).
- 4.2.5 The operational works application is assessable against the Performance Outcomes (PO) of SDAP Module 8 Native vegetation clearing:
- 4.2.5.1 Table 8.1.3 PO2 & PO3; and
 - 4.2.5.2 Table 8.1.4 PO1 to PO10
- 4.2.6 The vegetation management supporting map (taking into consideration the amended boundaries proposed by the applicant) overlaid with the submitted plan of development (refer Diagram 2) indicates:
- 4.2.6.1 Clearing of category B areas containing Of concern and Least concern REs would be cleared as a result of the development; and
 - 4.2.6.2 Clearing of category X areas will occur as a result of the development on land tenured as State land.
- 4.2.7 The application did not provide evidence e.g. an erosion and sediment control plan (ESCP) that demonstrates the clearing would not result in land degradation. DNRM

recommended an information request be sent to the applicant seeking the submission of an ESCP.

- 4.2.8 The applicant's response to the information request provided an ESCP. This document identified that greater areas of vegetation may need to be cleared to implement the ESCP activities. DNRM requested further information that would clarify the extent and location of clearing that would be required for the development including implementation of the ESCP as DNRM was not aware of this extra clearing prior to recommending its information request.
- 4.2.9 Further information submitted by the applicant clarified the extent and location of clearing and confirmed extra clearing areas were required to implement the ESCP. The clearing required for the development is as follows (refer Diagram 1 & 2):
- 4.2.9.1 Approx. 1.4Ha of mapped category B area containing Of concern RE11.3.2.
 - 4.2.9.2 Section 1: Approx. 0.47Ha of mapped category B area containing Least concern RE11.3.25 within five (5)m of the defining bank of the watercourse with widths of clearing greater than 10m.
 - 4.2.9.3 Section 2: Approx. 0.49Ha of mapped category B area containing Least concern RE11.3.25 within five (5)m of the defining bank of a watercourse and the width of clearing is greater than 10m.

4.3 Findings of material questions of fact

- 4.3.1 Table 8.1.3 (General) – PO2 to PO3
- a. **PO2 – Compliant:** Clearing is not in an area where a compliance notice, enforcement notice or offset exists.
 - b. **PO3 – Compliant:** Clearing will not occur in an area that contains an existing environment offset.
- 4.3.2 Table 8.1.4 (Public safety, relevant infrastructure and co-ordinated projects) – PO1 to PO10.
- a. **PO1 – Compliant:** The proposed clearing is required as part of the construction of a high flow diversion channel that is operationally related to flood mitigation works in Roma. The channel will divert flows away from the urban areas of Roma during flood events and help with flows when Bungil Creek reaches capacity. Regulated vegetation runs the length of Bungil Creek it is therefore not possible to locate the channel to completely avoid impacts to vegetation.
 - b. **PO2 Wetlands – Compliant:** The vegetation management wetland map does not identify a wetland in the relevant subject area.
 - c. **PO3 Watercourses & Drainage Features – Compliant, with conditions:**
 - i. The two clearing areas in Bungil Creek were assessed separately as they are in two disjunct areas.
 1. Section 1: Approx. 0.47Ha of mapped category B area containing Least concern RE11.3.25 within five (5)m of the defining bank of the watercourse with widths of clearing greater than 10m.
 2. Section 2: Approx. 0.49Ha of mapped category B area containing Least concern RE11.3.25 within five (5)m of the

defining bank of a watercourse and the width of clearing is greater than 10m.

- ii. Proposed clearing does not meet acceptable outcomes AO3.1 or AO3.2 because clearing will occur in a watercourse, within 100m of the defining bank of a stream order five (5) watercourse, and will be occur within five (5)m of the defining bank of the watercourse.
 - iii. The application is compliant with PO3 because relative to AO3.3, assessment of the clearing against the Significant Residual Impacts Guideline identifies the clearing is unlikely to be a significant residual impact based on the following:
 - 1. The levee is considered to generally linear in structure.
 - 2. Clearing in Section 1 will occur in a least concern RE that does not contain essential habitat and is less than one (1)Ha (0.47Ha).
 - 3. Clearing in Section 2 will occur in a least concern RE that does not contain essential habitat is less than one (1)Ha (0.49Ha)
 - iv. NOTE: The erosion and sediment control plan, including an adequate and practical rehabilitation plan, should ensure the impact of the development on adjacent assessable vegetation in terms of water quality, bank stability, and terrestrial and aquatic habitat is mitigated.
- d. **PO4 Connectivity (public safety and relevant infrastructure) – Compliant, with conditions:**
- i. Clearing does not meet the requirements of AO4.1 because:
 - 1. Clearing will occur in areas of vegetation that are less than 200 metres wide. Vegetation clearing is proposed to occur in areas that are less than 200 metres wide; vegetation is 48 metres wide at the narrowest extent
 - 2. Clearing will reduce the width of vegetation to less than 200 metres.
 - 3. Clearing is proposed to occur where the extent of vegetation on the subject lots is less than 30% of the total area of the lots. The total extent of vegetation on the lots is 12.78 hectares and the total area of the lots is 88.46h hectares. Thus the assessable vegetation comprises only 14.4% of the lots.
 - ii. The application complies with the elements of PO4 based on the following:
 - 1. Ecosystem function takes account of all of the ecological processes in which the assessable vegetation participates including the watercourse.
 - 2. Clearing in proposed in a relatively sparse environment where canopy cover could be as low as 11 to 20%.
 - 3. Clearing will occur in several disjunct areas.
 - 4. Clearing of approximately 2.6 hectares in total is not considered to impact significantly on ecosystem functioning given the extent of retained regulated vegetation along the length of Bungil Creek. Clearing will result in local disturbance however is unlikely to result in a significant disturbance to landscape ecosystem functioning.
 - 5. The ESCP, including an adequate and practical rehabilitation plan, should ensure the impact of the development on

adjacent assessable vegetation in terms of water quality, bank stability, and terrestrial and aquatic habitat is mitigated

- e. **PO5 Connectivity (Coordinated projects) – N/A.**
- f. **PO6 Soil Erosion - complies, with conditions:**
- i. The applicant provided an ESCP as part of their response to the information request. This document did not detail rehabilitation strategies although further information provided by the applicant did include a document that recommended suitable grasses/vegetation for the proposed levee. This was not a rehabilitation plan however; rather it simply recommended vegetation to be used.
 - ii. The ESCP must be updated to include a Rehabilitation Plan.
- g. **PO7 Salinity – Compliant**
- i. The application did not comply with the A07.1 or A07.2 because clearing of vegetation will occur within a discharge area (Bungil Creek) and clearing will be greater than 2 hectares.
 - ii. The application meets the elements of PO7 because:
 1. A review of groundwater bore logs indicated that the saline water table within a 1 km radius of the clearing site is present at a depth of 43, 153 and 163 metres. Watertable depths greater than six (6)m are not generally considered to pose a salinity hazard risk.
 2. A departmental Land resource Officer has reviewed the stratigraphy and precursors to salinity and has determined that clearing for the diversion channel will not make a measurable or significant difference to salinity.
- h. **PO8 Endangered and Of Concern REs – Compliant with conditions:**
- i. The applicant-derived RE map delineates the boundary of Of concern RE11.3.2 and Least Concern RE11.3.25 within the mixed polygon (Refer Diagram 2). Based on this delineation, the area of Of Concern RE11.3.2 that will be cleared as a result of this development is approximately 1.4Ha.
 - ii. Of concern RE11.3.2 has a Sparse structural category. Clearing complies with A08.2 because clearing does not exceed the area prescribed in Table 1 of the SDAP for a RE with a Sparse structural category i.e. clearing does not exceed two (2)Ha.
- i. **PO9 Essential Habitat – Compliant:** The assessable vegetation is not mapped as containing Essential Habitat.
- j. **PO10 Acid Sulphate Soils – Compliant:** Although clearing will occur on land zone 3, the land is above 5m AHD and is not identified as being in an acid sulphate hazard or risk area.

5.0 Recommendations

5.1 Technical agency advice for SARA as assessment manager

Our department, in administering the *Vegetation Management Act 1999*:

- (a) recommends the following conditions be attached to any development approval (SPA section 324(1)(b)):

SARA Model Conditions Version:
Aspect of development: Operational Works

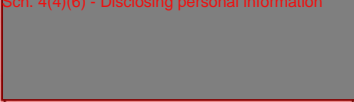
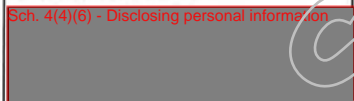
Compliance timing		
Unless specified in the issues below the timing for all conditions should be: <i>at all times</i>		
No.	Condition ID	Issues to be addressed or variations to model condition
Clearing vegetation		
1.		<p>Clearing is permitted in the area identified as "Red - Clear And Grub Zones" on the plan titled "EASTERN DIVERSION DRAIN GENERAL ARRANGEMENT PLAN", <i>Drawing No. 2016-378C-C001, dated 27 May 2016</i> prepared by GHD for the Maranoa Regional Council.</p> <p>Reason for condition: To ensure the development maintains general consistency with plans of development assessed by DNRM as complying with Module 8 of the SDAP, in particular PO1 Avoid and minimise, PO3 Watercourses, PO4 Connectivity, PO6 Soil Erosion, and PO8 Endangered & Of Concern Regional Ecosystems.</p>
2.		<p>The development must occur in accordance with the standards and specifications detailed in the '<i>Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016</i>', and any amendments consistent with best practice.</p> <p>a) The Erosion and Sediment Control Plan must be updated to include a Rehabilitation Plan.</p> <p>Reason for condition: To ensure the development maintains general consistency with plans of development assessed by DNRM as complying with Module 8 of the SDAP, in particular PO1 Avoid and minimise, PO3 Watercourses, PO4 Connectivity, PO6 Soil Erosion, and PO8 Endangered & Of Concern Regional Ecosystems.</p>
3.		<p>The appropriate erosion and sediment controls must be installed and working effectively prior to, during and after any site disturbance, vegetation clearing and grubbing, and construction.</p> <p>Reason for condition: To ensure the development maintains general consistency with plans of development assessed by DNRM as complying with Module 8 of the SDAP, in particular PO1 Avoid and minimise, PO3 Watercourses, PO4 Connectivity, PO6 Soil Erosion, and PO8 Endangered & Of Concern Regional Ecosystems.</p>
4.		<p>The permit holder must ensure that:</p> <p>(a) a full copy of the permit is held by; and</p> <p>(b) the extent of clearing authorised by this permit is properly understood by, any person(s) engaged or employed to carry out the clearing of the vegetation under this permit.</p>

5.2 Approved plans and specifications

Our department recommends that the following plans and specifications should be referenced in the response:

Drawing/Report Title	Prepared by	Date	Reference no.	Version/Issue
Aspect of development: Operational Works				
Eastern Diversion Drain General Arrangement Plan	GHD	27 May 2016	2016-378C-C001	0

6.0 Endorsement

Assessment Officer	Patrina Birt <small>Sch. 4(4)(6) - Disclosing personal information</small>  15 August 2016	Natural Resource Management Officer	3894 8120
Approver	Michael Gordon <small>Sch. 4(4)(6) - Disclosing personal information</small>  17 August 2016	Senior Natural Resource Management Officer	0427 157 132

Attachments:

1. Diagram 1 – Applicant-derived RE and Amended RE Maps
2. Diagram 2 – DNRM Veg TAR 2016/002280
3. Plan titled *Eastern Diversion Drain General Arrangement Plan – Maranoa Regional Council, Drawing No. 2016-378C-C001, prepared by GHD, dated 27 May 2016*

Diagram 1 – Applicant-derived RE and Amended RE maps for the SUBJECT area



Map Scale A4
0 100 200
Metres

Map Produced: Technical Manager
Author: JAM/184
Date: 02/04/2018

LEGEND
 Railway
 Road
 Watercourse
 Stage 3 Private Lot
 Stage 3 Reserve
 Stage 3 Boundary
 Stage 3 Property
 Regional Ecosystem - (DNR) V1
 Change P.R. - New Addition
 Change P.R. - New Deletion
 Change P.R. - New Addition
 Change P.R. - New Deletion

Mariano Regional Council
Roma - Stage 2 Detail Design

Job Number: 41-29431
Revision: 3
Date: 02 Feb 2018

DNR Regional Ecosystem Map Figure 1

140 Av. Road Brisbane QLD 4001 Australia T 61 7 319 1003 F 61 7 319 1003 E marianor@rcd.com.au W www.pd.com.au

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Map Scale A4
0 100 200
Metres

Map Produced: Technical Manager
Author: JAM/184
Date: 02/04/2018

LEGEND
 Railway
 Road
 Watercourse
 Stage 3 Private Lot
 Stage 3 Reserve
 Stage 3 Boundary
 Stage 3 Property
 Regional Ecosystem - (DNR) V1
 Change P.R. - New Addition
 Change P.R. - New Deletion
 Change P.R. - New Addition
 Change P.R. - New Deletion

Mariano Regional Council
Roma - Stage 2 Detail Design

Job Number: 41-29431
Revision: 3
Date: 02 Feb 2018

Ground-truthed Regional Ecosystem Map Figure 2

140 Av. Road Brisbane QLD 4001 Australia T 61 7 319 1003 F 61 7 319 1003 E marianor@rcd.com.au W www.pd.com.au

© 2018. All other maps have been taken from the 1:25,000 scale DMR (and DMR) SA, DTMR) as an approximation of location. All other maps, including aerial photography, are not to be used for any purpose without the express written consent of the relevant authority. All other maps, including aerial photography, are not to be used for any purpose without the express written consent of the relevant authority. All other maps, including aerial photography, are not to be used for any purpose without the express written consent of the relevant authority. All other maps, including aerial photography, are not to be used for any purpose without the express written consent of the relevant authority.



Queensland
Government

Department of Infrastructure,
Local Government and Planning

Our reference: SPL-0216-028496

15 March 2016

Chief Executive Officer
Maranoa Regional Council
PO Box 620
ROMA QLD 4455

ATTN: Danielle Pearn – Manager Planning

Dear Danielle,

Prelodgement meeting record— Operational Works (Diversion Channel)

Tiffin Road, Roma QLD 4455

This pre-lodgement record provides a summary of the matters discussed at the pre-lodgement meeting in addition to providing further advice prepared subsequent to the meeting. This record provides initial advice regarding the likely major issues relevant to the development proposal to assist in the timely processing of a development application. While this pre-lodgement advice is provided in good faith, if the proposal is changed to that which was discussed with the Department of Local Government and Planning (DILGP) during the pre-lodgement meeting, this advice is not binding.

Reference information

Departmental role:	Concurrence agency and Assessment Manager
Jurisdiction:	State-controlled Road and Environmentally Relevant Activities
Pre-lodgement meeting date:	2 March 2016

Reference information

Meeting attendees:

Name	Position	Organisation
Bernadette Plummer	A/Principal Planner	Department of Infrastructure, Local Government and Planning (DILGP)
Maria Johnson	A/Senior Planner	DILGP
Jason McGuire	Senior Town Planner	Department of Transport and Main Roads (DTMR)
Ben Setchfield	Planner	DTMR
Lindsay Webber	A/Manager	Department of Environment and Heritage Protection (DEHP)
Clare Davies	Senior Environment Officer	DEHP
Maranoa Regional Council staff	Numerous positions	Maranoa Regional Council

Site details

Street address: 2A Tiffin Street, Roma

Real property description: Lot 21 on R8614
 Lot 41 on R8614
 Lot 42 on R8614
 Lot 343 on R8614
 Lot 96 on M5398

Assessment manager reference: Nil

Local government area: Maranoa Regional Council

Proposed development details

Development type: Operational Works

Development description: Diversion Channel

Meeting minutes

Item	Discussion and advice
Environmentally Relevant Activity (ERA)	
1.	<p>Mr Webber provided the following information in relation to the proposal:</p> <ul style="list-style-type: none"> • The proposed activity will likely trigger ERA# 16 Extractive activities. • If there will be in excess of 5,000tonnes of material being removed in a year, and there is no exemption, the ERA will be triggered. • ERA16(2)(b) is a concurrence ERA and the development application will be taken to be the application for the environmental authority. • It was confirmed that there would be no material taken from the watercourse, therefore dredging would not form part of the application. • The following state interest would need to be addressed as part of an any ERA application submitted to SARA: <ul style="list-style-type: none"> o Matters of State Environmental Significance (Wildlife Habitat) o Regulated Vegetation o Regulated Vegetation intersecting with a watercourse <p>Please address the impacts that the works will have on these values ie impact to surface waters and sensitive values by noise and dust.</p> <ul style="list-style-type: none"> • The Lot/Plan details were provided to Mr Webber for the existing refuse facility. Based on the information provided, the proposed stockpiling of extraction material at these locations will not trigger an ERA. Please refer to the attached advice for additional information.
DTMR – State-controlled Road (SCR)	
2.	<p>Mr McGuire provided the following information in relation to the proposal</p> <ul style="list-style-type: none"> • The main area of interest for DTMR will be the access onto the SCR and whether pavement contributions will be required. • It is requested that a Traffic Impact Assessment be provided detailing the haulage route(s) to ensure that no impacts will be occurring on the SCR. • With regard to Stormwater runoff, please provide a Registered Professional Engineer of Queensland (RPEQ) certified report detailing flood immunity to the SCR. It was suggested that the applicant provide details of 'prior development' scenario vs 'post development' scenario to ensure a no net worsening to the SCR.
General SARA advice	
3.	Ms Johnson provided the following information in relation to the proposal

Item	Discussion and advice
	<ul style="list-style-type: none"> • The proposed development application will trigger: <ul style="list-style-type: none"> o Schedule 7.2.1 – Environmentally Relevant Activity ERA#16(ii)(b) - \$2922.00 o Schedule 7.3.2 – State-controlled road (SCR) and the fees would be: \$2922.00

It is considered that the above summary is an accurate record of the matters discussed at the pre-lodgement meeting.

If you require any further information, please contact Bernadette Plummer on the 07 4616 7307 who will be pleased to assist.

Yours sincerely

Sch. 4(4)(6) - Disclosing personal information

Ian McHugh
A/Manager (Planning)

From: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Sent: Tue, 19 Apr 2016 16:05:02 +1000
To: <Planning.support@ehp.qld.gov.au>
Subject: SDA-0416-029601

Hello,

Please note that Attachment to IDAS Form 8 has now been uploaded into MyDas for the above application.

Kind Regards

Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au
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RTI RELEASE - DSDMIP

From: "Christopher Tickner" <Christopher.Tickner@maranoa.qld.gov.au>
Sent: Wed, 29 Jun 2016 09:29:35 +1000
To: "Maria Johnson" <Maria.Johnson@dlgp.qld.gov.au>
Subject: Eastern Diversion Channel Roma
Attachments: Maranoalogo_481a17e0-c24d-469e-8c84-63db5a0c83d4.jpg
Hi Maria,

I've uploaded on the MyDAS site our info request response for the eastern diversion channel in Roma.

I posted a hard copy.

Please let me know if there are any issues.

FYI - Council approved the Western Levee Bank last week and we are anticipating a Water License from DNRM mid/late July for the diversion channel.

Thanks again,

Christopher
Christopher Tickner
Town Planner
Planning



Maranoa Regional Council
INFRASTRUCTURE OFFICE
1 Cartwright Street Roma QLD 4455
Postal Address: P.O. Box 620 ROMA QLD 4455
P: 1300 007 662
D: (07) 4624 0622 M: Sch. 4(4)(6) F: (07) 4624 6990

Email: christopher.tickner@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

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Please consider the environment before printing this e-mail

Maria Johnson

From: Katie Albiez
Sent: Tuesday, 3 May 2016 8:33 AM
To: Maria Johnson
Cc: Andrew Foley
Subject: SDA-0416-029601

Tracking:	Recipient	Read
	Maria Johnson	Read: 3/05/2016 1:26 PM
	Andrew Foley	

Maria,

This application is asking me to send the Information Request outside of MYDAS through the Toowoomba Sara email. Thought I would send this email for your reference incase something comes up.

Reference Number: SDA-0416-029601
 Current Status: Info & Refer
 Native Title Status : Notification not required

Application Details

Application Details | Location | Development Details | Assessments | Payment

Timeframes

Applicant Details			
Applicant	Maranoa Regional Council	Contact Name	Plan
Address	P.O. Box 620	Phone	1300
Suburb	Roma	Email Address	plan
State	QLD		

Application Details			
DSDIP Received Date		Region	SAF
Lodgement Date	19/04/2016	Case Officer	ina
Property Made/Referred Date	19/04/2016	SARA's Role	Ass
Decision Date		Financial Status	Pay

Manage TA Information

Technical Agency and Referral Agency interaction for this development application during the Information

Agency Name	Action Type	Agency Response	Completed By	Completion On	U
DEHP	Is More Information Needed	Yes	maria johnson	28/04/16	DEHP IR - SDA-0416-029601 IR

Prepare To Send

Please complete the form below.

Due Date: 05/05/2016

Information Requested From Applicant

MARANOA REGIONAL COUNCIL, Informati...
 MyDAS - Administrator
 Version 1.20 Apr-2016

Please manually email this information request to the Assessment M...

Katie Albiez
 Program Support Officer
 Regional Services
 Department of Infrastructure, Local Government and Planning

tel +61 7 4616 7318
 post PO Box 825 Toowoomba Qld 4350
 visit 128 Margaret Street Toowoomba
katie.albiez@dilgp.qld.gov.au

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From: "ROSIAK Dorota" <Dorota.Rosiak@ehp.qld.gov.au>
Sent: Mon, 15 Aug 2016 08:26:11 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Cc: "Industry and Development Assessment" <landD@ehp.qld.gov.au>
Subject: RE: Maranoa Regional Council - Technical Agency Response - SDA-0416-029601
Attachments: EPPR03917216 Maranoa RC.pdf; SDA-0416-029601 Maranoa RC TA advice.pdf; image002.png; image004.jpg; image001.png
Good morning Maria.

In relation to the MCU application for Maranoa Regional Council (Roma flood mitigating works) please find attached a Technical Agency's response and associated Environmental Authority for extractive activity.

Should you have any questions, please do not hesitate to contact me.

Kind regards,

Dot



Dorota Rosiak

Senior Environmental Officer
Industry and Development Assessment | Environmental Services and Regulation
Department of Environment and Heritage Protection

Phone: 07 3330 6372
Level 8, 400 George Street, Brisbane
GPO Box 2454, Brisbane QLD 4001
Email: dorota.rosiak@ehp.qld.gov.au
Website: www.ehp.qld.gov.au

From: Maria Johnson [<mailto:Maria.Johnson@dilgp.qld.gov.au>]
Sent: Monday, 18 July 2016 1:16 PM
To: ROSIAK Dorota; BIRT Patrina
Subject: Maranoa Regional Council - Further Issues Response - SDA-0416-029601

Hello Ladies,

Please note that the Maranoa Regional Council (MRC) response to the further issues detailed by the Department of Environment and Heritage Protection has now been uploaded in the MyDas system.

Unfortunately due to the size of the document, it is too large to be sent via email. If you are unable to access MyDas, please let me know then I can break the document up.

As your assessment response is due on the 20 July 2016, I will be initiating an extension for 20 days in accordance with the *Sustainable Planning Act 2009* from today in order for you to review the material attached.

Any questions or further queries, please don't hesitate to contact me. MRC has expressed if further clarification is required, they are more than happy to assist. Once again, any further correspondence with the applicant, please send through myself and ToowoombaSARA. Thank you for your understanding.

Kind Regards
Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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Department of
Environment and
Heritage Protection

To: Maranoa Regional Council
PO Box 42
MITCHELL, QLD 4465

Email: planning@maranoa.qld.gov.au

Your reference: EPPR03917216
Our reference: 438271

Application details

I refer to the application that was received by the administering authority on 19-APR-2016.

Land description: George Street, ROMA, QLD 4455 Lot 343 Plan R8614, Lot 342 Plan WV219; Miscamble Street, ROMA QLD 4455 Lot 96 Plan M5398; 2A Tiffin Street, ROMA QLD 4455 Lot 21 Plan R8614, Lot 41 Plan R8614.

Decision

Your application has been approved and your environmental authority (reference EPPR03917216) is attached.

Additional comments or advice

You are advised that if you are not the owner of the land to which the environmental authority relates, you have 10 business days from receipt of this environmental authority to give each owner of the land, written notice that you have been issued this environmental authority.

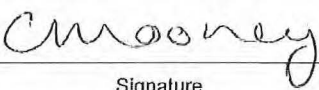
This permit only provides an approval under the *Environmental Protection Act 1994*. In order to lawfully operate you may also require permits / approvals from your local government authority and other State Government agencies prior to commencing any activity at the site. For example, this may include permits / approvals with your local Council (for planning approval), the Department of Transport and Main Roads (to access state controlled roads), the Department of Natural Resources and Mines (to clear vegetation), and the Department of Agriculture Forestry and Fisheries (to clear marine plants or to obtain a quarry material allocation).

If a copy of this environmental authority is attached to a development approval, it is for information only, and may not be current. Please contact the Department of Environment and Heritage Protection to ensure that you have the most current version of the environmental authority relating to this site.

Dorota Rosiak
Heritage, Utilities and Government
Organisations Assessment
Department of Environment and
Heritage Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: 07 3330 6037
Email: Dorota.Rosiak@ehp.qld.gov.au
Website www.ehp.qld.gov.au
ABN 46 640 294 485

Should you have any further enquiries, please contact Dorota Rosiak on telephone (07) 3330 6372.

Yours sincerely

	12 / 8 / 16
Signature	Date

Chris Mooney
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Enclosed

Permit - environmental authority (reference EPPR03917216)

RTI RELEASE - DSDMIP

Department of Environment and Heritage Protection

Permit¹

Environmental Protection Act 1994

Environmental authority

This environmental authority is issued by the administering authority under Chapter 5 of the Environmental Protection Act 1994.

Permit¹ number: EPPR03917216

Environmental authority takes effect when your related development approval takes effect. Prior to the commencement of the activity the administering authority must be given written notice of the proposed date of commencement.

The anniversary date of this environmental authority is the same day each year as the effective date. An annual return and the payment of the annual fee will be due each year on this day.

Environmental authority holder

Name	Principal address
Maranoa Regional Council	1 Cartwright Street ROMA QLD 4455

Environmentally relevant activity and location details

Environmentally relevant activity	Location(s)
16-(2b) Extractive >100000t but <1000000t yr	2A Tiffin Street, ROMA QLD 4455 - Lot 21 Plan R8614 and Lot 41 Plan R8614 George Street, ROMA QLD 4455 - Lot 343 Plan R8614 and Lot 342 Plan WV219 Miscamble Street and ROMA QLD 4455 - Lot 96 Plan M5398

Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

¹ Permit includes licences, approvals, permits, authorisations, certificates, sanctions or equivalent/similar as required by legislation



A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).

Contaminated land

It is a requirement of the EP Act that an owner or occupier of land give written notice to the chief executive if they become aware of the following:

- a notifiable activity (as defined in Schedule 3) that is being, or has been, carried out on the land (notice must be given within 20 business days)
- an event involving a hazardous contaminant on the land, or a change in the condition of the contaminated land, that is causing, or is reasonably likely to cause, serious or material environmental harm (notice must be given within 24 hours).

For further information, including the form for giving written notice, refer to the Queensland Government website <http://www.qld.gov.au/> (using the search term 'managing contaminated land').

	12 8 16
Signature	Date

Chris Mooney
Department of Environment and Heritage Protection
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Department of Environment and Heritage
Protection
GPO Box 2454
BRISBANE QLD 4001
Phone: 1300 130 372
Fax: 07 3330 6037
Email: palm@ehp.qld.gov.au

Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

Conditions of environmental authority

Environmentally relevant activity	Location(s)
16-(2b) Extractive >100,000t but <1000,000t yr	2A Tiffin Street, ROMA QLD 4455 - Lot 21 Plan R8614 and Lot 41 Plan R8614 George Street, ROMA QLD 4455 - Lot 343 Plan R8614 and Lot 342 Plan WV219 Miscamble Street and ROMA QLD 4455 - Lot 96 Plan M5398

The environmentally relevant activity conducted at the location as described above must be conducted in accordance with the following site specific conditions of approval.

Agency interest: General

Condition number	Condition
G1	Any activity operating under this environmental authority must not be conducted contrary to any of the following limitations: 1. must not exceed 1000,000 tonnes per year of material extracted; and 2. must be only carried out within the boundaries shown in Figure 1 (attached) – Drawing No: 41-25323-SK105 <i>Proposed Stage 2 Regional Options Eastern Diversion Channel D – Details</i> prepared by GHD reference 41-25323-SK105 and revision A.
G2	All reasonable and practicable measures must be taken to minimise the likelihood of environmental harm being caused.
G3	Any breach of a condition of this environmental authority must be reported to the administering authority as soon as practicable, or at most, within 24 hours of you becoming aware of the breach. Records must be kept including full details of the breach and any subsequent actions undertaken.
G4	Environmental monitoring results must be kept until surrender of this environmental authority. All other information and records that are required by the conditions of this environmental authority must be kept for a minimum of five (5) years. All information and records required by the conditions of this environmental authority must be provided to the administering authority , or nominated delegate upon request, within the required timeframe and in the specified format.

G5	An appropriately qualified person(s) must monitor, record and interpret all parameters that are required to be monitored by this environmental authority and in the manner specified by this environmental authority.
G6	All analyses required under this environmental authority must be carried out by a laboratory that has NATA certification, or an equivalent certification, for such analyses. The only exception to this condition is for in situ monitoring of pH and DO.
G7	When required by the administering authority , monitoring must be undertaken in the manner prescribed by the administering authority , to investigate a complaint of environmental nuisance arising from the activity . The monitoring results must be provided to the administering authority , or nominated delegate, within the required timeframe and in the specified format upon request.
G8	The activity must be undertaken in accordance with written procedures that: <ol style="list-style-type: none"> 1. identify potential risks to the environment from the activity during routine operations, closure and an emergency 2. establish and maintain control measures that minimise the potential for environmental harm 3. ensure plant, equipment and measures are maintained in a proper and effective condition 4. ensure plant, equipment and measures are operated in a proper and effective manner 5. ensure that staff are trained and aware of their obligations under the <i>Environmental Protection Act 1994</i> 6. ensure that reviews of environmental performance are undertaken at least annually.
G9	Chemicals and fuels in containers of greater than 15 litres must be stored within a secondary containment system.
Agency interest: Air	
Condition number	Condition
A1	Odours or airborne contaminants which are noxious or offensive or otherwise unreasonably disruptive to public amenity or safety must not cause nuisance to any sensitive place or commercial place .
A2	Dust and particulate matter emissions must not exceed the following concentrations at any sensitive place or commercial place : <ol style="list-style-type: none"> a) dust deposition of 120 milligrams per square metre per day, when monitored in accordance with Australian Standard AS 3580.10.1 (or more recent editions), or b) a concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (µm) (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24 hour averaging time, when monitored in accordance with Australian Standard AS 3580.9.6 (or more recent editions) or any other method approved by the administering authority.

Agency interest: Water																				
Condition number	Condition																			
WT1	<p>The only contaminants to be released to surface waters are settled treated stormwater runoff from areas of the site not likely to be contaminated with waste materials to waters described as describe waterway and location in accordance with <i>Table WT1— Surface water release limits</i> and the associated monitoring requirements.</p> <p style="text-align: center;">Table WT1—Surface water release limits</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Release Point(s) Description</th> <th>Quality characteristic (units)</th> <th>Limit</th> <th>Limit Type</th> <th>Minimum Monitoring Frequency</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Sediment traps shown on Drawing No: 2016-378C-C201 – <i>Erosion and Sediment Control Plan</i> attached in Figure 2</td> <td>Total Suspended Solids (mg/L)</td> <td>50</td> <td>Maximum</td> <td rowspan="4">Prior to release, and then daily during a release</td> </tr> <tr> <td>pH</td> <td>7.5 – 8.5</td> <td>Range</td> </tr> <tr> <td>Dissolved Oxygen (mg/L)</td> <td>2</td> <td>Minimum</td> </tr> <tr> <td>Electrical Conductivity (µS/cm)</td> <td>1,200</td> <td>Maximum</td> </tr> </tbody> </table> <p>Associated monitoring requirements</p> <ol style="list-style-type: none"> 1. Monitoring must be in accordance with the methods prescribed in the current edition of the Department of Environment and Heritage Protection <i>Monitoring and Sampling Manual</i>. 3. Water samples must be representative of the general condition of the water body. 4. All determinations must employ analytical practical quantification limits of sufficiently sensitivity to enable comparisons to be made against water quality objectives/triggers/limits relevant to the particular water or sediment quality characteristic. 5. Monitoring must be undertaken prior to release and at the frequency stated. 6. All monitoring devices must be calibrated and maintained according to the manufacturer's instruction manual. 7. Discharge must only occur when settled treated stormwater runoff complies with release limits. In storms greater than the design event specified in condition WT3 all other reasonable and practicable measures must be taken to minimize erosion and sediment export. 	Release Point(s) Description	Quality characteristic (units)	Limit	Limit Type	Minimum Monitoring Frequency	Sediment traps shown on Drawing No: 2016-378C-C201 – <i>Erosion and Sediment Control Plan</i> attached in Figure 2	Total Suspended Solids (mg/L)	50	Maximum	Prior to release, and then daily during a release	pH	7.5 – 8.5	Range	Dissolved Oxygen (mg/L)	2	Minimum	Electrical Conductivity (µS/cm)	1,200	Maximum
Release Point(s) Description	Quality characteristic (units)	Limit	Limit Type	Minimum Monitoring Frequency																
Sediment traps shown on Drawing No: 2016-378C-C201 – <i>Erosion and Sediment Control Plan</i> attached in Figure 2	Total Suspended Solids (mg/L)	50	Maximum	Prior to release, and then daily during a release																
	pH	7.5 – 8.5	Range																	
	Dissolved Oxygen (mg/L)	2	Minimum																	
	Electrical Conductivity (µS/cm)	1,200	Maximum																	
WT2	The release to waters permitted under WT1 must not produce any slick or other visible evidence of oil or grease, scum, litter or other visually objectionable matter.																			
WT3	Stormwater runoff from disturbed areas of the site, generated by (up to and including) a 24 hour storm event with an average recurrence interval of 1 in 5 years must be retained on site or managed to remove contaminants prior to release.																			
WT4	Contaminants must not be released to groundwater or at a location where they are likely to release to groundwater.																			
Agency interest: Noise																				
Condition number	Condition																			
N1	Noise generated by the activity must not cause environmental nuisance to any sensitive place or commercial place .																			

Agency interest: Land	
Condition number	Condition
L1	Contaminants must not be released to land .
L2	<p>Land that has been disturbed for activities conducted under this environmental authority must be rehabilitated in a manner such that:</p> <ol style="list-style-type: none"> 1. suitable native species of vegetation for the location are established and sustained for earthen surfaces; 2. potential for erosion is minimised; 3. the quality of water released from the site, including seepage, does not cause environmental harm; 4. potential for environmental nuisance caused by dust is minimised; 5. the water quality of any residual water body does not have potential to cause environmental harm; 6. the final landform is stable and protects public safety.
L3	Treatment and management of acid sulfate soils must comply with the guidance provided in the current edition of the <i>Queensland Acid Sulfate Soil Technical Manual</i> .
Agency interest: Waste	
Condition number	Condition
WS1	All waste generated in carrying out the activity must be reused, recycled or removed to a facility that can lawfully accept the waste.

Definitions

Key terms and/or phrases used in this document are defined in this section and **bolded** throughout this document. Applicants should note that where a term is not defined, the definition in the *Environmental Protection Act 1994*, its regulations or environmental protection policies must be used. If a word remains undefined it has its ordinary meaning.

Activity means the environmentally relevant activities, whether resource activities or prescribed activities, to which the environmental authority relates.

Administering authority means the Department of Environment and Heritage Protection or its successor or predecessors.

Appropriately qualified person(s) means a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.

Commercial place means a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place.

Land means any land, whether above or below the ordinary high-water mark at spring tides (i.e. includes **tidal land**).

Measures has the broadest interpretation and includes:

- **Procedural measures** such as standard operating procedures for dredging operations, environmental risk assessment, management actions, departmental direction and competency expectations under relevant guidelines

- **Physical measures** such as plant, equipment, physical objects (such as bunding, containment systems etc.), ecosystem monitoring and bathymetric surveys.

NATA means National Association of Testing Authorities.

Noxious means harmful or injurious to health or physical well-being.

Offensive means causing offence or displeasure; is unreasonably disagreeable to the senses; disgusting, nauseous or repulsive.

Sensitive place includes the following and includes a place within the curtilage of such a place reasonably used by persons at that place:

1. a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
2. a motel, hotel or hostel; or
3. a kindergarten, school, university or other educational institution; or
4. a medical centre or hospital; or
5. a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 2004* or a World Heritage Area; or
6. a public park or garden; or
7. for noise, a place defined as a sensitive receptor for the purposes of the Environmental Protection (Noise) Policy 2008.

Waters includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water, natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

You means the holder of the environmental authority.

24 hour storm event with an average recurrence interval of 1 in 5 years means the maximum rainfall depth from a 24 hour duration precipitation event with an average recurrence interval of once in 5 years. *For example, an Intensity-Frequency-Duration table for a 24 hour duration event with an average recurrence interval of 1 in 5 years, identifies a rainfall intensity of 7.09mm/hour. The rainfall depth for this event is therefore 24 hour x 7.09mm/hour = 170.16mm.*

Schedule 1—Approved plans

Figure 1 Drawing No: 41- 25323-SK105 Proposed Stage 2 Regional Options Eastern Diversion Channel D - Details

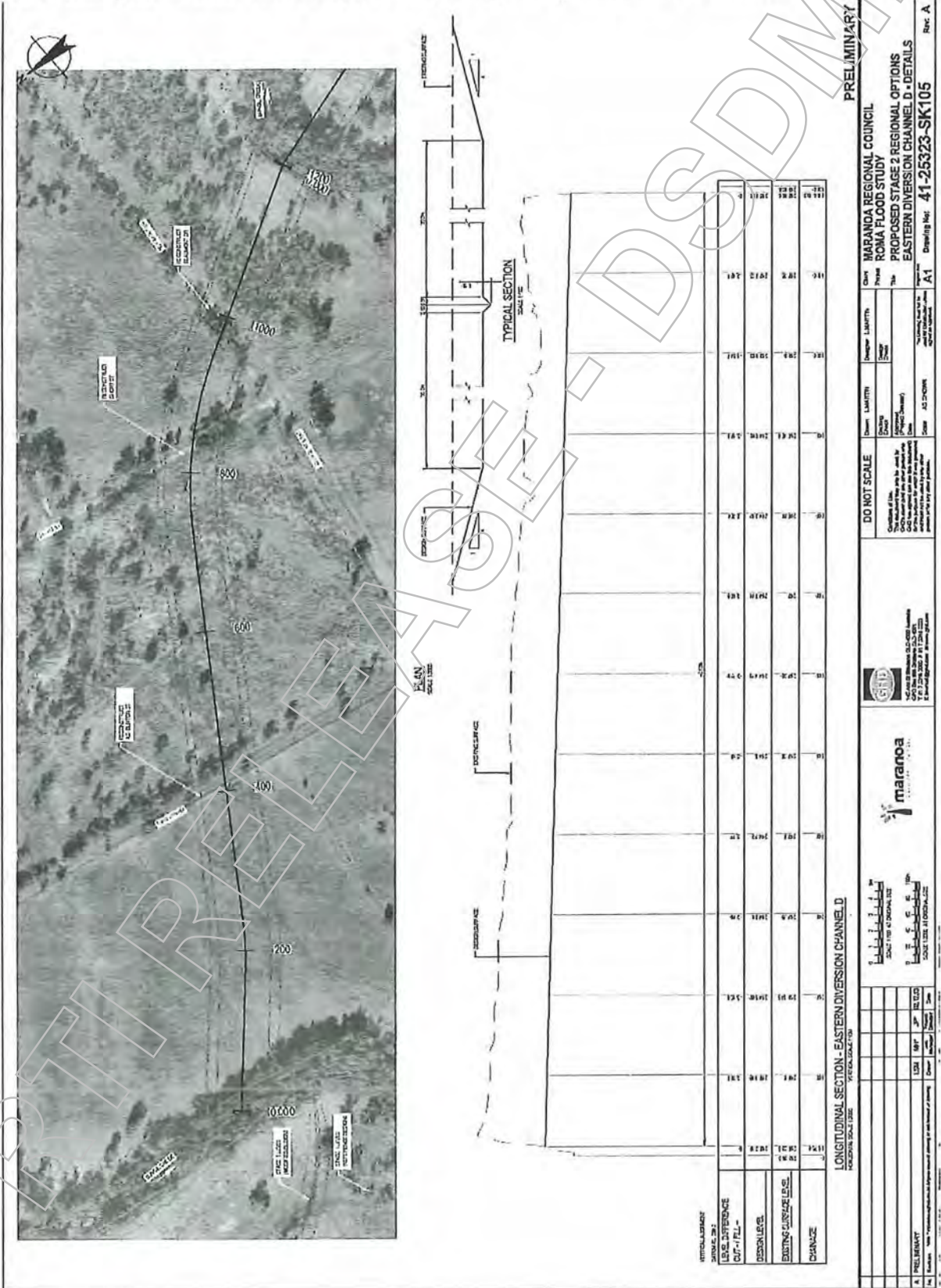
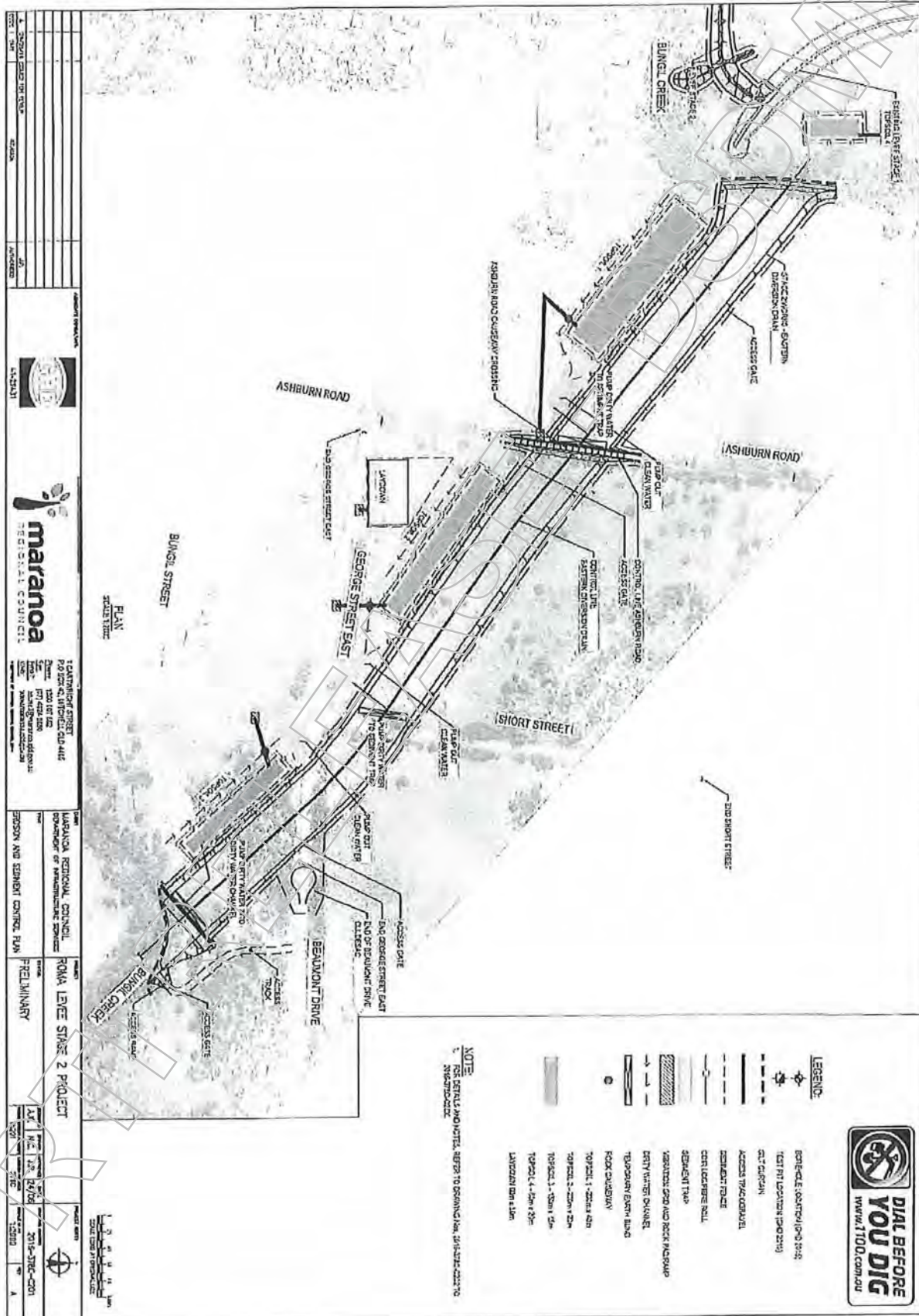


Figure 2 Drawing No: 2016-378C-C201 – Erosion and Sediment Control Plan



END OF PERMIT

RTI RELEASE - DSDMIP

SARA technical agency assessment response

Technical agency (TA)— Department of Environment and Heritage Protection

DSDIP reference: SDA-0416-029601
DSDIP Role: referral agency
DSDIP regional office: SARA Darling Downs South West
DSDIP email:

[NB. All responses are to be returned to this email address]

TA reference: SDA-0416-029601 / EPPR03917216
TA contact name: Dot Rosiak
TA contact details: Dorota.Rosiak@ehp.qld.gov.au
TA approver: Chris Mooney

1.0 Application details

Street address: 2A Tiffin - Roma, Maranoa Regional - QLD; 2A Tiffin - Roma, Maranoa Regional - QLD; Miscamble - Roma, Maranoa Regional - QLD; Ge - Roma, Maranoa Regional - QLD;

Lot on plan: 21; 41; 96; 343; 342 R8614; R8614; M5398; R8614; WV219

Local government area: Maranoa Regional, Maranoa Regional, Maranoa Regional, Maranoa Regional, MARANOA REGIONAL

Applicant name: Maranoa Regional Council

Applicant contact details: planning@maranoa.qld.gov.au

2.0 Aspects of development and type of approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)	Code Assessment

3.0 Matters of interest to the state

The development application has the following matters of interest to the state under the following provisions of the Sustainable Planning Regulation 2009¹:

Schedule 6 Assessment manager for development applications and Schedule 7 Referral agencies and their jurisdictions — matters of interest specific to technical agency

Trigger ID	Description	Technical Agency
6.3.1	If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development	EHP

¹ MyDAS does not collect data on assessable development aspects under Schedule 3—this is a matter confirmed by DSDIP during the validation process.

4.0 Assessment

4.1 Considerations and assessment

- Maranoa Regional Council (MRC) has proposed an implementation of a Second Stage of flood mitigation measure for the township of Roma, which involves construction of a high flow diversion channel to the east of Bungil Creek.
- The proposal includes carrying out of extractive activity - ERA16-(2b) – extracting more than 100,000t but not more than 1,000,000t of material in a year, which is operationally related to the construction of the channel.
- The construction of the high flow diversion channel will involve clearing 75 meters of riparian vegetation along banks of Bungil Creek on Lot 21 Plan R8614, Lot 343 Plan R8614, Lot 96 Plan M5398 and Lot 342 Plan WV219; extracting and removing of 200,000t of material on Lot 21 Plan R8614, Lot 41 Plan R8614, Lot 42 Plan R8614 Lot 343 Plan R8614, Lot 96 Plan M5398 and Lot 342 Plan WV219. The extracted material will be stockpiled on another site, at the Roma landfill/refuse facility and will be used for cover/fill as well as for rehabilitation works.
- The high flow diversion channel will run from Bungil Creek (from end of Stage 1 levee) to Bungil Creek (at Creek Street). The length of the channel will be 1,200m; width – 60m and depth – 3.5m.
- The proposal has been assessed against the State Development Assessment Provisions (version 1.9), Module 4 – Environmentally relevant activities.
- The proposal has also been assessed against Environmental objectives and performance outcomes specified in Table 2 – Land use assessment under Schedule 5 of the *Environmental Protection Regulation 2008*.

5.0 Recommendations

5.1 Technical agency advice for SARA as concurrence agency

Our department:

- (a) recommends the following condition be attached to any development approval (SPA section 324(1)(b)):

SARA Model Conditions Version: 2.3 – 05 May 2016		
Aspect of development: Material Change of Use for ERA 16		
Compliance timing		
Unless specified in the issues below the timing for all conditions should be: Prior to the commencement of use and to be maintained at all times.		
No.	Condition ID	Issues to be addressed or variations to model condition
ERA 16 – extractive activity		
1.	AD01	The development must be carried out generally in accordance with the following plans: <ul style="list-style-type: none"> • Proposed Stage 2 <i>Regional Options Eastern Diversion Channel D - Details</i> prepared by GHD reference 41-25323-SK105 revision A.

5.2 Approved plans and specifications

Our department recommends that the following plans and specifications should be referenced in the response:

Drawing/Report Title	Prepared by	Date	Reference no.	Version/Issue
Aspect of development: Material change of use for ERA 16				
Proposed Stage 2 Regional Options Eastern Diversion Channel D - Details	GHD		41-25323-SK105	A

6.0 Endorsement

Officer	Dot Rosiak	Senior Environmental Officer	(07) 3330 6372	Dorota.Rosiak@ehp.qld.gov.au
Approver	Chris Mooney	Manager	(07) 3339 5839	Chris.Mooney@ehp.qld.gov.au

Chris Mooney

From: "ToowoombaSARA" <ToowoombaSARA@dilgp.qld.gov.au>
Sent: Thu, 30 Jun 2016 14:20:57 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: FW: SDA-0416-029601 Request for technical assessment-confirmation
Attachments: image001.png; ~WRD000.jpg; image003.png; image004.png
For your action

From: ROSIAK Dorota [mailto:Dorota.Rosiak@ehp.qld.gov.au]
Sent: Thursday, 30 June 2016 2:19 PM
To: ToowoombaSARA
Subject: FW: SDA-0416-029601 Request for technical assessment-confirmation

Good afternoon Maria,

I am currently looking after DA/EA application for Maranoa Regional Council – Flood mitigation Works Stage 2.

During the initial review of the information I have noted that there are MSES present in the area of proposed works which may be impacted by the proposal.

I would like to discuss/consult this matter with the DNRM officer who is involved in the assessment of this application.

Can you please advise who should I contact. Thank you.

Dot



Dorota Rosiak

Senior Environmental Officer

Industry and Development Assessment | Environmental Services and Regulation
Department of Environment and Heritage Protection

Phone: 07 3330 6372

Level 8, 400 George Street, Brisbane

GPO Box 2454, Brisbane QLD 4001

Email: dorota.rosiak@ehp.qld.gov.au

Website: www.ehp.qld.gov.au

From: Sara-EHP
Sent: Wednesday, 20 April 2016 8:30 AM
To: Industry and Development Assessment
Subject: FW: SDA-0416-029601 Request for technical assessment-confirmation

TOOWOOMBA

FYI Project 438271.

Regards



Nadine Marinucci
A/Environmental Support Officer
Industry and Development Support | Industry, Development & South Queensland Compliance
Department of Environment and Heritage Protection

P 07 3330 5562
Level 8, 400 George Street, Brisbane QLD 4000
GPO Box 2454, Brisbane QLD 4001

From: SARA Common Email [mailto:processmodel196@dspdip.appiancloud.com]
Sent: Tuesday, 19 April 2016 2:14 PM
To: Sara-EHP; vegsouthregion
Subject: SDA-0416-029601 Request for technical assessment-confirmation

Our reference: SDA-0416-029601
Application street address: 2A Tiffin - Roma, Maranoa Regional - QLD; 2A Tiffin - Roma, Maranoa Regional - QLD; Miscamble - Roma, Maranoa Regional - QLD; George - Roma, Maranoa Regional - QLD;
GIS Link:

21R8614

41R8614

96M5398

343R8614

342WV219

The Department of State Development, Infrastructure and Planning has previously forwarded you a request for a technical assessment of the following application SDA-0416-029601.

The department has now validated the application and confirms that the application was properly made with the following triggers confirmed:

Trigger ID	Description	Technical Agency	Fast track
------------	-------------	------------------	------------

6.3.1	If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development	EHP	No
6.3.2	If tables 1 and 2 do not apply and the application is for - (a) operational work for the clearing of native vegetation; and (b) no other assessable development	NRM	No

The department confirms the following due dates for this request:
 please advise the department if your agency intends to request further information by 28/04/2016
 please advise the department if your agency requires further time to review the application before further information is requested by 26/04/2016.
 or alternatively, if no further information is requested or extensions sought, your technical assessment response is due by 12/05/2016.

If further information is requested or an extension to timeframes is granted, you will be advised of the new timeframes.

The technical agency assessment response template is now available for download from the Internal Documents section of the application Document Dashboard. The department will assess triggers confirmed as FASTTRACK5 in the Fast track trigger column.

The application has been assigned to SARA Darling Downs South West.

If you require any further information or clarification, please contact SARA Darling Downs South West on 0746167307, or via email ToowoombaSARA@dsdip.qld.gov.au who will be able to assist.

Thank you for your assistance to date.

Regards
 Maria Johnson

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 If you have received this message in error, you are asked to inform the sender as quickly as possible and delete this message and any copies of this message from your computer and/or your computer system network.

From: "ROSIK Dorota" <Dorota.Rosiak@ehp.qld.gov.au>
Sent: Mon, 4 Jul 2016 12:10:28 +1000
To: "Christopher Tickner" <Christopher.Tickner@maranoa.qld.gov.au>
Cc: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>, "GRAY Amanda" <Amanda.Gray@ehp.qld.gov.au>
Subject: RE: 2016/19469 - Maranoa Regional Council - OpWorks - "Diversion Channel" - Lot 21 on R8614, Lot 41 on R8614, Lot 96 on M5398, Lot B on SP127242 and Lot 342 on WV219 - Information request
Attachments: image001.png; image003.jpg; image002.png

Hi Christopher,

As per our discussion from this morning, considering the short duration of the works, your response addressing acoustic impacts, air quality impacts and surface water impacts seems to be sufficient. However, in terms of site values, such as regional ecosystems, flora communities, fauna - including endangered or vulnerable species and their habitats; it appears that the response does not address issues around impacts that potentially will be associated with the proposal on these values, and does not specify mitigating measures that will be in place to minimise the impacts.

Under the Environmental Offsets framework the proponent is required to identify prescribed environmental matters (Matters of State Environmental Significance or MSES) that are likely to be affected by the activity (this requirement has been satisfied by the information provided in the *Ecological Assessment Report* prepared by GHD) and also demonstrate how the impacts in the first instance will be avoided, and if avoidance cannot be achieved, it needs to be demonstrated that the impacts will be carefully managed and minimised. Additionally, if after avoidance and mitigation, there is still an impact on MSES, the assessment needs to be undertaken to determine if the impacts is likely to be significant.

To enable further assessment please demonstrate how the impact on the prescribed environmental matters has been avoided (e.g. in selecting a project location have you chosen a site where the prescribed environmental matters are in the poorest condition; or have you chosen a site that avoids habitat for vulnerable species; or the footprint of the project area has been reduced to minimise impact; or the ancillary facilities are to be located in areas where there are no or poor condition prescribed environmental matters). If the impact cannot be avoided demonstrate what mitigating measures will be applied to minimise the impact. After that consideration, the impact will still be there, determine - based on the *Significant Residual Impact Guideline* - if the impact is significant.

The relevant guidelines that may assist you in preparation of this additional information can be found at:

<http://www.qld.gov.au/environment/pollution/management/offsets/>

Please provide this information as soon as possible. Should you have any questions, please do not hesitate to contact me.

Kind regards,

Dot



Dorota Rosiak

Senior Environmental Officer

Industry and Development Assessment | Environmental Services and Regulation
Department of Environment and Heritage Protection

Phone: 07 3330 6372
Level 8, 400 George Street, Brisbane
GPO Box 2454, Brisbane QLD 4001
Email: dorota.rosiak@ehp.qld.gov.au
Website: www.ehp.qld.gov.au

From: Christopher Tickner [<mailto:Christopher.Tickner@maranoa.qld.gov.au>]
Sent: Monday, 4 July 2016 11:29 AM
To: ROSIAK Dorota
Cc: Maria Johnson
Subject: 2016/19469 - Maranoa Regional Council - OpWorks - "Diversion Channel" - Lot 21 on R8614, Lot 41 on R8614, Lot 96 on M5398, Lot B on SP127242 and Lot 342 on WV219 - Information request

Hi Dorota,

Thank you for taking the time to contact me to discuss the above project.

I understand that EHP is now in receipt of Councils information request response for the project and, having reviewed the material, requires some additional information.

If you could provide details of the further information that EHP requires to continue with the assessment of the project I will endeavor to respond asap.

I have cc'd Maria Johnson from DILGP into the email to ensure that we are all on the same page.

Thanks again,

Christopher
Christopher Tickner
Town Planner
Planning




Maranoa Regional Council
INFRASTRUCTURE OFFICE

1 Cartwright Street Roma QLD 4455
Postal Address: P.O. Box 620 ROMA QLD 4455
P: 1300 007 662
D: (07) 4624 0622 M: (07) 4624 6990 F: (07) 4624 6990

Email: christopher.tidmore@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

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RTI RELEASE - DSDMIP

From: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Sent: Wed, 20 Jul 2016 09:31:18 +1000
To: <Christopher.Tickner@maranoa.qld.gov.au>
Subject: FW: Maranoa Regional Council - Further Issues Response - SDA-0416-029601
Attachments: SDA-0416.eml; ESC plan diagram(marked up).pdf; image001.jpg
Hi Chris,

Thanks you for looking at the attached to clarify items for the Department of Natural Resources and Mines.

Talk soon.

Kind Regards

Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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From: BIRT Patrina [mailto:Patrina.Birt@dnrm.qld.gov.au]
Sent: Monday, 18 July 2016 4:41 PM
To: Maria Johnson
Subject: RE: Maranoa Regional Council - Further Issues Response - SDA-0416-029601

Hi Maria,

Thanks for the information, but unfortunately does not help me out in terms of the impact of the implementing the erosion and sediment control plan (see my original query email attached). I have extracted the plan within the ESC plan and marked up the area I am interested in. I just

need to know whether vegetation needs to be cleared in the highlighted area so that I can accurately assess the extent and location of clearing for the development.

Many thanks,
Patrina

Patrina Birt

Natural Resource Management Officer, Vegetation Management
Telephone: 07 3894 8120 **Facsimile:** 07 3894 8143
Email:
patrina.birt@dnrm.qld.gov.au

Department of Natural Resources and Mines
Level 4, Icon Building
117 Brisbane Road, Ipswich Q 4305
PO Box 864, Ipswich Q 4305

<https://www.qld.gov.au/environment/land/vegetation/management/>



Please consider the environment before printing this e-mail

From: Maria Johnson [mailto: Maria.Johnson@dilgp.qld.gov.au]
Sent: Monday, 18 July 2016 1:16 PM
To: ROSIAK Dorota; BIRT Patrina
Subject: Maranoa Regional Council - Further Issues Response - SDA-0416-029601

Hello Ladies,

Please note that the Maranoa Regional Council (MRC) response to the further issues detailed by the Department of Environment and Heritage Protection has now been uploaded in the MyDas system.

Unfortunately due to the size of the document, it is too large to be sent via email. If you are unable to access MyDas, please let me know then I can break the document up.

As your assessment response is due on the 20 July 2016, I will be initiating an extension for 20 days in accordance with the *Sustainable Planning Act 2009* from today in order for you to review the material attached.

Any questions or further queries, please don't hesitate to contact me. MRC has expressed if further clarification is required, they are more than happy to assist. Once again, any further correspondence with the applicant, please send through myself and ToowoombaSARA. Thank you for your understanding.

Kind Regards
Maria Johnson
Planning Officer
Regional Services - South
Department of **Infrastructure, Local Government and Planning**
Queensland Government
tel 07 4616 7302 (ext 67302)

post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dlgp.qld.gov.au



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RTI RELEASE

From: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Sent: Mon, 18 Jul 2016 13:16:10 +1000
To: <dorota.rosiak@ehp.qld.gov.au>, <patrina.birt@dnrm.qld.gov.au>
Subject: Maranoa Regional Council - Further Issues Response - SDA-0416-029601
Attachments: image001.jpg
Hello Ladies,

Please note that the Maranoa Regional Council (MRC) response to the further issues detailed by the Department of Environment and Heritage Protection has now been uploaded in the MyDas system.

Unfortunately due to the size of the document, it is too large to be sent via email. If you are unable to access MyDas, please let me know then I can break the document up.

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Any questions or further queries, please don't hesitate to contact me. MRC has expressed if further clarification is required, they are more than happy to assist. Once again, any further correspondence with the applicant, please send through myself and ToowoombaSARA. Thank you for your understanding.

Kind Regards
Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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From: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Sent: Tue, 23 Aug 2016 16:40:26 +1000
To: "Christopher Tickner" <Christopher.Tickner@maranoa.qld.gov.au>
Subject: RE: Roma - Eastern Diversion Channel
Attachments: DEHP - EA -SDA-0416-029601 -EPPR03917216 Maranoa RC.pdf; MARANOA -Notice of decision (approvals) (code assessment) - SDA-0416-029601 - SDA-0416-029601.pdf; image001.jpg; image002.jpg
Hi Chris,

SARA inbox has sent it the Notice of Decision to Maranoa generic email address. However, it did not allow additional documents to be attached.

Please find the Environmental Authority for the above application and I have attached the Notice of Decision for your convenience.

Talk soon.
Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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From: Christopher Tickner [mailto:Christopher.Tickner@maranoa.qld.gov.au]
Sent: Tuesday, 23 August 2016 4:05 PM
To: Maria Johnson
Subject: RE: Roma - Eastern Diversion Channel

I'll let them know, thanks again Maria.

From: Maria Johnson [mailto:Maria.Johnson@dilgp.qld.gov.au]
Sent: Tuesday, 23 August 2016 4:04 PM

To: Christopher Tickner <Christopher.Tickner@maranoa.qld.gov.au>
Subject: RE: Roma - Eastern Diversion Channel

Hi Chris,

With my Manager for approval now.

Talk soon

Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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From: Christopher Tickner [mailto:Christopher.Tickner@maranoa.qld.gov.au]
Sent: Tuesday, 23 August 2016 2:40 PM
To: Maria Johnson
Subject: Roma - Eastern Diversion Channel

Hi Maria,

Is a decision on the ERA/DA for the proposed eastern diversion channel in Roma still expected this week?

I have to provide an update to the working group and was hoping you could confirm either way.

Thanks again Maria,

Christopher

Christopher Tickner
Town Planner
Planning



Maranoa Regional Council
INFRASTRUCTURE OFFICE
1 Cartwright Street Roma QLD 4455
Postal Address: P.O. Box 620 ROMA QLD 4455
P: 1300 007 662
D: (07) 4624 0622 M: (07) 4624 6981 F: (07) 4624 6990

Email: christopher.tickner@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

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RTI RELEASE SECT - 43SDMIP

From: "ToowoombaSARA" <ToowoombaSARA@dilgp.qld.gov.au>
Sent: Thu, 18 Aug 2016 13:29:49 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: FW: DNRM Veg TAR OpWks_2016-002280_SDA-0416-029601
Priority: High
Attachments: DNRM Veg TAR OpWks_2016-002280_signed.docx; Plan of Development_Stage 2_EasternDiversionDrain.pdf; Diagram 2_DNRM Veg TAR 2016-002280.pdf; image001.png; image003.png
FYI

From: LAHEY Belinda [mailto:Belinda.Lahey@dnrm.qld.gov.au]
Sent: Thursday, 18 August 2016 1:28 PM
To: ToowoombaSARA
Subject: DNRM Veg TAR OpWks_2016-002280_SDA-0416-029601

Good Afternoon,

Please find attached DNRM's TAR and associated documents.

Regards



Belinda Lahey
Administration Officer
Department of Natural Resources and Mines
Natural Resource Assessment – South Region - Bundaberg

P 07 41312391 | F 07 41312308
16-32 Enterprise Street, Bundaberg Q 4670
PO Box 1167, Bundaberg Q 4670

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From: "ToowoombaSARA" <ToowoombaSARA@dilgp.qld.gov.au>
Sent: Fri, 23 Sep 2016 12:08:57 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: FW: 2016/19469 - Maranoa Regional Council - OpWorks - "Diversion Channel" - Lot 21 on R8614, Lot 41 on R8614, Lot 96 on M5398, Lot B on SP127242 and Lot 342 on WV219
Attachments: image001.jpg; image002.jpg

Maria Johnson
Planning Officer
Regional Services - South
Department of **Infrastructure, Local Government and Planning**
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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From: BIRT Patrina [mailto:Patrina.Birt@dnrm.qld.gov.au]
Sent: Friday, 23 September 2016 11:33 AM
To: Christopher Tickner
Cc: ToowoombaSARA
Subject: RE: 2016/19469 - Maranoa Regional Council - OpWorks - "Diversion Channel" - Lot 21 on R8614, Lot 41 on R8614, Lot 96 on M5398, Lot B on SP127242 and Lot 342 on WV219

Hi Christopher,

Just confirming our earlier telephone discussion regarding DNRM's expectation for condition 4 of the Op Works approval i.e. the rehabilitation plan to be created and included in the erosion and sediment control plan.

1. DNRM expects the plants species to be used would be native where possible, but not necessarily so, and plantings to be such that they will complement the erosion and sediment control strategies in terms of preventing erosion and sedimentation.

2. While condition 4 does require the rehabilitation plan to be created and included as part of the erosion and sediment control plan prior to commencement of works it does not require the applicant to submit the rehabilitation plan to DNRM for assessment. The applicant is quite welcome to do this if they would like comments from DNRM in regard to the rehabilitation plan but it is not a condition of approval.

As also discussed, it is recommended you discuss with DILGP to make sure they agree with DNRM's advice re the rehabilitation plan.

Regards,
Patrina

Patrina Birt

Natural Resource Management Officer, Vegetation Management

Telephone: 07 3894 8120 Facsimile: 07 3894 8143

Email: patrina.birt@dnrm.qld.gov.au

Department of Natural Resources and Mines

Level 4, Icon Building

117 Brisbane Road, Ipswich Q 4305

PO Box 864, Ipswich Q 4305

<https://www.qld.gov.au/environment/land/vegetation/management/>



Please consider the environment before printing this e-mail

From: Christopher Tickner [mailto:Christopher.Tickner@maranoa.qld.gov.au]

Sent: Thursday, 22 September 2016 3:46 PM

To: BIRT Patrina

Subject: 2016/19469 - Maranoa Regional Council - OpWorks - "Diversion Channel" - Lot 21 on R8614, Lot 41 on R8614, Lot 96 on M5398, Lot B on SP127242 and Lot 342 on WV219

Good afternoon Patrina,

With regards to condition 4 of the attached approval.

I was hoping to discuss with you the scope of works required to address this condition.

If you could please call me on 46240622 as soon as practicable it would be greatly appreciated.


Regards,
Christopher

Christopher Tickner
Town Planner
Planning



Maranoa Regional Council
INFRASTRUCTURE OFFICE
1 Cartwright Street Roma QLD 4455
Postal Address: P.O. Box 620 ROMA QLD 4455
P: 1300 007 662
D: (07) 4624 0622 M: Sch 4(4)(6) F: (07) 4624 6990
Email: christopher.tichner@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

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RTI RELEASE - DSDMIP

From: "BIRT Patrina" <Patrina.Birt@dnrm.qld.gov.au>
Sent: Tue, 23 Aug 2016 12:56:12 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: RE: HPRM: RE: Conditions for SDA-0416-029601
Attachments: image002.png; image003.jpg
Hi Maria,

Yes, this sounds good. DNRM Veg is fine with this change ☺

Regards,
Patrina

Patrina Birt
Natural Resource Management Officer, Vegetation Management
Telephone: 07 3894 8120 **Facsimile:** 07 3894 8143
Email: patrina.birt@dnrm.qld.gov.au

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117 Brisbane Road, Ipswich Q 4305
PO Box 864, Ipswich Q 4305

<https://www.qld.gov.au/environment/land/vegetation/management/>



Please consider the environment before printing this e-mail

From: Maria Johnson [mailto:Maria.Johnson@dilgp.qld.gov.au]
Sent: Tuesday, 23 August 2016 12:51 PM
To: BIRT Patrina
Subject: RE: HPRM: RE: Conditions for SDA-0416-029601

Hi Patrina,

Sorry to be a pain, can you confirm that there is only one Erosion & Sediment Control Plan?

Also I've changed Condition 3 again to better incorporate 'best practice'. Please see Model Conditions insert.

	version].		
Erosion and sediment control			
WPA2A	Earthworks and construction must only occur during [INSERT clarify months] of the dry season.	At all times during construction works	
WPA2B	Develop and implement erosion and sediment controls in accordance with the <i>Best Practice Erosion and Sediment Control (BPESC) guidelines for Australia (International Erosion Control Association)</i> . In particular, maintain sediment control devices to achieve best practice design objectives.	At all times during construction works	

To emphasise the requirement of the Rehab Plan, I've made another Condition 4, as I believe it does need to sit by itself to emphasise the need for Rehab Plan.

3.	The development must occur in accordance with the standards and specifications detailed in: <ul style="list-style-type: none"> 'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'. In particular, maintain sediment control devices to achieve best practice design objectives. 	At all times.
4.	Develop and implement a Rehabilitation Plan to be included in the 'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'.	Prior to the commencement of use and to be maintained at all times.

Maria Johnson
 Planning Officer
 Regional Services - South
 Department of Infrastructure, Local Government and Planning
 Queensland Government
 tel 07 4616 7302 (ext 67302)
 post PO Box 825, Toowoomba Qld 4350
 visit 128 Margaret Street, Toowoomba
 maria.johnson@dlgp.qld.gov.au



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From: BIRT Patrina [mailto:Patrina.Birt@dnrm.qld.gov.au]
Sent: Tuesday, 23 August 2016 11:17 AM
To: Maria Johnson
Subject: HPRM; RE: Conditions for SDA-0416-029601

Hi Maria,

That all looks good. DNRM Veg is fine with the changes.

Thanks for the opportunity to comment on the changes.

Regards,
Patrina

Patrina Birt
Natural Resource Management Officer, Vegetation Management
Telephone: 07 3894 8120 **Facsimile:** 07 3894 8143
Email: patrina.birt@dnrm.qld.gov.au

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117 Brisbane Road, Ipswich Q 4305
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<https://www.qld.gov.au/environment/land/vegetation/management/>



Please consider the environment before printing this e-mail

From: Maria Johnson [mailto:Maria.Johnson@dlgp.qld.gov.au]
Sent: Tuesday, 23 August 2016 11:02 AM
To: BIRT Patrina
Subject: Conditions for SDA-0416-029601

Hi Patrina,

Thank you for discussing the above application.

If you could please review, adjust where necessary and confirm the conditions below, that would be appreciated. Please note DNRM conditions are 2-4.

No.	Conditions of Development Approval	Condition Timing
1.	<p>The development must be carried out generally in accordance with the following plans:</p> <ul style="list-style-type: none"> Proposed Stage 2 <i>Regional Options Eastern Diversion Channel D - Details</i> prepared by GHD reference 41-25323-SK105 revision A. 	At all times.
2.	<p>The clearing of vegetation is limited to the extent identified as Area(s):</p> <ul style="list-style-type: none"> "Red - Clear And Grub Zones" on the plan titled "EASTERN DIVERSION DRAIN GENERAL ARRANGEMENT PLAN", <i>Drawing No. 2016-378C-C001, dated 27 May 2016</i> prepared by GHD for the Maranoa Regional Council. 	At all times.
3.	<p>The development must occur in accordance with the standards and specifications detailed in the:</p> <ul style="list-style-type: none"> a) <i>'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'</i>; b) any amendments consistent with best practice; and c) The Erosion and Sediment Control Plan (updated to include a Rehabilitation Plan). 	<p>(a) & (b) At all times.</p> <p>(c) Prior to the commencement of use and to be maintained at all times.</p>
4.	<p>The permit holder is responsible for ensuring that:</p> <ul style="list-style-type: none"> a) a full copy of the permit is held by; and b) the extent of clearing authorised by this permit is properly understood by, any person(s) engaged or employed to carry out the clearing of the vegetation under this permit. 	At all times.

Kind Regards
 Maria Johnson
 Planning Officer
 Regional Services - South
 Department of Infrastructure, Local Government and Planning
 Queensland Government
 tel 07 4616 7302 (ext 67302)
 post PO Box 825, Toowoomba Qld 4350

visit 128 Margaret Street, Toowoomba
maria.johnson@dlgp.qld.gov.au



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RTI RELEASE - SDMP

From: "Bernadette Plummer" <Bernadette.Plummer@dilgp.qld.gov.au>
Sent: Fri, 22 Apr 2016 16:14:17 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: FW: Pre lodgement advice
Attachments: Pre-lodgement advice - 2015-005215.docx; image001.jpg
FYI

From: ToowoombaSARA
Sent: Friday, 22 April 2016 4:10 PM
To: Bernadette Plummer
Subject: FW: Pre lodgement advice

I think this one is yours.

Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)

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From: MCALISTER Brian [mailto:Brian.McAlister@dnrm.qld.gov.au]
Sent: Friday, 22 April 2016 2:43 PM
To: Christopher Tickner
Cc: ToowoombaSARA
Subject: Pre lodgement advice

Hi Christopher

Attached pre-lodgement meeting minutes.

Our IR should be out to you by end of next week – give me a call once you have had a chance to digest it and we can discuss options.

Regards

Brian

Brian McAlister
Natural Resource Management Officer
Department of Natural Resources and Mines
PO Box 864, Ipswich, Q, 4305
Icon Building, Level 4, 117 Brisbane St Ipswich
Ph 3894 8123 Qnet 28123 Fax 3894 8143
<https://www.qld.gov.au/environment/land/vegetation/management/>

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RTI RELEASE - DSDMIP

From: "Planning" <Planning@maranoa.qld.gov.au>
Sent: Tue, 19 Apr 2016 15:35:39 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: RE: Native Title Assessment - SDA-0416-029601
Attachments: picture_c68643ca-cbf7-40e0-9ee7-2058f042c57a.jpg

Hi Maria


Yes works will be carried out within the boundaries of the Bungil Creek.

Regards



Maranoa Regional Council
Postal Address: P.O. Box 42 MITCHELL QLD 4465
P: 1300 007 662
1300 007 662
F: (07) 4624 6990
Email: Planning@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

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From: Maria Johnson [mailto:Maria.Johnson@dilgp.qld.gov.au]
Sent: Tuesday, 19 April 2016 3:32 PM
To: Planning; Jessica (Jess) Reiser
Subject: FW: Native Title Assessment - SDA-0416-029601

Hi Jess,

As the Department is the Assessment Manager of the Maranoa Diversion Channel application, a Native Title Assessment is required by the State.

Would you mind confirming the below question asked by the Native Title Officer?

You are welcome to contact Sophie directly if further clarification is required.

Talk soon

Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350

visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au

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From: Sophie Smith
Sent: Tuesday, 19 April 2016 3:28 PM
To: Maria Johnson
Subject: Native Title Assessment - SDA-0416-029601

Hi Maria,

I am just completing the native title assessment for SDA-0416-029601.

Can you please confirm if there will be any works taking place within the boundaries/banks of Bungil Creek?

Thanks,
Sophie

Sophie Smith
Native Title Officer
Development Assessment Division
Department of Infrastructure, Local Government and Planning
Level 6, 63 George St Brisbane QLD 4000
p. 07 3452 7680 | e. Sophie.Smith@dilgp.qld.gov.au
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RTI RELEASE - DSDMIP

From: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Sent: Tue, 19 Apr 2016 15:32:21 +1000
To: <planning@maranoa.qld.gov.au>, <Jessica.Reiser@maranoa.qld.gov.au>
Subject: FW: Native Title Assessment - SDA-0416-029601

Hi Jess,

As the Department is the Assessment Manager of the Maranoa Diversion Channel application, a Native Title Assessment is required by the State.

Would you mind confirming the below question asked by the Native Title Officer?

You are welcome to contact Sophie directly if further clarification is required.

Talk soon

Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
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From: Sophie Smith
Sent: Tuesday, 19 April 2016 3:28 PM
To: Maria Johnson
Subject: Native Title Assessment - SDA-0416-029601

Hi Maria,

I am just completing the native title assessment for SDA-0416-029601.

Can you please confirm if there will be any works taking place within the boundaries/banks of Bungil Creek?

Thanks,
Sophie

Sophie Smith
Native Title Officer
Development Assessment Division
Department of Infrastructure, Local Government and Planning
Level 6, 63 George St Brisbane QLD 4000
p. 07 3452 7680 | e. Sophie.Smith@dilgp.qld.gov.au
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From: "SARA NativeTitle" <SARANativeTitle@dilgp.qld.gov.au>
Sent: Fri, 19 Aug 2016 13:37:44 +1000
To: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: RE: Maranoa Regional Council - SDA-0416-029601
Attachments: image003.jpg; image004.png; image005.png
Hi Maria

The native title assessments for this one covered Lot 21 on R8614, Lot 41 on R8614, Lot 95 on M5398, Lot 343 on R8614, Lot 342 on WW219 and the adjacent road reserve.

Due to the expansion of the entire project it was assessed under a number of modules/sections due to some areas having extinguishment over them (you will notice a number of documents in the native title folder). Can you please ensure you advise me in the future if someone is asking for our native title assessments? In some cases there is confidential details in them that should not be released.

I hope this helps.

Thanks,
Sophie

From: Maria Johnson
Sent: Thursday, 18 August 2016 11:45 AM
To: SARA NativeTitle
Subject: FW: Maranoa Regional Council - SDA-0416-029601

Hello,

Please see email below in regards to the above application.

Could I please have a response today if possible.

Talk soon.

Kind Regards
Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)
post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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From: BEEBY Ashton [mailto:Ashton.Beeby@dnrm.qld.gov.au]
Sent: Monday, 15 August 2016 12:01 PM
To: Maria Johnson
Subject: RE: Maranoa Regional Council - SDA-0416-029601

Hey Maria,

Was a native title check done on lot 343 on R8614? There is actually a permit to occupy over this land (B/SP127242). You have included adjacent to this lot on plan (on the road reserve). But realistically the diversion channel is running straight across this parcel.

Kind regards,



Ashton Beeby (BSc, LLB)
Natural Resource Officer
Water Services I South Region
Department of Natural Resources and Mines

P 07 4529 1302 M Sch. 4(4)(6) -
203 Tor Street, Toowoomba Qld 4350
GPO Box 318, Toowoomba Qld 4350

From: Maria Johnson [mailto:Maria.Johnson@dilgp.qld.gov.au]
Sent: Thursday, 11 August 2016 9:11 AM
To: BEEBY Ashton
Subject: Maranoa Regional Council - SDA-0416-029601

Hi Ashton,

Please find attached the Native Title Search conducted by SARA.

If you have any questions regarding the above please let me know.

Kind Regards
Maria Johnson
Planning Officer
Regional Services - South
Department of Infrastructure, Local Government and Planning
Queensland Government
tel 07 4616 7302 (ext 67302)

post PO Box 825, Toowoomba Qld 4350
visit 128 Margaret Street, Toowoomba
maria.johnson@dilgp.qld.gov.au



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RTI RELEASE SE

From: "Sophie Smith" <Sophie.Smith@dilgp.qld.gov.au>
Sent: Mon, 22 Aug 2016 14:00:26 +1000
To: <ashton.beeby@dnrm.qld.gov.au>
Cc: "Maria Johnson" <Maria.Johnson@dilgp.qld.gov.au>
Subject: 24JA Assessment - Lots 343 & 342
Attachments: image001.png; image001.png
Hi Ashton,

As per our phone conversation, attached is a copy of the JA assessment for the missing lots.

Let me know if you require anything further.

Thanks,
Sophie

Sophie Smith
Native Title Officer
Development Assessment Division
Department of Infrastructure, Local Government and Planning
Level 6, 63 George St Brisbane QLD 4000
p. 07 3452 7680 | e. Sophie.Smith@dilgp.qld.gov.au

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RTI RELEASE - DSDMIP

15 April 2016

Department of Infrastructure, Local Government and Planning
128 Margaret Street
Toowoomba QLD 4350

Attention: Andrew Foley

Dear Andrew

RE: Application for a Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)

Described as Lot 21 on R8614; Lot 41 on R8614; Lot 96 on M5398; Lot 343 on R8614; and Lot 342 on WV219

Maranoa Regional Council (MRC) is seeking a Development Permit and a concurrence Environmental Authority (EA) to carry out extractive activities that are operationally related to the second stage of flood mitigation works proposed for the town of Roma.

The second stage of flood mitigation works includes the construction of a high flow diversion channel, which would capture flows from the already constructed Stage 1 levee bank and redirect them in an easterly direction away from the urban area of Roma (refer to Appendix 1). The diversion channel would also manage excess flows that are beyond Bungil Creek's capacity during major flood events.

The diversion channel works are made "exempt" in the *Roma Town Planning Scheme 2006* because they are being undertaken for flood mitigation purposes (refer to Appendix 2). However; initial discussions with the Department of Infrastructure and Local Government (DILGP) identified a possible requirement for a Development Permit from DILGP and a concurrence Environmental Authority from the Department of Environment and Heritage Protection (DEHP) due to the amount of material being excavated (in excess of 100,000 tonnes in a year). This requirement was later confirmed in a pre-lodgement meeting between MRC staff and State government representatives on 2 March 2016 (refer to Appendix 3).

Further discussions between MRC staff and representatives from DILGP following the pre-lodgement meeting have confirmed that the application will also need to be referred to the Department of Natural Resources and Mines (DNRM) because the project involves clearing of remnant vegetation located at the eastern and western extents of the channel.

Development Application

This application has been prepared in direct response to the discussions held between MRC staff and State government agencies. It includes;

- IDAS Form 1 - Application Details;

- IDAS Form 8 – Environmentally relevant activity (including completed site specific application for a new environmental authority for a prescribed ERA);
- IDAS Form 11 – Clearing native vegetation;
- Eastern Diversion Drain - Geotechnical Investigations and Service Locations,
- Responses to concurrence environmentally relevant activities State code;
- Response to Queensland vegetation management State code;
- Roma Flood Mitigation Study – Stage 2 Ecological Assessment Report February 2016;
- Hydrology and Hydraulics for Stage 2 Local Mitigation Options dated December 2013; and
- Hydrology and Hydraulics for Stage 2 Regional Mitigation Options Revision 1 dated January 2014.

MRC is currently assessing a development permit for the proposed Western levee, which forms the other major component of Stage 2 flood mitigation works for Roma. Whilst the Western levee and the eastern diversion channel are being assessed separately, it is expected that both will be built simultaneously. As such, it would be appreciated if DILGP could advise MRC as soon as practicable if there are any inconsistencies or issues with the proposed diversion channel which may necessitate changes or result in delays in the assessment of the Western levee.

Provided below is an overview of the proposed eastern diversion channel. Additional details, including the potential impacts of the excavation works associated with the diversion channel on terrestrial and aquatic environmental values and the removal of vegetation are contained in the attached materials.

Project Overview

The proposed high flow diversion channel will be excavated to a depth of 3.5 metres and have a base width of approximately 60 metres. The slope of the channel would be 1V:4H, which would allow easy access for heavy machinery during construction and enable maintenance vehicles to easily access the channel for maintenance purposes once completed. The channel will be vegetated with native grasses that will assist with channel function and help to stabilise and prevent erosion once the channel is completed.

It is expected that 130,000 tonnes of soil will need to be excavated to construct the channel. A portion of the excavated material will be used in the construction of the proposed Western levee, with the remainder of material stockpiled at the Roma tip. Excavation will be carried out by a "truck and shovel operation" and will involve semi-side tippers, both double and single, as well as scraper machinery and excavators. It is expected that a temporary on site office and amenities building will be provided on site.

Maranoa Regional Council
 Building & Planning Services
 Cnr Bungil & Quintin Streets
 Roma Queensland 4455
 Phone: 1300 007 662 Fax: 07 4622 3084
www.maranoa.qld.gov.au

Postal Address:
 PO Box 620
 ROMA Queensland 4455
 ABN: 99 324 089 164

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The project is expected to commence on receipt of the required approvals and permits and take approximately 6 months to complete. To avoid unnecessary expenditure and disturbance to adjoining land owners and the wider community, it is expected that the construction of the diversion channel will occur at the same time as works on the Western levee bank commence. Once finished, the channel will require only minor maintenance (i.e. mowing and irrigating). MRC will surrender the Environmental Authority once the excavation has been completed.

Construction of the diversion channel will require alterations to the profile of some local roads. Access to Short Street from George Street East will be closed and access to Beaumont Drive from George Street East will no longer be possible. A low flow causeway will be constructed where the channel crosses Ashburn Road (refer to Appendix 1 for reference).

Remnant vegetation is present at the western and the eastern extent of the channel and it is unlikely that the proposal will completely avoid impact. DNRM have confirmed the removal of the vegetation at these sections of the channel will require a clearing native vegetation permit, which is being sought as part of this development application.

Project location

The channel will traverse several lots (refer to Table 1). Its general location is described as 1,200m in length and 60m in width travelling in a south-easterly direction and bound by the southern end of the Stage 1 levee to the north, Bungil creek to the south, Tiffin Street to the west and Clayton Street to the east (refer to Appendix 1).

Real property description	Site area	Zoning	Current land use
Lot 21 on R8614	10.3ha	Rural	Vacant
Lot 41 on R8614	6.88ha	Rural	Rural dwelling
Lot 96 on M5398	44.5ha	Rural	Rural dwelling
Lot B on SP127242	25.29ha	Special Use	Vacant
Lot 342 on WV219	12.1ha	Rural	Vacant

Table 1 – Property description

Site Description

The channel alignment will avoid all forms of built development, running for the most part through vacant, undeveloped rural land. There are some areas of remanent vegetation that will need to be removed to accommodate the channel. A permit is being sought from DNRM to clear the vegetation as part of this application.

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 Roma Queensland 4455
 Phone: 1300 007 662 Fax: 07 4622 3084
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 PO Box 620
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 ABN: 99 324 089 164

WORKING FOR YOU. GROWING WITH YOU

Two lots, Lot 41 on 68614 and Lot 96 on M5398, contain habitable dwellings. The diversion channel is located in excess of 100m from these homes and is expected to have minimal impact on residents. The remaining lots are vacant and used for grazing purposes. The channel will not impact the continued use of these lots for grazing.

The alignment of the channel has been informed by detailed survey and hydrological work and in consultation with affected landholders and the wider community. The channel has been designed to work in conjunction with the already constructed Stage 1 earthen levee bank and divert water away from the town of Roma in extreme flood events. It will also assist flows in Bungil Creek when Bungil Creek reaches capacity during flood events. The effects of re-diverting flood waters will have an impact beyond the site; however the channel has been designed to minimise wider impacts on aquatic and terrestrial environmental values, limit inconvenience to nearby land owners affected by the channel and ensure best hydraulic flood mitigation performance.

A detailed description of the vegetation communities, flora species, terrestrial fauna habitat and aquatic values are contained in the Ecological Assessment Report prepared by GHD dated February 2016.

State agency considerations

GHD on behalf of MRC have undertaken extensive hydrological and ecological studies and consulted widely and extensively with the Roma community (refer to Attachment 9). The result of this work is contained in the attached reports, which is relied on to address State agency considerations for the excavation of the channel and the removal of remnant vegetation associated with the excavation works.

Environmentally relevant activities

DILGP have advised that an Environmental Authority (EA) is required for the extractive works associated with the construction of the diversion channel. The amount of material being extracted (approximately 130,000 tonnes) triggers Environmentally Relevant Activity (ERA) 16 2 (b) – being extracting, other than by dredging, in a year, more than 100,000 tonnes but not more than 1,000,000 tonnes of material.

The ERA is a concurrence ERA and the development application will be taken to be the application for the environmental authority. DILGP have advised that, as Assessment Manger, they will assess the application, and if approved, administer a development permit with a concurrence EA.

Clearing regulated vegetation

Remnant vegetation is present at the eastern and western extent of the diversion channel. It is unlikely that the proposal will avoid impacts and therefore DNRM have advised that a permit to clear vegetation is required. Attached with this application is the applicable IDAS Form and a response to the applicable SDAP provisions. Information contained in the attached Ecological Assessment Report is relied on to further inform the DNRM's review.

Confirmation that the proposed diversion channel is considered a *relevant purpose* for the removal of native vegetation is attached to the applicable IDAS Form (IDAS Form 8). Information contained in the materials submitted with this application, including this cover letter, address the requirements of Section 11 of the Vegetation Management Regulation 2012.

Maranoa Regional Council
Building & Planning Services
Cnr Bungil & Quintin Streets
Roma Queensland 4455
Phone: 1300 007 662 Fax: 07 4622 3084
www.maranoa.qld.gov.au

Postal Address:
PO Box 620
ROMA Queensland 4455
ABN: 99 324 089 164

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Diverting a watercourse

DNRM have advised that the activity involves diverting a watercourse and therefore a water license is required to interfere with the course of flow. This license is being sought as part of a separate application process which MRC is coordinating directly with DNRM. To be clear, the license to divert a watercourse does not form part of this development application. Notwithstanding, MRC acknowledges that the project cannot proceed without first obtaining both the development permit *and* the water license.

We trust that the materials submitted with this application satisfy State agency requirements. Please contact the Department of Development, Facilities and Environmental services on telephone 1300 007 662 should you have any questions.

Yours sincerely,

Danielle Pearn
Manager Planning & Building Development





Encl.




Maranoa Regional Council
Building & Planning Services
Cnr Bungil & Quintin Streets
Roma Queensland 4455
Phone: 1300 007 662 Fax: 07 4622 3084
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PO Box 620
ROMA Queensland 4455
ABN: 99 324 089 164

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LEGEND

-  PROPOSED DESIGN
-  POLES
-  EXISTING BOREHOLE
-  PROPOSED BOREHOLE INVESTIGATION

-  PROPOSED TEST PIT INVESTIGATION
-  NEXTGEN COMMUNICATIONS CABLE
-  PROPERTY ACCESS DENIED

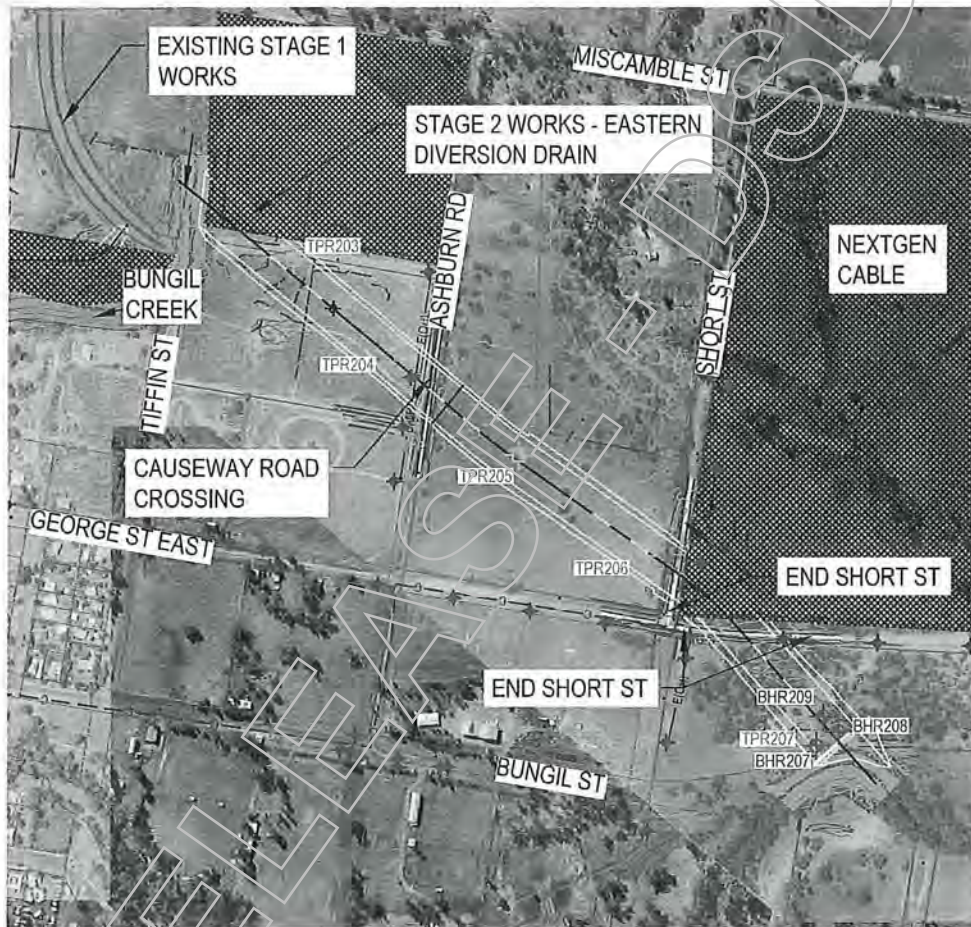
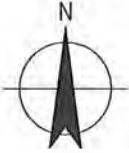
EASTERN DIVERSION DRAIN BOREHOLE - SETOUT TABLE

ID	EASTING	NORTHING
BHR207	680166.000	7059780.000
BHR208	680196.000	7059800.000
BHR209	680175.000	7059820.000

EASTERN DIVERSION DRAIN TEST PIT - SETOUT TABLE

ID	EASTING	NORTHING
TPR203	679442.000	7060450.000
TPR204	679584.000	7060330.000
TPR205	679756.000	7060180.000
TPR206	679934.000	7060050.000
TPR207	680160.000	7059790.000

COORDINATES IN HORIZONTAL DATUM MGA GDA94 (ZONE 55).



EASTERN DIVERSION DRAIN - GEOTECHNICAL INVESTIGATIONS AND SERVICES LOCATIONS

SCALE 1:10,000



ALIGNMENTS SHOWN IS INDICATIVE ONLY & IS SUBJECT TO CORRECTIONS AS A RESULT OF DETAILED SURVEY & COMMUNITY CONSULTATION.



MARANOA REGIONAL COUNCIL
ROMA FLOOD MITIGATION
STAGE 2
EASTERN DIVERSION DRAIN
INVESTIGATIONS AND SERVICES **Figure 14**

Job Number | 41-29431
Revision | E
Date | NOV 2015

145 Ann St Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnenmail@ghd.com W www.ghd.com

IDAS form 11—Clearing native vegetation

(Sustainable Planning Act 2009 version 3.1 effective 23 September 2013)

This form must be used for development applications that involve the clearing of native vegetation.

You **MUST** complete **ALL** questions that are stated to be a mandatory requirement unless otherwise identified on this form.

For all development applications, you must:

- complete *IDAS form 1—Application details*
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application
- include the relevant application fee, noting that referral agency fees (where applicable) are to be paid to the referral agency.

Attach extra pages if there is insufficient space on this form.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* (SPA) or the Sustainable Planning Regulation 2009.

This form can also be completed online using MyDAS at www.dsdir.qld.gov.au/MyDAS

Mandatory requirements

1. What type of development is proposed?

- Operational work for clearing vegetation made assessable under Schedule 3 of the Sustainable Planning Regulation 2009
- Material change of use of the premises
- Reconfiguring a lot

2. What type of approval is being sought?

- Development permit
- Preliminary approval
- Both—provide details below

Mandatory supporting information

3. Confirm that the following mandatory supporting information accompanies this application

For ALL applications	Confirmation of lodgement	Method of lodgement
A property vegetation management plan including as defined under the Vegetation Management Act 1999 schedule. Note: A property vegetation management plan must show the matters prescribed in section 11 of the Vegetation Management Regulation 2012.	<input checked="" type="checkbox"/> Confirmed	Electronic



For ALL applications	Confirmation of lodgement	Method of lodgement
A statement addressing the relevant part(s) of the State Development Assessment Provisions (SDAP).	<input checked="" type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	Electronic
For an operational work application for which the assessment manager is the local government		
Written confirmation that the chief executive of the Department of Natural Resources and Mines is satisfied the proposed clearing is for a relevant purpose under the <i>Vegetation Management Act 1999</i> , section 22A.	<input type="checkbox"/> Confirmed <input checked="" type="checkbox"/> Not applicable	
For an operational work application where the assessment manager is the Department of State Development, Infrastructure and Planning		
Either of the following: <ul style="list-style-type: none"> written confirmation that the chief executive of the Department of Natural Resources and Mines is satisfied the proposed clearing is for a relevant purpose under the <i>Vegetation Management Act 1999</i>, section 22A; or information identifying the relevant purpose under the <i>Vegetation Management Act 1999</i>, section 22A and demonstrating how the proposed clearing is for that purpose. 	<input checked="" type="checkbox"/> Confirmed <input type="checkbox"/> Not applicable	Electronic
For applications for a material change of use or reconfiguring a lot		
The following additional detail to be included in the property vegetation management plan: <ul style="list-style-type: none"> details of the location and extent of: <ul style="list-style-type: none"> infrastructure, including buildings, fences, roads and electrical, telecommunication or sewerage services; and firebreaks and fire management lines; and details of the way the proposed clearing complies with the relevant part(s) of the SDAP. 	<input type="checkbox"/> Confirmed <input checked="" type="checkbox"/> Not applicable	

Notes for completing this form

- The Department of Natural Resource and Mines (DNRM) website contains a comprehensive range of information about the *Vegetation Management Act 1999*.
- Question 3 for operational work applications—Under the *Vegetation Management Act 1999*, the proposed vegetation clearing is only for a relevant purpose if the applicant satisfies the chief executive of the DNRM that the development applied for is one of the purposes listed in section 22A of that Act. If the assessment manager is the local government, the applicant must obtain confirmation from the chief executive of DNRM that the proposed clearing is for a relevant purpose and provide this with the application. However, if the Department of State Development, Infrastructure and Planning (DSDIP) is the assessment manager, the applicant has the choice of either obtaining this confirmation from DNRM before making the application, or providing adequate information for the decision to be made on whether the proposed clearing is for a relevant purpose at the time the application is made.

Privacy—Please refer to your assessment manager, referral agency and/or building certifier for further details on the use of information recorded in this form.

OFFICE USE ONLY

Date received

Reference numbers

The *Sustainable Planning Act 2009* is administered by the Department of State Development, Infrastructure and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agency.

IDAS form 1—Application details

(Sustainable Planning Act 2009 version 4.2 effective 3 August 2015)

This form must be used for **ALL** development applications.

You **MUST** complete **ALL** questions that are stated to be a mandatory requirement unless otherwise identified on this form.

For all development applications, you must:

- complete this form (*IDAS form 1—Application details*)
- complete any other forms relevant to your application
- provide any mandatory supporting information identified on the forms as being required to accompany your application.

Attach extra pages if there is insufficient space on this form.

All terms used on this form have the meaning given in the *Sustainable Planning Act 2009* (SPA) or the Sustainable Planning Regulation 2009.

This form and any other IDAS form relevant to your application must be used for development applications relating to strategic port land and Brisbane core port land under the *Transport Infrastructure Act 1994* and airport land under the *Airport Assets (Restructuring and Disposal) Act 2008*. Whenever a planning scheme is mentioned, take it to mean land use plan for the strategic port land, Brisbane core port land or airport land.

PLEASE NOTE: This form is not required to accompany requests for compliance assessment.

Mandatory requirements

Applicant details (Note: the applicant is the person responsible for making the application and need not be the owner of the land. The applicant is responsible for ensuring the information provided on all IDAS application forms is correct. Any development permit or preliminary approval that may be issued as a consequence of this application will be issued to the applicant.)

Name/s (individual or company name in full)	Maranoa Regional Council		
For companies, contact name			
Postal address	PO Box 620		
	Suburb	Roma	
	State	QLD	Postcode
Country	Australia		
Contact phone number	1300 007 662		
Mobile number (non-mandatory requirement)			
Fax number (non-mandatory requirement)	(07) 4624 6990		



Email address (non-mandatory requirement)

planning

@maranoa.qld.gov.au

Applicant's reference number (non-mandatory requirement)

1. What is the nature of the development proposed and what type of approval is being sought?

Table A—Aspect 1 of the application (If there are additional aspects to the application please list in Table B—Aspect 2.)

- a) What is the nature of the development? (Please only tick one box.)
- Material change of use Reconfiguring a lot Building work Operational work
- b) What is the approval type? (Please only tick one box.)
- Preliminary approval under s241 of SPA Preliminary approval under s241 and s242 of SPA Development permit
- c) Provide a brief description of the proposal, including use definition and number of buildings or structures where applicable (e.g. six unit apartment building defined as a *multi-unit dwelling*, 30 lot residential subdivision etc.)
- Construction of diversion channel
- d) What is the level of assessment? (Please only tick one box.)
- Impact assessment Code assessment

Table B—Aspect 2 of the application (If there are additional aspects to the application please list in Table C—Additional aspects of the application.)

- a) What is the nature of development? (Please only tick one box.)
- Material change of use Reconfiguring a lot Building work Operational work
- b) What is the approval type? (Please only tick one box.)
- Preliminary approval under s241 of SPA Preliminary approval under s241 and s242 of SPA Development permit
- c) Provide a brief description of the proposal, including use definition and number of buildings or structures where applicable (e.g. six unit apartment building defined as a *multi-unit dwelling*, 30 lot residential subdivision etc.)
-
- d) What is the level of assessment?
- Impact assessment Code assessment

Table C—Additional aspects of the application (If there are additional aspects to the application please list in a separate table on an extra page and attach to this form.)

- Refer attached schedule Not required

2. Location of the premises (Complete Table D and/or Table E as applicable. Identify each lot in a separate row.)

Table D—Street address and lot on plan for the premises or street address and lot on plan for the land adjoining or adjacent to the premises (Note: this table is to be used for applications involving taking or interfering with water.) (Attach a separate schedule if there is insufficient space in this table.)

- Street address **and** lot on plan (All lots must be listed.)
- Street address **and** lot on plan for the land adjoining or adjacent to the premises (Appropriate for development in water but adjoining or adjacent to land, e.g. jetty, pontoon. All lots must be listed.)

Street address					Lot on plan description		Local government area (e.g Logan, Cairns)
Lot	Unit no.	Street no.	Street name and official suburb/ locality name	Post-code	Lot no.	Plan type and plan no.	
i)			Tiffin Street	4455	21	R8614	Maranoa Regional Council
ii)			51-85 George Street	4455	343 (Lot B on SP1272 42)	R8614	
iii)			Tiffin Street	4455	41	R8614	
			153 George Street	4455	96	M5398	
			88-156 George Street	4455	342 (Lease: Lot 1 on PER206 871)	WV219	

Planning scheme details (If the premises involves multiple zones, clearly identify the relevant zone/s for each lot in a separate row in the below table. Non-mandatory)

Lot	Applicable zone / precinct	Applicable local plan / precinct	Applicable overlay/s
i)	Rural Zone	Roma Town Planning Scheme	
ii)	Recreation Zone	Roma Town Planning Scheme	
iii)			

Table E—Premises coordinates (Appropriate for development in remote areas, over part of a lot or in water not adjoining or adjacent to land e.g. channel dredging in Moreton Bay.) (Attach a separate schedule if there is insufficient space in this table.)

Coordinates (Note: place each set of coordinates in a separate row)				Zone reference	Datum	Local government area (if applicable)
Easting	Northing	Latitude	Longitude			
					<input type="checkbox"/> GDA94 <input type="checkbox"/> WGS84 <input type="checkbox"/> other	

3. Total area of the premises on which the development is proposed (indicate square metres)

Lot 21: 103195m², Lot 343: 254,950m², Lot 41: 68800m², Lot 96: 445154m² and Lot 342: 121000m²

4. Current use/s of the premises (e.g. vacant land, house, apartment building, cane farm etc.)

Lot 21: Vacant land, Lot 343: Reserve, Lot 41: Vacant Land, Lot 96: Dwelling/Rural land and Lot 342: Reserve

5. Are there any current approvals (e.g. a preliminary approval) associated with this application? (Non-mandatory requirement)

No Yes—provide details below

List of approval reference/s	Date approved (dd/mm/yy)	Date approval lapses (dd/mm/yy)

6. Is owner's consent required for this application? (Refer to notes at the end of this form for more information.)

No
 Yes—complete either Table F, Table G or Table H as applicable

Table F

Name of owner/s of the land	
I/We, the above-mentioned owner/s of the land, consent to the making of this application.	
Signature of owner/s of the land	
Date	

Table G

Name of owner/s of the land	
<input type="checkbox"/> The owner's written consent is attached or will be provided separately to the assessment manager.	

Table H

Name of owner/s of the land	
<input type="checkbox"/> By making this application, I, the applicant, declare that the owner has given written consent to the making of the application.	

7. Identify if any of the following apply to the premises (Tick applicable box/es.)

- Adjacent to a water body, watercourse or aquifer (e.g. creek, river, lake, canal)—complete Table I
- On strategic port land under the *Transport Infrastructure Act 1994*—complete Table J
- In a tidal water area—complete Table K
- On Brisbane core port land under the *Transport Infrastructure Act 1994* (No table requires completion.)
- On airport land under the *Airport Assets (Restructuring and Disposal) Act 2008* (no table requires completion)
- Listed on either the Contaminated Land Register (CLR) or the Environmental Management Register (EMR) under the *Environmental Protection Act 1994* (no table requires completion)

Table I

Name of water body, watercourse or aquifer	
--	--

Bungil Creek

Table J	
Lot on plan description for strategic port land	Port authority for the lot

Table K	
Name of local government for the tidal area (if applicable)	Port authority for the tidal area (if applicable)

8. Are there any existing easements on the premises? (e.g. for vehicular access, electricity, overland flow, water etc)

- No Yes—ensure the type, location and dimension of each easement is included in the plans submitted

9. Does the proposal include new building work or operational work on the premises? (Including any services)

- No Yes—ensure the nature, location and dimension of proposed works are included in plans submitted

10. Is the payment of a portable long service leave levy applicable to this application? (Refer to notes at the end of this form for more information.)

- No—go to question 12 Yes

11. Has the portable long service leave levy been paid? (Refer to notes at the end of this form for more information.)

- No
 Yes—complete Table L and submit with this application the yellow local government/private certifier's copy of the receipted QLeave form

Table L		
Amount paid	Date paid (dd/mm/yy)	QLeave project number (6 digit number starting with A, B, E, L or P)

12. Has the local government agreed to apply a superseded planning scheme to this application under section 96 of the Sustainable Planning Act 2009?

- No
 Yes—please provide details below

Name of local government	Date of written notice given by local government (dd/mm/yy)	Reference number of written notice given by local government (if applicable)

13. List below all of the forms and supporting information that accompany this application (Include all IDAS forms, checklists, mandatory supporting information etc. that will be submitted as part of this application)

Description of attachment or title of attachment	Method of lodgement to assessment manager
Cover Letter	Online - SARA
IDAS Form 8 IDAS Form 11	Online - SARA
Proposal Plan – Eastern Diversion Drain – Geotechnical Investigations and Service Locations	Online - SARA
Response to concurrence environmentally relevant activities State code	Online - SARA
Response to Queensland vegetation management State code	Online - SARA
Roma Flood Mitigation Study – Stage 2 Ecological Assessment Report February 2016	Online - SARA
Hydrology and Hydraulics for Stage 2 – Local Mitigation Options dated December 2013	Online - SARA
Hydrology and Hydraulics for Stage 2 – Regional Mitigation Options Revision 1 dated January 2014	Online - SARA

14. Applicant's declaration

By making this application, I declare that all information in this application is true and correct (Note: it is unlawful to provide false or misleading information)

Notes for completing this form

- Section 261 of the *Sustainable Planning Act 2009* prescribes when an application is a properly-made application. Note, the assessment manager has discretion to accept an application as properly made despite any non-compliance with the requirement to provide mandatory supporting information under section 260(1)(c) of the *Sustainable Planning Act 2009*

Applicant details

- Where the applicant is not a natural person, ensure the applicant entity is a real legal entity.

Question 1

- Schedule 3 of the *Sustainable Planning Regulation 2009* identifies assessable development and the type of assessment. Where schedule 3 identifies assessable development as "various aspects of development" the applicant must identify each aspect of the development on Tables A, B and C respectively and as required.

Question 6

- Section 263 of the *Sustainable Planning Act 2009* sets out when the consent of the owner of the land is required for an application. Section 260(1)(e) of the *Sustainable Planning Act 2009* provides that if the owner's consent is required under section 263, then an application must contain, or be accompanied by, the written consent of the owner, or include a declaration by the applicant that the owner has given written consent to the making of the application. If a development application relates to a state resource, the application is not required to be supported by evidence of an allocation or entitlement to a state resource. However, where the state is the owner of the subject land, the written consent of the state, as landowner, may be required. Allocation or entitlement to the state resource is a separate process and will need to be obtained before development commences.

Question 7

- If the premises is listed on either the Contaminated Land Register (CLR) or the Environmental Management Register (EMR) under the *Environmental Protection Act 1994* it may be necessary to

seek compliance assessment. Schedule 18 of the Sustainable Planning Regulation 2009 identifies where compliance assessment is required.

Question 11

- The *Building and Construction Industry (Portable Long Service Leave) Act 1991* prescribes when the portable long service leave levy is payable.
- The portable long service leave levy amount and other prescribed percentages and rates for calculating the levy are prescribed in the *Building and Construction Industry (Portable Long Service Leave) Regulation 2002*.

Question 12

- The portable long service leave levy need not be paid when the application is made, but the *Building and Construction Industry (Portable Long Service Leave) Act 1991* requires the levy to be paid before a development permit is issued.
- Building and construction industry notification and payment forms are available from any Queensland post office or agency, on request from QLeave, or can be completed on the QLeave website at www.qleave.qld.gov.au. For further information contact QLeave on 1800 803 481 or visit www.qleave.qld.gov.au.

Privacy—The information collected in this form will be used by the Department of Infrastructure, Local Government and Planning (DILGP), assessment manager, referral agency and/or building certifier in accordance with the processing and assessment of your application. Your personal details should not be disclosed for a purpose outside of the IDAS process or the provisions about public access to planning and development information in the *Sustainable Planning Act 2009*, except where required by legislation (including the *Right to Information Act 2009*) or as required by Parliament. This information may be stored in relevant databases. The information collected will be retained as required by the *Public Records Act 2002*.

OFFICE USE ONLY

Date received Reference numbers

NOTIFICATION OF ENGAGEMENT OF A PRIVATE CERTIFIER

To Council. I have been engaged as the private certifier for the building work referred to in this application

Date of engagement	Name	BSA Certification license number	Building classification/s

QLEAVE NOTIFICATION AND PAYMENT (For completion by assessment manager or private certifier if applicable.)

Description of the work	QLeave project number	Amount paid (\$)	Date paid	Date received form sighted by assessment manager	Name of officer who sighted the form

The *Sustainable Planning Act 2009* is administered by the Department of Infrastructure, Local Government and Planning. This form and all other required application materials should be sent to your assessment manager and any referral agency.

File: 2016/19469
Enquiries: Department of Development, Facilities & Environmental Services
Phone: 1300 007 662
Post: PO Box 620, Roma Qld 4455
Email: planning@maranoa.qld.gov.au



29 June 2016

Department of Infrastructure, Local Government and Planning
128 Margaret Street
Toowoomba, QLD 4350

Attention: Andrew Foley

Dear Andrew,

**RE: Information Request Response - Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)
Described as Lot 21 on R8614; Lot 41 on R8614; Lot 96 on M5398; Lot 343 on R8614; and Lot 342 on WV219**

I refer to your correspondence dated 29 April 2016 requesting additional information to complete the assessment process for the above noted application.

Attached with this letter is all of the information requested.

We trust that the Department of Infrastructure, Local Government and Planning is now in a position to continue processing the application.

Should you have any questions please contact the Department of Development, Facilities and Environmental services on telephone 1300 007 662.

Yours sincerely

Sch. 4(4)(6) - Disclosing personal information

Danielle Pearn
Manager Planning & Building Development

Attachment 1 – Information Request Response

Attachment 1 – Information Request Response

Information Requested (IR)

IR Item 1

In accordance with the State Development Assessment Provisions (SDAP) further information is required to ensure that the activity does not have an adverse environmental impact beyond the site.

Identify all potential impacts and provide mitigation measures to address risk for the following environmental values;

1. Acoustic impacts for all sensitive receptors;
2. Air quality impacts for all sensitive receptors and the management hierarchy for air emissions;
3. Water impacts existing on the site and surrounding vicinity;
4. Rehabilitation measures to be used once the relevant activity ceases

IR Response

This information request response identifies the potential risks and proposed mitigation measures for each of the environmental values identified in IR Item 1.

The following overarching points are offered for general consideration;

- A full time Council officer has been employed to act as a community liaison while the activity is taking place.
- Council has undertaken extensive community consultation and continues to liaise with affected landholders as part of the Roma flood mitigation project.
- The proposed activity is temporary (approximately 6 months).
- Any conditions of development approval issued by the Department of Infrastructure Local Government and Planning will be stringently adhered to by Council.
- The proposed activity relates to flood mitigation works for the town of Roma which are considered a critical part of community infrastructure and community resilience.
- The proposed activity will be funded by the State Government of Queensland.

1. Acoustic impacts for all sensitive receptors

The proposed channel will avoid all forms of built development, running for the most part through vacant undeveloped rural land. The closest sensitive receptor is a dwelling located approximately 270m south-west of the channel. Other nearby sensitive receptors are identified in Figure 1 below.

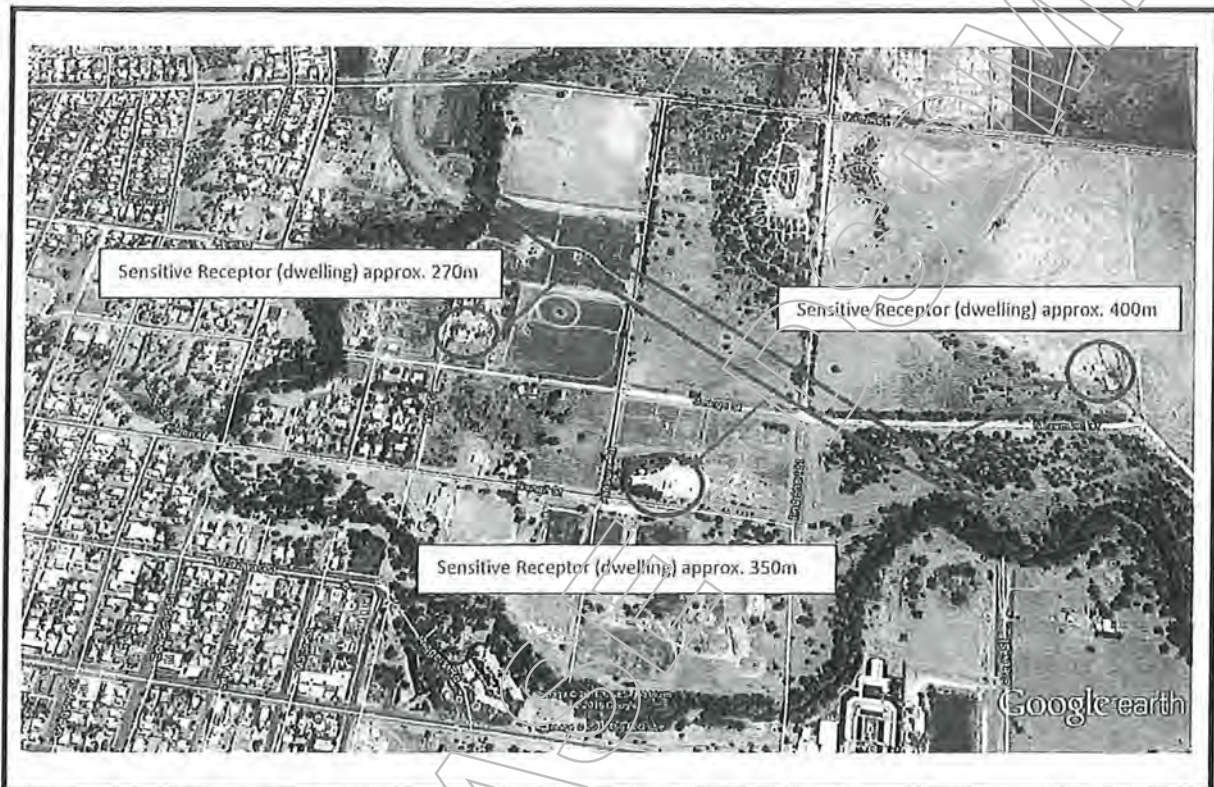


Figure 1 – Location of nearby sensitive receptors (Source - Google Earth)

Built development in the generally vicinity includes recreational uses to the north and south; industrial development to the east; and low density residential development to the west.

Potential noise impacts

Noise from the proposed activity can be expected from the following sources;

- Dozers and excavators removing and shifting soil and rock;
- Front end loaders placing the soil and rock into vehicles for removal from site;
- Heavy vehicles entering and leaving the site;
- Water truck suppressing dust; and
- Staff vehicles accessing the site;

Proposed noise nuisance mitigation measures

To mitigate noise impacts expected from the proposed activity on nearby and surrounding land uses Council will;

- Prepare a Site Environmental Management Plan (EMP);

- Restrict operating hours to 6am - 6pm Monday to Saturday and not conduct works on Public Holidays;
- Use only the latest model vehicles and machinery fitted with noise attenuation devices;
- Service and maintain all equipment and machinery on a regular basis;
- Position machinery to have the least amount of disturbance on nearby receptors;
- Ensure that Idle plant and equipment is shut down when not in use;
- Limit the use compression brakes around sensitive receptors;
- Ensure all excavation, stockpiling and associated activities are contained within a designated work area immediately adjacent to the proposed channel alignment and maintain a minimum separation distance of 100 metres to all sensitive receptors identified in Figure 1 above, throughout the duration of the development works; and
- Locate site access and access tracks to minimise disturbance on nearby and surrounding land uses.

2. Air quality impacts for all sensitive receptors and the management hierarchy for air emission

The proposed channel is located in a low-density, low-intensity, semi-rural setting where air quality is considered high. The prevailing wind direction at the development site is south-west.

Potential air quality impacts

Possible impacts to air quality from the activity can be expected from the following sources;

- Dust generated from machinery and vehicles being used in the activity; and
- Diesel fumes from the machinery and vehicles used in the activity.

Proposed air nuisance mitigation measures

To mitigate against possible air impacts generated from the activity Council will;

- Prepare a Site Environmental Management Plan (EMP);
- Regularly monitor dust being generated from the activity (by site supervisor and employees);
- Have a full time on-site water truck to suppress dust;
- Use only well maintained & compliant vehicles and machinery;
- Restrict the idling of vehicles and machinery;
- Implement speed restrictions on vehicles accessing the site; and
- Locate access points and access tracks so as to have minimal impact on nearby and surrounding development.

3. Water impacts existing on the site and surrounding vicinity

The purpose of the channel is to redirect flows away from town of Roma during flood events. It will work in conjunction with the Stage 1 earthen levee bank, capturing flows that build up behind the levee and redirecting them away from the built up areas of Roma. The channel will also reduce water levels at critical points along Bungil Creek when Bungil Creek reaches capacity during major flood events.

Potential water impacts

Possible impacts to water resulting from the activity include;

- Sediment from the erosion of unprotected soil during construction of the channel; and
- Petroleum spill from machinery associated with the construction of the channel.

Proposed water impact mitigation measures

To mitigate against possible impacts to water Council advises that;

- A Site Environmental Management Plan (EMP) will be prepared;
- There will be no direct or indirect release of contaminants to ground water from the activity and no acid forming (ASS) or potential acid forming (PASS) soil will be disturbed during the activity;
- All vehicles will be maintained and regularly serviced to minimise the risk of a petroleum and/or chemical spill. A material safety data sheet (MSDS) will be located at the site office as well as spill kits on refuelling vehicles;
- Conduct all servicing of vehicles and equipment at an approved motor vehicle workshop facility and designated service areas on site;
- The profile of the channel will be designed and constructed to ensure water does not pond or stagnate; and
- Sediment controls will be in place at discharge points.

4. Rehabilitation measures to be used once the relevant activity ceases

Council is in the process of preparing a rehabilitation plan for the eastern diversion channel, including a comprehensive list of grass species to be used in re-vegetating the diversion channel once it is constructed. The rehabilitation plan will form part of the detailed design phase and Council would respectfully request that the requirement for a detailed rehabilitation plan form part of the conditions of development approval.

Rehabilitation measures

The following is offered as a general information regarding site rehabilitation;

- All machinery and equipment associated with the activity will be removed from the site;
- The diversion channel will be vegetated with plant species in accordance with a comprehensive revegetation plan provided by a suitably qualified supplier;

- Conditions imposed by the Department of Infrastructure, Local Government and Planning with regards to offset plantings and other rehabilitation measures will be implemented by Council and contractors; and
- Council will continually monitor and maintain the channel as part of its ongoing works program.

IR Item 2

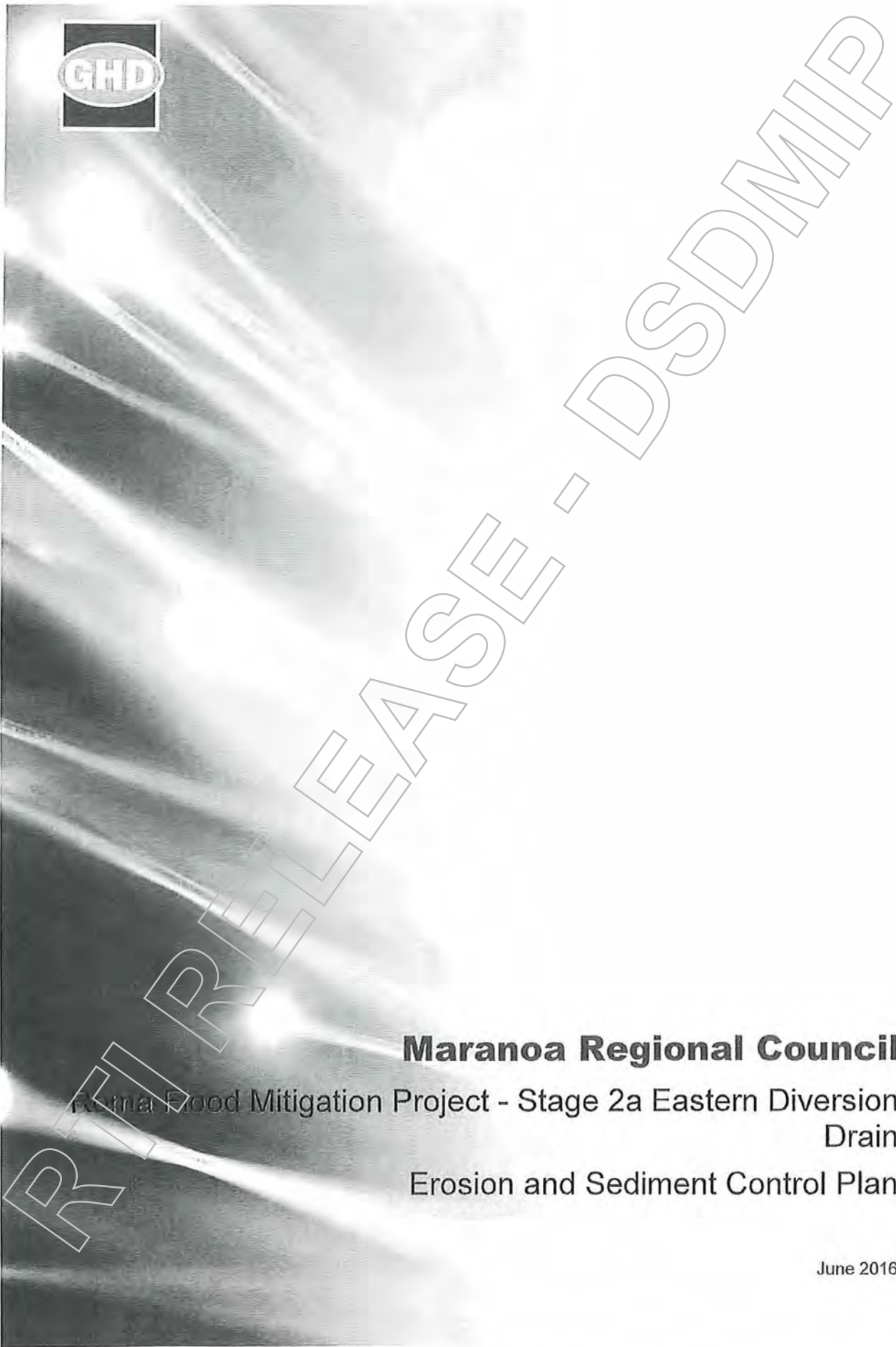
Provide an erosion and sediment control plan, compiled by a suitably qualified person and in accordance with the following document:

- Best Practice Erosion and Sediment Control, IECA 2008 International Erosion Control Association (Australia), Picton NSW

Note: Consideration should also be given to the effect the diversion channel will have on hydraulic flow and potential scour within the bed and banks of Bungil Creek.

Attached is a sediment and erosion control plan that has been prepared by GHD Pty Ltd dated June 2016. The Sediment and Erosion Plan has been prepared in accordance with Best Practice Erosion and Sediment Control IECA 2008 International Erosion Control Association (Australia), Picton NSW.

RTI RELEASE



Maranoa Regional Council

Maranoa Flood Mitigation Project - Stage 2a Eastern Diversion
Drain

Erosion and Sediment Control Plan

June 2016

Table of contents

1.	Introduction.....	1
1.1	Project Background.....	1
1.2	Purpose of this report.....	3
1.3	Scope and Limitations.....	3
1.4	Assumptions	4
1.5	Relevant Guidelines.....	4
1.6	Legislative Requirements	4
2.	Site Analysis.....	6
2.1	Rainfall and Evaporation.....	6
2.2	Soil Loss Estimation.....	6
2.3	ESC Program and Timeframe for Works.....	7
3.	Erosion and Sediment Management.....	8
3.1	Erosion and Sediment Control Guidelines for Contractor.....	8
3.2	Erosion Management.....	8
3.3	Sediment Management.....	11
4.	Monitoring and Maintenance.....	13
4.1	Monitoring requirements.....	13
4.2	Maintenance requirements.....	13

Table index

Table 1	Rainfall Data*	6
Table 2	Evaporation Data*.....	6
Table 3	Soil Loss Calculations for Diversion Drain	7
Table 4	Limitations to Access.....	9

Figure index

Figure 1	Stage 2 Eastern Diversion Drain Alignment.....	2
Figure 2	Stage 2 levee alignment.....	2

Appendices

Appendix A – Erosion and Sediment Control Plan Drawings

1. Introduction

Maranoa Regional Council (MRC) engaged GHD to undertake the detailed design of a levee extension and diversion drain for Stage 2a of the Roma Flood Mitigation Project. This phase of the Roma Flood Mitigation Project comes after GHD were previously engaged by Council to deliver a series of design, consultation and optioneering outcomes as part of the Regional Flood Study.

This report presents an Erosion and Sediment Control Plan (ESC) for the construction of the eastern diversion drain element of the project as required by the conditional approval of works by the State regulator. This report has been undertaken with reference to the International Erosion Control Association Guidelines (IECA, 2008).

1.1 Project Background

In 2012, GHD Pty Ltd was commissioned by Maranoa Regional Council (MRC) to investigate flood mitigation options to address regional flood risk within the township of Roma. Concept design options to mitigate flooding from the Bungil Creek catchment for 'Stage 1' were subsequently developed as part of these investigations. Stage 1 was followed by Stage 2.

The purpose of the Stage 2 Flood Mitigation Project is to further reduce the risk of above floor flooding to properties within the township of Roma from a flood event equivalent to the 2012 DFE. This is an extension of the overall regional flood mitigation project, from which the following arrangement was selected based on cost-benefit and effectiveness of the solution.

The selected arrangement from the Stage 2 Roma Flood Mitigation Study, Hydrology and Hydraulics for Stage 2 Regional Mitigation Options (GHD, 2014 Rev 1) was the eastern diversion drain and western levee. The eastern diversion drain provides a diversion of the Bungil Creek to the eastern side of the township and the western levee is an extension of the Stage 1 Levee at the southern end, adjacent to Bungil Creek.

The eastern diversion drain alignment is shown in Figure 1 and the western levee alignment is shown in Figure 2 below.

1.2 Purpose of this report

The purpose of this Roma Stage 2 Flood Mitigation Project Design Report is to develop an Erosion and Sediment Control Plan (ESCP) for the construction phase of the Stage 2 eastern diversion drain element only. The preparation of an ESCP was required by Department of Infrastructure, Local Government and Planning in their Information Request dated 29 April 2016. This report and attached drawings address the requirements of item ERA 16 z (B) 2.

The determination of the required erosion and sediment control measures outlined in the ESCP is based on assumed conservative values (soil and rainfall data) as sourced from IECA guidelines. The Contractor's preparation of the site/task specific erosion and sediment works instructions should be informed by additional soil data required from appropriate localised site verification and additional geotechnical investigation.

As part of the Environment Management Plan (EMP) for the works, the Contractor should prepare detailed, task specific erosion and sediment control measures to compliment this Erosion and Sediment Control Plan (ESCP). Site conditions may require:

- Construction of any or all of the measures described in this report to differ from their on-site application described in this document;
- Design and implementation of additional long or short term controls and designs, consistent with the concepts contained within this ESCP; and
- Geotechnical investigations to support the implementation of the ESCP.

1.3 Scope and Limitations

This report has been prepared by GHD for Maranoa Regional Council and may only be used and relied on by Maranoa Regional Council for the purpose agreed between GHD and the Maranoa Regional Council as set out Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Maranoa Regional Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section 1.4). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Maranoa Regional Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.4 Assumptions

The following assumptions have been made in preparation of this report:

- The survey data provided by Bennett & Bennett Surveyors and MRC is sufficiently accurate for the purposes of this report.
- The survey datum used is the Australian Height Datum (AHD). All geospatial references contained within this report are to Map Grid Australia GDA 94.

1.5 Relevant Guidelines

This ESCP has been prepared in reference to the following guidelines:

- Best Practice Erosion and Sediment Control. International Erosion Control Association (Australasia) (IECA 2008)

1.6 Legislative Requirements

A person or persons conducting land-disturbing development must conduct such development in accordance with the requirements of relevant environmental legislation (e.g. *Environmental Protection Act 1994*, and the associated *Environmental Protection (Water) Policy 2009*); and the *Sustainable Planning Act 2009*. Relevant portions of these Acts are listed below.

1.6.1 Environmental Protection Act 1994

All persons have a legal duty under the *Environmental Protection Act 1994* (s319) to take all reasonable and practicable measures to minimise or prevent environmental harm. Such harm can be caused if sediment from building sites enters (washes, blows, falls or otherwise) into stormwater drains, roadside gutters or waterways. Stormwater run-off must be managed so that it is not released into waters, a roadside gutter, or stormwater drain at more than 50 mg/l TSS (Total Suspended Solids). Under s443 of the *Environmental Protection Act 1994* a person must not cause or allow a contaminant to be placed in a position where it could reasonably be expected to cause serious or material environmental harm or environmental nuisance (e.g. placing a stockpile adjacent a waterway).

In addition, people who are concerned with management in a corporation have an additional duty under the *Environmental Protection Act 1994* to ensure that their corporation complies with the Act. This means supervisors need to take reasonable and practicable steps to ensure that the people under their control do not breach environmental laws.

People who become aware of environmental harm in association with their work (e.g. significant loss of sediment from their site-works into a watercourse) have a legal duty under the *Environmental Protection Act 1994* to notify the Department of Environment and Resource Management (DERM).

1.6.2 Environmental Protection (Water) Policy 2009

This policy sits under the *Environmental Protection Act 1994*. The *Environmental Protection (Water) Policy 2009* provides environmental values and water quality objectives for Queensland waters. These are utilised when determining environmental harm and to inform other statutory and non-statutory decisions. The water quality objectives assist in identifying whether the environmental values are protected. These values and objectives should be utilised when determining risk of environmental harm from water releases or run off and appropriate erosion and sediment controls implemented.

1.6.3 The Sustainable Planning Act 2009

The *Sustainable Planning Act 2009* is the mechanism for assessing all developments within Queensland. This act establishes the process for sustainable planning and development assessment in an ecologically sustainable way.

2. Site Analysis

The purpose of the site analysis is to identify the constraints that need to be considered during planning and design.

2.1 Rainfall and Evaporation

The following weather pattern data was obtained from the Bureau of Meteorology (BOM) to assist with the desktop analysis. The closest (open) weather station collecting monthly rainfall and evaporation data is at Roma Airport, Qld. Rainfall data has been recorded from 1985 to 2016. Evaporation data has been recorded from 1992 to 2008. The two sets of data has been provided in Table 1 and Table 2 below.

Table 1 Rainfall Data*

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	71.6	87.5	53.2	34.6	34.4	29.6	22.4	23.9	24	50.9	61.5	82.3	579.8
Mean number of rain days \geq 10mm	2	2.5	1.3	0.8	1.1	1	0.7	0.7	0.7	1.5	2	2.5	16.8
Mean number of rain days \geq 25mm	1.1	1.1	0.7	0.4	0.4	0.3	0.2	0.3	0.2	0.4	0.6	1	6.7
Erosion Risk*	M	M	M	L	L	VL	VL	VL	VL	M	M	M	

*BOM Rainfall data from Roma Airport, Station Number 043091

*Erosion Risk High = H, Moderate = M, Low = L, Very Low = VL

The number of rain days can be used as an indicator of how often runoff, and therefore potential erosion, may occur. The Bureau of Meteorology (BoM) provides monthly rainfall data of depths that occur greater or equal to 10 mm and 25 mm days per month. Storms less than 10 mm are considered to have less potential to cause erosion as much of the water will infiltrate into the soil and run-off is typically minimal.

Table 2 Evaporation Data*

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Mean daily evaporation (mm)	10.3	8.6	7.8	6.2	4.4	3.2	3.5	4.6	7.0	8.6	9.2	9.7	6.9

*BOM Evaporation data from Roma Airport, Station Number 043091

2.2 Soil Loss Estimation

Soils present in the diversion drain vicinity area dispersive in nature and can be classified as clayey sands. Refer to the *Stage 2 Geotechnical Factual Report* (GHD, 2016) for more details.

The Revised Universal Soil Loss Equation RUSLE equation has been applied to estimate the month soil loss from sheet and rill erosion from the site, if no controls were put into place.

Soil loss is computed through the following equation:

$$A = R \times K \times LS \times P \times C$$

Where:

A = annual soil loss due to erosion (t/ha/yr)

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length / gradient factor

P = erosion control practice factor

C = ground cover and management factor

The soil loss calculations for the diversion drain have been presented in Table 3.

Table 3 Soil Loss Calculations for Diversion Drain

Parameter	Diversion Drain	Comments
R	1890	Computed from IFD chart for 2 yr 6 hr storm event
K	0.044	Soil erodibility factor for Clayey Sands
LS	0.24	Computed from topographical data
P	1.3	Assumed limited erosion controls (worst case)
C	1	Assumed no ground cover (worst case)
A (t/ha/yr)	26	Soil loss in tons per hectare on an annual basis

Based on the above, without implementation of upstream erosion and sediment control procedures, the estimated potential soil loss over a year for the diversion drain is 26 tonnes per hectare per year respectively.

This translates into 20 m³/ha of sediment volume for a 12-month period from the diversion drain catchment. Therefore, the site will be considered high risk.

2.3 ESC Program and Timeframe for Works

Construction is dependent upon the timing that environmental permitting is approved and the work sequencing that should need to occur to ensure appropriate ESC mitigation measures are installed.

Construction is expected to take up to 12 weeks or 3 months.

For each element within the work stages, detailed ESC work instructions should be developed by the Contractor to outline the specific requirements.

3. Erosion and Sediment Management

3.1 Erosion and Sediment Control Guidelines for Contractor

3.1.1 General

Sediment and erosion controls should be established by the contractor to comply with the requirements of the *Protection of the Environment Operations Act* and *Best Practice Erosion and Sediment Control*, International Erosion Control Association (IECA, 2008).

The ESC measures on site should be installed generally in the following progression:

- Installation of sediment controls (down slope) and exclusion fencing to nominate areas of work and establishing "No-Go" zones;
- Installation of stabilised site access, site compound and facilities;
- Undertake clearing and grubbing work;
- Strip and place / stockpile topsoil;
- Temporary access to location of sedimentation trap;
- Construction of sedimentation trap;
- Construction of sediment-laden water diversion drains to direct runoff to the sedimentation trap;
- Installation of diversion drains upslope and sediment fences downstream of stockpile locations; and
- Construction of the remainder of works.

3.1.2 Erosion and Sediment Control Training for Site Personnel

All personnel should attend an induction program.

The project should require a number of training methods including:

- All personnel should attend a project site specific induction prior to commencing any work on the site, where general erosion and sediment control and water quality matters should be highlighted, together with responsibilities under relevant legislation;
- Toolbox meetings should be conducted regularly, at least weekly, to address numerous issues related to operations, safety, the environment etc. Issues relevant to the stage of construction are to be highlighted; and
- Formal training covering awareness of soil and water related issues and additional advanced training should be delivered to relevant personnel.

Measures and controls required to mitigate pollution of receiving waters and unacceptable levels of soil loss during construction are included below.

3.2 Erosion Management

3.2.1 Explanatory Notes and Installation Sequences

In order to reduce on-site erosion and off-site sedimentation, construction sequencing should be undertaken that balances the timing of land disturbance activities and the installation of mitigation measures.

3.2.2 Minimise Disturbance

Where practicable, the soil erosion hazard on the site should be kept as low as possible and as recommended in Table 4. At the commencement of onsite activities, the installation of barrier fencing and sediment fencing should be undertaken to clearly define the limits of works and any "No-Go" zones. Where possible, existing vegetation strips should be maintained to minimise soil disturbance. The number and size of construction compounds should be minimised as far as practicable. All sediment and erosion controls should be installed within the project boundary (Greenfields Area).

Table 4 Limitations to Access

Land use	Limitation	Comments
Constructions areas	Disturbance to generally be no further than five (preferably two) metres from the edge of any essential construction activity	All site workers should clearly recognise these zones that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (down slope), or similar methods.
Access areas	Generally limited to a maximum width of 10 m	The site manager/foreman should determine and mark the location of these zones onsite. They may vary in position to best conserve the existing vegetation and protect downstream areas while being considerate of the needs of efficient works' activities. All site workers should clearly recognise their boundaries which, where appropriate, are marked with barrier mesh, sediment fencing, or similar materials.
Remaining lands	Entry prohibited except for essential thinning of plant growth	All site workers clearly recognise this land by marking boundary with barrier fence or similar.

3.2.3 "No Go" Zones

Any areas outside of the clearing limits should be designated as "No Go" zones to minimise or prevent access by personnel or vehicles. Temporary fencing or barricading such as Para webbing or perimeter tape is to be utilised on the cleared perimeter with accompanying signage. Site inductions and toolbox meetings should include the importance of observing "No Go" zones, particularly in areas near to any identified sensitive area.

3.2.4 Vegetation Clearing

Vegetation can only be cleared within approved areas. The limits of the development are to be clearly defined with perimeter tape, security line, Para webbing or similar.

Vegetation outside of the development footprint is not to be removed or damaged. The protection of existing vegetation should be incorporated into site inductions for all project personnel and contractors. This information should also be reiterated at toolbox talks or briefings.

3.2.5 Erosion Control Measures

Earthworks are expected to disturb dispersive and fine soils. The vegetation removal and earthworks are expected to produce appreciable quantities of fine materials that could become entrained in runoff.

Clearly visible barrier fencing shall be installed to assist traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site through the stabilised access points. Erosion

control on the embankment crests, downstream batters and any other exposed areas will be provided by gypsum stabilisation of a 200 mm thick layer of the on-site (dispersive) clays, and by covering with 75 mm of topsoil seeded with grass mix.

Short term erosion control on any exposed areas should be provided by regular application of soil binding polymer product such as *Vital Bon Matt Stonewall* as per manufacturer's recommendations.

3.2.6 Stabilisation

The stabilisation requirements for the project are as follows:

- Disturbed soil surfaces are to be stabilised with soil glue products (*Vital Stonewall* or equivalent) during the works and within 1 day of completion of works within any area of the site;
- All temporary earth banks, flow diversion systems, and embankments where runoff should flow uncontrolled off site are to be stabilised with rock/gravel over geo-textile, or vegetation;
- A success criterion for ground cover is a minimum of 75% cover

3.2.7 Stockpile Management

All stockpiles are to:

- Be separated into soil and use types;
- Be located further than 40 metres from waterways;
- Be located at least one metre from site boundary fencing;
- Not be located against the base of significant trees;
- Be watered and / or protected through effective erosion control emulsions (*Vital Bon-Matt Stonewall* or equivalent), as required, to minimise dust emissions; and
- Have sediment fences and coir logs located down slope to minimise the risk of sediment laden runoff.

3.3 Sediment Management

3.3.1 Dust suppression

Dust suppression and erosion protection on access tracks can be provided by regular application of *Vital Bon Matt HR* or approved equivalent.

3.3.2 Sediment Fence

The sediment fence recommended for this project is *TerraStop TS 1780* or approved equivalent.

3.3.3 Rock Pads

The rock pads at the site entry and exit locations should have the following dimensions

- Rock d50= 100 mm (minimum) over geotextile (*Terratex E1 PP* or approved equivalent); and
- Thickness of rock protection layer = 200 mm (minimum).

3.3.4 Earth Bunds

Earth Bunds can be formed by using excavated material. While forming Earth bunds, care should be taken to separate topsoil from subsoil. Also, as indicated on the Erosion and Sediment Control Drawings, earth bunds shall be utilised to capture dirty water within the drainage channel during construction. The earth bund should be 1 m high with 1:2 side slopes.

The upstream base of the earth bunds should be protected with non-woven geotextile (*TerraStop Non Woven Q Range* or approved equivalent). Erosion control on Earth Bunds should be provided by regular application of soil binding polymer product such as *Vital Bon Matt Stonewall* as per manufacturer's recommendations.

3.3.5 Dirty Water Channels

Dirty water channel dimensions have been conservatively designed to convey up to 1 m³/s flow and their dimensions (minimum) are as follows:

- Base Width: 0.50 m
- Side Slopes: 1 to 2
- Channel Slope: 0.5 %
- Flow depth: 0.58 m
- Discharge: 1.00 m³/s
- Channel Lining: Coconut / jute fibre mats or Geotextile
- Maximum Acceptable Velocity: 1.7 m/s

3.3.6 Coir Logs

Coir Logs to be used as indicated on Erosion and Sediment Control Drawings (*EcoLog*, 300 mm diameter or approved equivalent). Installation of the coir logs to be as per manufacturer's recommendations.

3.3.7 Sediment Traps and Flocculation

It is noted that during the earthworks for different stages, sediment laden water shall be trapped at the designated points.

Excavated sediment traps have been shown at several locations in the ESC drawings and have been conservatively designed to treat a flow of 1 m³/s during construction. The minimum dimensions of excavated sediment traps are as follows (IECA, 2008):

- Surface area: 750 m²
- Length to Width Ratio: 3:1
- Side slopes: 1V:3H
- Depth: 1 m
- Inflow bank to be protected with Geotextile lining
- Sediment to be removed when it exceeds 30 % of trap volume

Due to presence of dispersive soils, the water contained within the sediment traps will, most likely, not achieve the desired water quality (especially Total Suspended Solids, 50 mg/l). Therefore, appropriate flocculation is obligatory.

Apply Gypsum (CaSO₄) at the rate of 32 kg per 100 m³. In case of increased likelihood of high intensity storms, increase dosage to 70 kg per 100 m³. Gypsum is the least ecologically threatening flocculant as it causes little pH change, however, slight changes in salinity can be experienced. Gypsum needs to be spread evenly across the water surface.

In addition, Filter bags (1380 Filter Bags or approved equivalent) filled with Gypsum should be applied every 20 m in the dirty water channels to aid with Flocculation. It must be noted that Gypsum can cause scum deposits in equipment.

Other flocculation options will require written approval from Department of Environment and Heritage Protection (DEHP). These include:

- Polyacrylamides (PAMS like DamClear Floc Blocks or other product approved by CPESC)
- Aluminium based flocculants

3.3.8 Silt Curtains

Floating silt curtains shall be installed in Bungil Creek (when in flow) near the inlet and outlet of the diversion drain during the construction phase. Silt curtains act to isolate the sediment-laden waters from passing stream flows. This allows sedimentation of the disturbed water body with the area enclosed by the silt curtain. The most effective placement method for silt curtain is in a semicircle or U shape arrangement around the disturbance area.

The following companies supply and install silt curtains in Australia:

- AussieErosion Floating silt curtains
- Polaris Marine Pty Ltd
- Adiemas Services Pty Ltd

The installation and maintenance of the silt curtains should be as per manufacturer / supplier requirements.

4. Monitoring and Maintenance

4.1 Monitoring requirements

Appropriate procedures and qualified personnel should be engaged to plan and conduct site inspections and water quality monitoring throughout the construction

- All ESC measures should be inspected in accordance with the IECA 2008 guidelines.
- All site monitoring data including rainfall records, dates of water quality testing, testing results and records of controlled water releases for the site, should be documented onsite. The documentation should be maintained up to date for the duration of the approved works and be available on-site for inspection by the Assessing Authority on request.
- All environmental incidents should be documented, and should remain accessible to the relevant regulatory authorities on request. When an Environmental Incident (i.e. breach of limits) or exceedance of trigger value occurs, it is the responsibility of the Environmental Manager to investigate and initiate remedial actions commensurate with the severity of the incident.
- A system should be implemented and maintained that monitors and records site compliance and non-compliance with the ESCP requirements.

4.2 Maintenance requirements

All materials removed from ESC devices during maintenance, whether solid or liquid, should be disposed of in a manner that does not cause ongoing soil erosion or environmental harm. Solid materials removed from ESC devices are to be stockpiled onsite in accordance with stockpile guidelines.

Written records of erosion and sediment control monitoring and maintenance activities conducted during the construction and maintenance periods should be maintained on site. Original copies of such records shall be provided on request to the Assessing Authority

Maintenance of erosion and sediment control measures must occur in accordance with IECA 2008 guidelines.

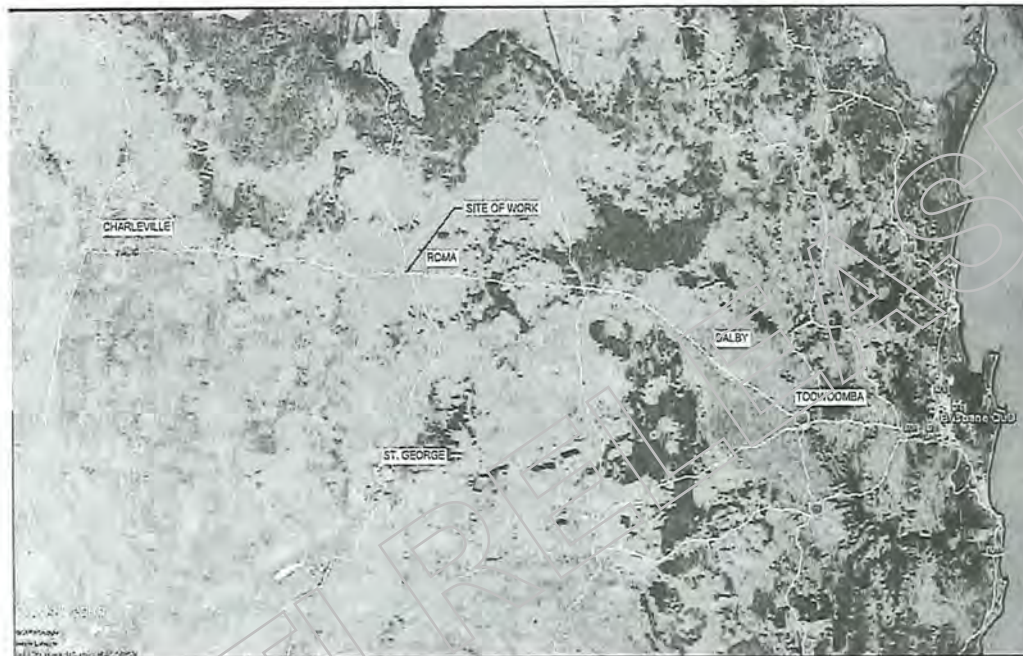
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Appendices

Appendix A – Erosion and Sediment Control Plan Drawings

RTI RELEASE - DSDMIP

MARANOA REGIONAL COUNCIL ROMA LEVEE STAGE 2 PROJECT 41-29431



IMAGERY - GOOGLE EARTH PRO (EXTRACTED 04 MARCH 2016)
LOCALITY PLAN
NTS

DRAWING LIST

DRAWING No.	DRAWING TITLE
2016-378C-G201	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
2016-378C-G202	EROSION AND SEDIMENT CONTROL NOTES
CIVIL	
2016-378C-C201	EROSION AND SEDIMENT CONTROL PLAN
2016-378C-C202	NOTES AND DETAILS, SHEET 1 OF 4
2016-378C-C203	NOTES AND DETAILS, SHEET 2 OF 4
2016-378C-C204	NOTES AND DETAILS, SHEET 3 OF 4
2016-378C-C205	NOTES AND DETAILS, SHEET 4 OF 4

CODE	DATE	ISSUED FOR REVIEW	REVISION	AUTHORISED
A	24/04/18	ISSUED FOR REVIEW		J.P.

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CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE
COVER SHEET
DRAWING LIST AND LOCALITY PLAN

PROJECT
ROMA LEVEE STAGE 2 PROJECT

STATUS
PRELIMINARY

DESIGNED	DRAWN	APPROVED	DATE	DRAWING NUMBER
A.K.	N.C.	J.P.	24/06	2016-378C-G201
WORK CODE	RASTER	DESIGN NUMBER	SCALE # AT	REV
15201	378C		NTS	A

EROSION AND SEDIMENT CONTROL NOTES:



LIMITATIONS
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GENERAL NOTES

- READ THESE DRAWINGS IN CONJUNCTION WITH ENGINEERING DRAWINGS, SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED. REFER TO ROMA EASTERN DIVERSION DRAIN DESIGN DRAWINGS 2016-378C-G001 TO 2016-378C-G003 AND 2016-378C-C001 TO 2016-378C-C025.
- MENTION OF PROPRIETARY DEVICES DOES NOT INDICATE EXCLUSIVE REFERENCE BUT INDICATES THAT SIMILAR ALTERNATIVES HAVING THE REQUIRED PROPERTIES MAY BE OFFERED FOR APPROVAL BY A SUITABLY QUALIFIED PROFESSIONAL (PREFERABLY WITH CPESC AND/OR RPEQ ACCREDITATION).
- REFER ANY DISCREPANCY TO THE DESIGNER BEFORE PROCEEDING WITH THE WORK.
- DO NOT OBTAIN DIMENSIONS BY SCALING FROM THE DRAWINGS.
- VERIFY SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE SAA CODES, SPECIFICATIONS AND BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITY.
- THE CONTRACTOR SHALL MAINTAIN ACCURATE RECORDS OF LEVELS AND LOCATIONS OF SERVICES TO FULLY COMPLY WITH LOCAL AUTHORITY 'AS CONSTRUCTED' INFORMATION REQUIREMENTS.
- IT IS EXPECTED THAT PRIOR TO ANY CONSTRUCTION ACTIVITY AT THE PARK, A DETAILED WORK SPECIFIC ESCP WILL BE DEVELOPED BY THE CONTRACTOR AS PART OF THE CONSTRUCTION ENVIRONMENT MANAGEMENT PLAN (CEMP). THE CONTRACTOR WILL REVISE THIS ESCP TO PROVIDE GREATER DETAIL BASED ON CONSTRUCTION METHODOLOGY AND TIMING OF WORKS BY THE CONTRACTOR.
- THE CONTRACTOR SHALL KEEP RECORD OF RAINFALL FORECAST FOR THE UPCOMING WEEK AS A MINIMUM. IT IS NOTED THAT RAINFALL GREATER THAN 10 MM HAS A HIGHER EROSION POTENTIAL THEREFORE APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MUST BE IN PLACE ESPECIALLY IF THERE IS GREATER THAN 50% CHANCE OF RAINFALL GREATER THAN 10 MM.
- THE CONTRACTOR SHALL ENSURE IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL MEASURES.
- TYPICAL DETAILS OF EROSION AND SEDIMENT CONTROL MEASURES HAVE BEEN OBTAINED FROM THE IECA 2008.

SURVEY
 SITE SURVEY HAS BEEN PROVIDED BY MARANOVA REGIONAL COUNCIL. SOILS AND EROSION CONTROL.
 EARTHWORKS ARE EXPECTED TO DISTURB DISPERSIVE AND FINE SOILS. THE VEGETATION REMOVAL AND EARTHWORKS ARE EXPECTED TO PRODUCE APPRECIABLE QUANTITIES OF FINE MATERIALS THAT COULD BECOME ENTRAINMENT IN RUNOFF.
 EROSION CONTROL ON THE EMBANKMENT CRESTS, DOWNSTREAM BATTERS AND ANY OTHER EXPOSED AREAS SHOULD BE PROVIDED BY GYPSIUM STABILISATION (MINIMUM OF 3% BY MASS) OF A 200 MM (MINIMUM) THICK LAYER OF THE ON-SITE (DISPERSIVE) CLAYS, AND BY COVERING WITH 75 mm (MINIMUM) OF TOPSOIL SEEDED WITH GRASS MIX.
 EROSION CONTROL ON ANY EXPOSED AREAS SHOULD BE PROVIDED BY REGULAR APPLICATION OF SOIL BINDING POLYMER PRODUCT SUCH AS VITAL BON MATT STONEWALL AS PER MANUFACTURER'S RECOMMENDATIONS.

DISTURBANCE MINIMISATION
 WHERE PRACTICABLE, THE SOIL EROSION HAZARD ON THE SITE SHOULD BE KEPT AS LOW AS POSSIBLE AT THE COMMENCEMENT OF ON-SITE ACTIVITIES. THE INSTALLATION OF BARRIER FENCING AND SEDIMENT FENCING SHOULD BE UNDERTAKEN TO CLEARLY DEFINE THE LIMITS OF WORKS AND ANY 'NO-GO' ZONES, WHERE POSSIBLE. EXISTING VEGETATION STRIPS SHOULD BE MAINTAINED TO MINIMISE SOIL DISTURBANCE. THE NUMBER AND SIZE OF CONSTRUCTION COMPOUNDS SHOULD BE MINIMISED AS FAR AS PRACTICABLE. ALL SEDIMENT AND EROSION CONTROLS SHOULD BE INSTALLED WITHIN THE PROJECT BOUNDARY (GREENFIELD AREA).

NO GO ZONE
 ANY AREAS OUTSIDE OF THE CLEARING LIMITS SHOULD BE DESIGNATED AS 'NO GO' ZONES TO MINIMISE OR PREVENT ACCESS BY PERSONNEL OR VEHICLES. TEMPORARY FENCING OR BARRICADING SUCH AS PARA WEBBING OR PERIMETER TAPE IS TO BE UTILISED ON THE CLEARED PERIMETER WITH ACCOMPANYING SIGNAGE. SITE INDUCTIONS AND TOOLBOX MEETINGS SHOULD INCLUDE THE IMPORTANCE OF OBSERVING 'NO GO' ZONES, PARTICULARLY IN AREAS NEAR TO ANY IDENTIFIED SENSITIVE AREA.

STABILISATION
 THE STABILISATION REQUIREMENTS FOR THE PROJECT ARE AS FOLLOWS:

- DISTURBED SOIL SURFACES ARE TO BE STABILISED WITH SOIL GLUE PRODUCTS (VITAL STONEWALL OR EQUIVALENT) DURING THE WORKS AND WITHIN 1 DAY OF COMPLETION OF WORKS WITHIN ANY AREA OF THE SITE;
- ALL TEMPORARY EARTH BANKS, FLOW DIVERSION SYSTEMS, AND EMBANKMENTS WHERE RUNOFF SHOULD FLOW UNCONTROLLED OFF SITE ARE TO BE STABILISED WITH ROCK/GRAVEL OVER GEO-TEXTILE, OR VEGETATION;
- A SUCCESS CRITERION FOR GROUND COVER IS A MINIMUM OF 75% COVER

STOCKPILE MANAGEMENT
 ALL STOCKPILES ARE TO:

- BE SEPARATED INTO SOIL AND LIME TYPES;
- BE LOCATED FURTHER THAN 40 METRES FROM WATERWAYS;
- BE LOCATED AT LEAST ONE METRE FROM SITE BOUNDARY FENCING;
- NOT BE LOCATED AGAINST THE BASE OF SIGNIFICANT TREES;
- BE WATERED AND / OR PROTECTED THROUGH EFFECTIVE EROSION CONTROL EMULSIONS (VITAL BON-MATT STONEWALL OR EQUIVALENT), AS REQUIRED, TO MINIMISE DUST EMISSIONS;
- HAVE SEDIMENT FENCES AND COIR LOGS LOCATED DOWN SLOPE TO MINIMISE THE RISK OF SEDIMENT LADEN RUNOFF

DUST SUPPRESSION
 DUST SUPPRESSION AND EROSION PROTECTION ON ACCESS TRACKS CAN BE PROVIDED BY REGULAR APPLICATION OF VITAL BON MATT HR OR APPROVED EQUIVALENT.

SEDIMENT FENCE
 THE SEDIMENT FENCE RECOMMENDED FOR THIS PROJECT IS TERRASTOP TS 1780 OR APPROVED EQUIVALENT.

ROCK PADS
 THE ROCK PADS AT THE SITE ENTRY AND EXIT LOCATIONS SHOULD HAVE THE FOLLOWING DIMENSIONS:

- ROCK D50 = 100 mm (MINIMUM) OVER GEOTEXTILE (TERRATEX E1 PP OR APPROVED EQUIVALENT)
- THICKNESS OF ROCK PROTECTION LAYER = 200 mm (MINIMUM)

EARTH BUNDS
 EARTH BUNDS CAN BE FORMED BY USING EXCAVATED MATERIAL, WHILE FORMING EARTH BUNDS, CARE SHOULD BE TAKEN TO SEPARATE TOPSOIL FROM SUBSOIL. ALSO, AS INDICATED ON THE EROSION AND SEDIMENT CONTROL DRAWINGS, EARTH BUNDS SHALL BE UTILISED TO CAPTURE DIRTY WATER WITHIN THE DRAINAGE CHANNEL. DURING CONSTRUCTION, THE EARTH BUND SHOULD BE 1m HIGH WITH 1:2 SIDE SLOPES.
 THE UPSTREAM BASE OF THE EARTH BUNDS SHOULD BE PROTECTED WITH NON-WOVEN GEOTEXTILE (TERRASTOP NON WOVEN Q RANGE OR APPROVED EQUIVALENT). EROSION CONTROL ON EARTH BUNDS SHOULD BE PROVIDED BY REGULAR APPLICATION OF SOIL BINDING POLYMER PRODUCT SUCH AS VITAL BON MATT STONEWALL AS PER MANUFACTURER'S RECOMMENDATIONS.

DIRTY WATER CHANNELS
 DIRTY WATER CHANNEL DIMENSIONS HAVE BEEN CONSERVATIVELY DESIGNED TO CONVEY UP TO 1 M³/S AND THEIR DIMENSIONS (MINIMUM) ARE AS FOLLOWS:

- BASE WIDTH: 0.50 m
- SIDE SLOPES: 1 TO 2
- CHANNEL SLOPE: 0.5 %
- FLOW DEPTH: 0.58 m
- DISCHARGE: 1.00 m³/s
- CHANNEL LINING: COCONUT / JUTE FIBRE MATS OR GEOTEXTILE
- MAXIMUM ACCEPTABLE VELOCITY: 1.7 m/s

COF LOGS
 COF LOGS TO BE USED AS INDICATED ON EROSION AND SEDIMENT CONTROL DRAWINGS (EQUVALENT 300 MM DIAMETER OR APPROVED EQUIVALENT). INSTALLATION OF THE COF LOGS TO BE AS PER MANUFACTURER'S RECOMMENDATIONS.

SEDIMENT TRAPS AND FLOCCULATION
 IT IS NOTED THAT DURING THE EARTHWORKS FOR DIFFERENT STAGES, SEDIMENT LADEN WATER SHALL BE TRAPPED AT THE DESIGNATED POINTS.
 EXCAVATED SEDIMENT TRAPS HAVE BEEN SHOWN AT SEVERAL LOCATIONS IN THE ESCP DRAWINGS AND HAVE BEEN CONSERVATIVELY DESIGNED TO TREAT A FLOW OF 1 M³/S DURING CONSTRUCTION. THE MINIMUM DIMENSIONS OF EXCAVATED SEDIMENT TRAPS ARE AS FOLLOWS:

- SURFACE AREA: 750 m²
- LENGTH TO WIDTH RATIO: 3:1
- SIDE SLOPES: 1V:3H
- DEPTH: 1 m
- INFLOW BANK TO BE PROTECTED WITH GEOTEXTILE LINING
- SEDIMENT TO BE REMOVED WHEN IT EXCEEDS 30 % OF TRAP VOLUME

DUE TO PRESENCE OF DISPERSIVE SOILS, THE WATER CONTAINED WITHIN THE SEDIMENT TRAPS WILL, MOST LIKELY, NOT ACHIEVE THE DESIRED WATER QUALITY (ESPECIALLY TOTAL SUSPENDED SOLIDS, 50 MG/L). THEREFORE APPROPRIATE FLOCCULATION IS OBLIGATORY.

APPLY GYPSIUM (CaSO₄) AT THE RATE OF 32 KG PER 100 m² IN CASE OF INCREASED LIKELIHOOD OF HIGH INTENSITY STORMS. INCREASE DOSEAGE TO 70 KG PER 100 m². GYPSIUM IS THE LEAST ECOLOGICALLY THREATENING FLOCCULANT AS IT CAUSES LITTLE PH CHANGE. HOWEVER, SLIGHT CHANGES IN SALINITY CAN BE EXPERIENCED. GYPSIUM NEEDS TO BE SPREAD EVENLY ACROSS THE WATER SURFACE.
 IN ADDITION, FILTER BAGS (1330 FILTER BAGS OR APPROVED EQUIVALENT) FILLED WITH GYPSIUM SHOULD BE APPLIED EVERY 20 M IN THE DIRTY WATER CHANNELS TO AID WITH FLOCCULATION. IT MUST BE NOTED THAT GYPSIUM CAN CAUSE SCUM DEPOSITS IN EQUIPMENT.
 OTHER FLOCCULATION OPTIONS WILL REQUIRE WRITTEN APPROVAL FROM DEPARTMENT OF ENVIRONMENT AND HERITAGE PROTECTION (DEHP). THESE INCLUDE:

- POLYACRYLAMIDES (PAMs LIKE DAMCLEAR FLOCC BLOCKS OR OTHER PRODUCT APPROVED BY CPESC)
- ALUMINIUM BASED FLOCCULANTS

SILT CURTAINS
 FLOATING SILT CURTAINS WILL NEED TO BE INSTALLED IN BUNGA CREEK NEAR THE INLET AND OUTLET OF THE DIVERSION DRAIN DURING THE CONSTRUCTION PHASE. SILT CURTAINS ACT TO ISOLATE THE SEDIMENT-LADEN WATERS FROM PASSING STREAM FLOWS. THIS ALLOWS SEDIMENTATION OF THE DISTURBED WATER BODY WITH THE AREA ENCLOSED BY THE SILT CURTAIN. THE MOST EFFECTIVE PLACEMENT METHOD FOR SILT CURTAIN IS IN A SEMI-CIRCLE OR U SHAPE ARRANGEMENT AROUND THE DISTURBANCE AREA.

THE FOLLOWING COMPANIES SUPPLY AND INSTALL SILT CURTAINS IN AUSTRALIA:

- AUSSEEPERSON FLOATING SILT CURTAINS
- POLARIS MARINE PTY LTD
- ADRIEMAS SERVICES PTY LTD

THE INSTALLATION AND MAINTENANCE OF THE SILT CURTAINS SHOULD BE AS PER MANUFACTURER / SUPPLIER REQUIREMENTS.

MONITORING REQUIREMENTS
 APPROPRIATE PROCEDURES AND QUALIFIED PERSONNEL SHOULD BE ENGAGED TO PLAN AND CONDUCT SITE INSPECTIONS AND WATER QUALITY MONITORING THROUGHOUT THE CONSTRUCTION

- ALL ESCP MEASURES SHOULD BE INSPECTED IN ACCORDANCE WITH THE IECA 2008 GUIDELINES.
- ALL SITE MONITORING DATA INCLUDING RAINFALL RECORDS, DATES OF WATER QUALITY TESTING, TESTING RESULTS AND RECORDS OF CONTROLLED WATER RELEASES FOR THE SITE, SHOULD BE DOCUMENTED ON-SITE. THE DOCUMENTATION SHOULD BE MAINTAINED UP TO DATE FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON-SITE FOR INSPECTION BY THE ASSESSING AUTHORITY ON REQUEST.
- ALL ENVIRONMENTAL INCIDENTS SHOULD BE DOCUMENTED, AND SHOULD REMAIN ACCESSIBLE TO THE RELEVANT REGULATORY AUTHORITIES ON REQUEST. WHEN AN ENVIRONMENTAL INCIDENT (I.E. BREACH OF LIMITS) OR EXCEEDANCE OF TRIGGER VALUE OCCURS, IT IS THE RESPONSIBILITY OF THE ENVIRONMENTAL MANAGER TO INVESTIGATE AND INITIATE REMEDIAL ACTIONS COMMENSURATE WITH THE SEVERITY OF THE INCIDENT.
- A SYSTEM SHOULD BE IMPLEMENTED AND MAINTAINED THAT MONITORS AND RECORDS SITE COMPLIANCE AND NON-COMPLIANCE WITH THE ESCP REQUIREMENTS.

MAINTENANCE REQUIREMENTS
 ALL MATERIALS REMOVED FROM ESC DEVICES DURING MAINTENANCE, WHETHER SOLID OR LIQUID, SHOULD BE DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONSIDERABLE SOIL EROSION OR ENVIRONMENTAL HARM. SOLID MATERIALS REMOVED FROM ESC DEVICES ARE TO BE STOCKPILED ON-SITE IN ACCORDANCE WITH STOCKPILE GUIDELINES.
 WRITTEN RECORDS OF EROSION AND SEDIMENT CONTROL MONITORING AND MAINTENANCE ACTIVITIES CONDUCTED DURING THE CONSTRUCTION AND MAINTENANCE PERIODS SHOULD BE MAINTAINED ON-SITE. ORIGINAL COPIES OF SUCH RECORDS SHALL BE PROVIDED ON REQUEST TO THE ASSESSING AUTHORITY.
 MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES MUST OCCUR IN ACCORDANCE WITH IECA 2008 GUIDELINES.

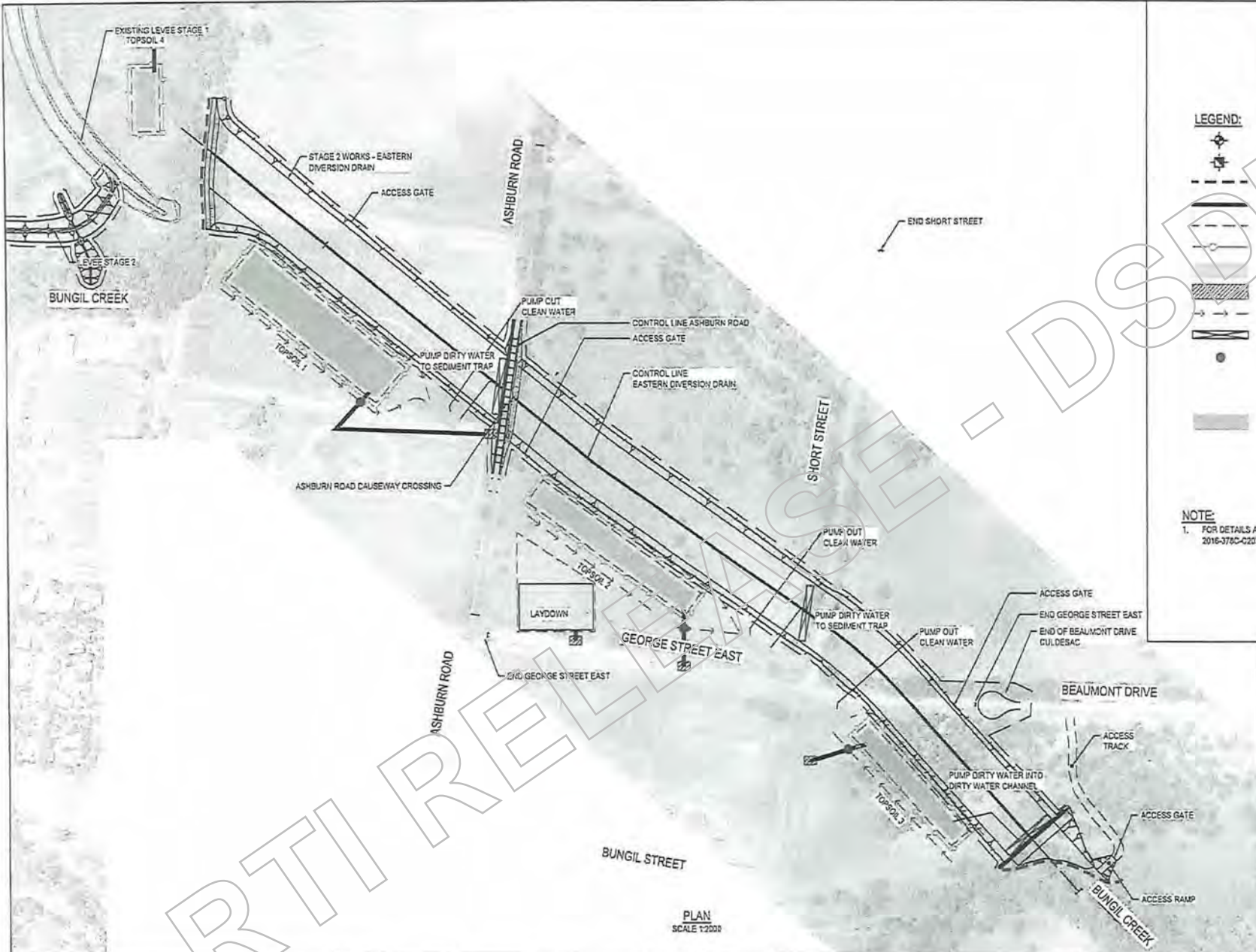
ASSESSOR	DATE	ISSUED FOR REVIEW	REVISION	APP. AUTHORIZED

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CLIENT	MARANOVA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES	PROJECT	ROMA LEEVEE STAGE 2 PROJECT
TITLE	EROSION AND SEDIMENT CONTROL NOTES	STATUS	PRELIMINARY
DESIGNED	A.K.	APPROVED	J.P. 24/06
DATE	N.C.	DATE	2016-378C-G202
WORK ORDER NUMBER	15201	ORDER NUMBER	378C
SCALE	NTS	REV	A



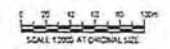
LEGEND:

- BOREHOLE LOCATION (GHD 2015)
- TEST PIT LOCATION (GHD 2015)
- SILT CURTAIN
- ACCESS TRACK/GRAVEL
- SEDIMENT FENCE
- COIR LOG/FIBRE ROLL
- SEDIMENT TRAP
- VIBRATION GRID AND ROCK PAD/RAMP
- DIRTY WATER CHANNEL
- TEMPORARY EARTH BUND
- ROCK CAUSEWAY
- TOPSOIL 1 - 200m x 40m
- TOPSOIL 2 - 200m x 20m
- TOPSOIL 3 - 150m x 15m
- TOPSOIL 4 - 50m x 20m
- LAYDOWN 80m x 50m

NOTE:

1. FOR DETAILS AND NOTES, REFER TO DRAWING Nos. 2016-378C-C202 TO 2016-378C-C20X.

PLAN
SCALE 1:2000



CODE	DATE	REVISION	AUTHORISED
A	24/06/16	ISSUED FOR REVIEW	J.P.

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CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE
EROSION AND SEDIMENT CONTROL PLAN

PROJECT
ROMA LEVEE STAGE 2 PROJECT

STATUS
PRELIMINARY

DESIGNED
A.K.
15/01

DRAWN
N.C.

APPROVED
J.P.
24/06

DATE

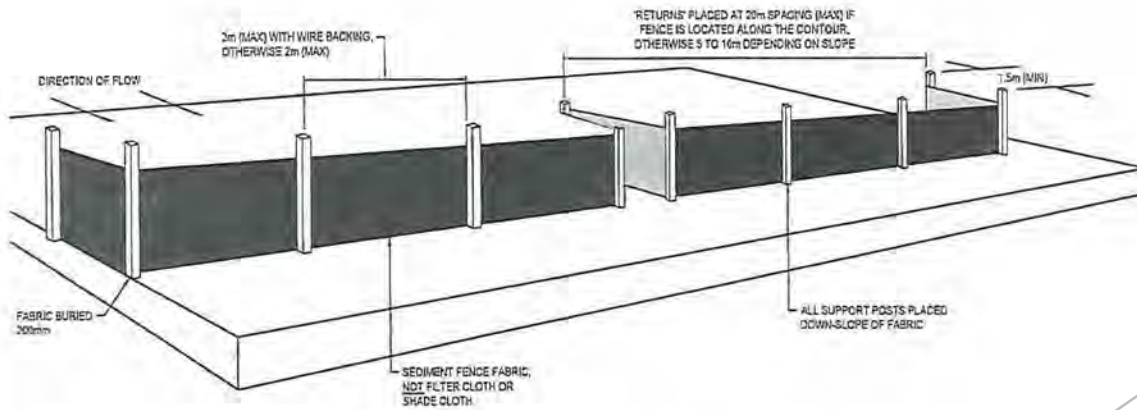
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2016-378C-C201

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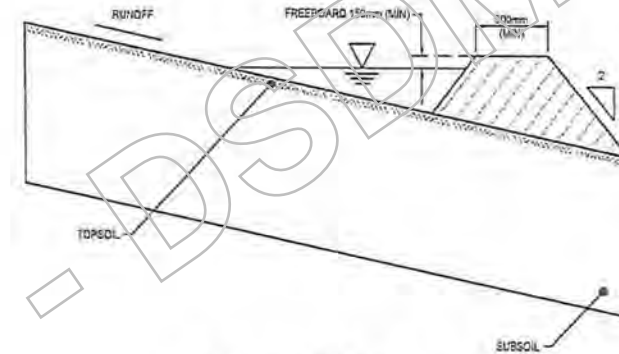
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BASE WIDTH (MIN)	250mm
SIDE SLOPE (MAX)	2:1 (H:V)
HYDRAULIC FREEBOARD	150mm (300mm)



TYPICAL SEDIMENT FENCE DETAIL (IECA 2008)
SCALE N.T.S.



EARTH BANKS (IECA, 2008)
SCALE N.T.S.

SEDIMENT FENCE INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND REQUIRED TYPE OF FABRIC (IF SPECIFIED). IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT ENGINEER OR RESPONSIBLE ON-SITE OFFICE FOR ASSISTANCE.
- TO THE MAXIMUM DEGREE PRACTICAL, AND WHERE THE PLANS ALLOW, ENSURE THE FENCE IS LOCATED:
 - TOTALLY WITHIN THE PROPERTY BOUNDARIES,
 - ALONG A LINE OF CONSTANT ELEVATION WHEREVER PRACTICAL,
 - AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL DAMAGING THE FENCE.
- INSTALL RETURNS WITHIN THE FENCE AT MAXIMUM 20m INTERVALS IF THE FENCE IS INSTALLED ALONG THE CONTOUR, OR 5 TO 10m MAXIMUM SPACING (DEPENDING ON SLOPE) IF THE FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR, THE RETURNS SHALL CONSIST OF EITHER:
 - V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE OR
 - SANDBAG OR ROCK/AGGREGATE CHECK DAM A MINIMUM 1/2 AND MAXIMUM 1/3 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.
- ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m, OR AS NECESSARY, TO MINIMISE WATER BYPASSING AROUND THE FENCE.
- ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE, AND THE UNDESIRABLE DISCHARGE OF WATER AROUND THE ENDS OF THE FENCE.
- IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF THE EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE. DO NOT ATTACH THE FABRIC TO THE TREES.
- ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 2m IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER THAN 2m.
- IF SPECIFIED, SECURELY ATTACH THE SUPPORT WIRE OR MESH TO THE UP-SLOPE SIDE OF THE STAKES WITH THE MESH EXTENDING AT LEAST 200mm INTO THE EXCAVATED TRENCH, ENSURE THE MESH AND FABRIC IS ATTACHED TO THE UP-SLOPE SIDE OF THE STAKES EVEN WHEN DIRECTING A FENCE AROUND A CORNER OR SHARP CHANGE OF DIRECTION.
- WHENEVER POSSIBLE, CONSTRUCT THE SEDIMENT FENCE FROM A CONTINUOUS ROLL OF FABRIC, TO JOIN FABRIC EITHER:
 - ATTACH EACH END TO TWO OVERLAPPING STAKES WITH THE FABRIC FOLDING AROUND THE ASSOCIATED STAKE ONE TURN, AND WITH THE TWO STAKES TIED TOGETHER WITH WIRE (METHOD 1), OR
 - OVERLAP THE FABRIC TO THE NEXT ADJACENT SUPPORT POST (METHOD 2).
- SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING 25 x 12.5mm STAPLES, OR THE WIRE AT MAXIMUM 150mm SPACING.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
- ENSURE THE COMPLETED SEDIMENT FENCE IS AT LEAST 450mm, BUT NO MORE THAN 700mm HIGH. IF A SPILL-THROUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE GROUND LEVEL.
- BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.
- IF IT IS NOT POSSIBLE TO ANCHOR THE FABRIC IN AN EXCAVATED TRENCH, THEN USE A CONTINUOUS LAYER OF SAND OR AGGREGATE TO HOLD THE FABRIC FIRMLY ON THE GROUND.

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICE FOR ASSISTANCE.
- CLEAR THE LOCATION FOR THE BANK, CLEARING ONLY THE AREA THAT IS NEEDED TO PROVIDE ACCESS FOR PERSONNEL AND EQUIPMENT.
- REMOVE ROOTS, STUMPS, AND OTHER DEBRIS AND DISPOSE OF THEM PROPERLY. DO NOT USE DEBRIS TO BUILD THE BANK.
- FORM THE BANK FROM THE MATERIAL, AND TO THE DIMENSION SPECIFIED IN THE APPROVED PLANS.
- IF EARTH IS USED, THEN ENSURE THE SIDES OF THE BANK ARE NO STEEPER THAN A 2:1 (H:V) SLOPE, AND THE COMPLETED BANK MUST BE AT LEAST 500mm HIGH.
- IF FORMED FROM SANDBAGS, THEN ENSURE THE BAGS ARE TIGHTLY PACKED SUCH THAT WATER LEAKAGE THROUGH THE BAGS IS MINIMISED.
- CHECK THE BANK ALIGNMENT TO ENSURE POSITIVE DRAINAGE IN THE DESIRED DIRECTION.
- THE BANK SHOULD BE VEGETATED (TURFED, SEEDED AND MULCHED), OR OTHERWISE STABILISED IMMEDIATELY, UNLESS IT WILL OPERATE FOR LESS THAN 30 DAYS OR IF SIGNIFICANT RAINFALL IS NOT EXPECTED DURING THE LIFE OF THE BANK.
- ENSURE THE EMBANKMENT DRAINS TO A STABLE OUTLET, AND DOES NOT DISCHARGE TO AN UNSTABLE FILL SLOPE.

MAINTENANCE

- INSPECT FLOW DIVERSION BANKS AT LEAST WEEKLY AND AFTER RUNOFF-PRODUCING RAINFALL.
- INSPECT THE BANK FOR ANY SLUMPS, WHEEL TRACK DAMAGE OR LOSS OF FREEBOARD. MAKE REPAIRS AS NECESSARY.
- CHECK THAT FILL MATERIAL OR SEDIMENT HAS NOT PARTIALLY BLOCKED THE DRAINAGE WITH UP-SLOPE OF THE EMBANKMENT, WHERE NECESSARY, REMOVE ANY DEPOSITED MATERIAL TO ALLOW FREE DRAINAGE.
- DISPOSE OF ANY COLLECTED SEDIMENT OR FILL IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.
- REPAIR ANY PLACES IN THE BANK THAT ARE WEAKENED OR IN RISK OF FAILURE.

ASSOCIATE CONSULTANT



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CLIENT

MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

PROJECT

ROMA LEVEE STAGE 2 PROJECT

FILE

NOTES AND DETAILS
SHEET 2 OF 4

PROJECT NORTH

2016-378C-C203

STATUS

PRELIMINARY

DESIGNED

A.K.

DRAWN

N.C.

APPROVED

J.P.

DATE

24/05

SHIPPED NUMBER

378C

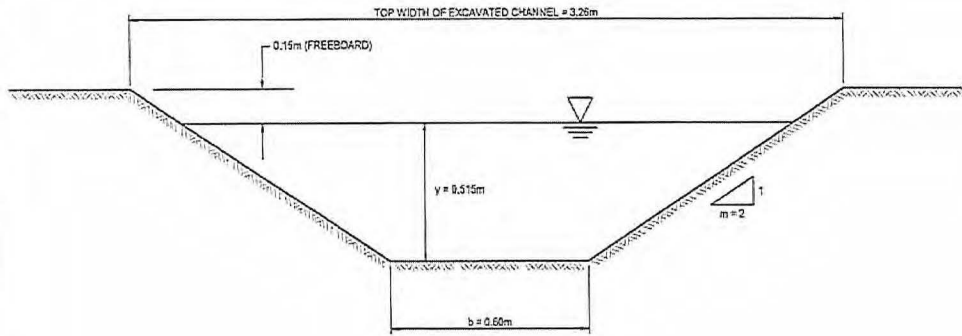
SCALE

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NO.	DATE	REVISION	AUTHORISED
1	24/05/16	ISSUED FOR REVIEW	J.P.



DIRTY WATER CHANNELS (IECA, 2008)
SCALE N.T.S.

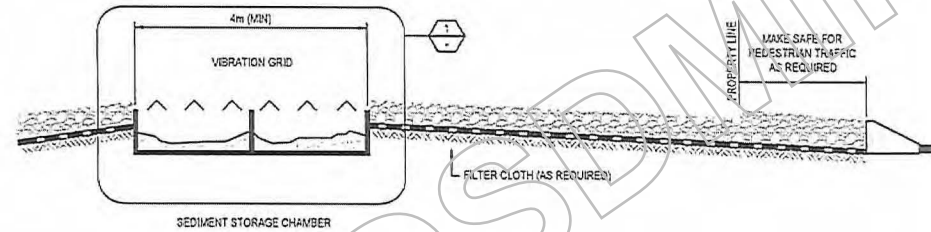


FIGURE 2 - TYPICAL LAYOUT OF VIBRATION GRID WITH ROCK RAMPS

TYPICAL SITE ACCESS TRACK DETAIL (IECA, 2008)
SCALE N.T.S.

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- ENSURE ALL NECESSARY SOIL TESTING (E.G. SOIL pH, NUTRIENT LEVELS) AND ANALYSIS HAS BEEN COMPLETED, AND REQUIRED SOIL ADJUSTMENTS PERFORMED PRIOR TO PLANTING.
- CLEAR THE LOCATION FOR THE CHANNEL, CLEARING ONLY WHAT IS NEEDED TO PROVIDE ACCESS FOR PERSONNEL AND CONSTRUCTION EQUIPMENT.
- REMOVE ROOTS, STUMPS, AND OTHER DEBRIS AND DISPOSE OF THEM PROPERLY. DO NOT USE DEBRIS TO BUILD ANY ASSOCIATED EMBANKMENTS.
- EXCAVATE THE DIVERSION CHANNEL TO THE SPECIFIED SHAPE, ELEVATION AND GRADIENT. THE SIDES OF THE CHANNEL SHOULD BE NO STEEPER THAN A 2:1 (H:V) IF CONSTRUCTED IN EARTH, UNLESS SPECIFICALLY DIRECTED WITHIN THE APPROVED PLANS.
- STABILISE THE CHANNEL AND BANKS IMMEDIATELY UNLESS IT WILL OPERATE FOR LESS THAN 30 DAYS. IN EITHER CASE, TEMPORARY EROSION PROTECTION (MATTING, ROCK, ETC.) WILL BE REQUIRED AS SPECIFIED WITHIN THE APPROVED PLANS OR AS DIRECTED.
- ENSURE THE CHANNEL DISCHARGES TO A STABLE AREA.

MAINTENANCE

- DURING THE SITE'S CONSTRUCTION PERIOD, INSPECT THE DIVERSION CHANNEL WEEKLY AND AFTER ANY INCREASE IN FLOWS WITHIN THE CHANNEL. REPAIR ANY SLUMPS, WHEEL TRACK DAMAGE OR LOSS OF FREEBOARD.
- ENSURE FILL MATERIAL OR SEDIMENT IS NOT PARTIALLY BLOCKING THE CHANNEL. WHERE NECESSARY, REMOVE ANY DEPOSITED MATERIAL TO ALLOW FREE DRAINAGE.
- DISPOSE OF ANY COLLECTED SEDIMENT OR FILL IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

VIBRATION GRID AND ROCK RAMPS INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION AND DIMENSIONAL DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- CLEAR THE LOCATION OF THE VIBRATION GRID REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE A FIRM FOUNDATION SO THAT THE ROCK IS NOT PRESSED INTO SOFT GROUND. CLEAR SUFFICIENT WIDTH TO ALLOW FOR PASSAGE OF LARGE VEHICLES, BUT CLEAR ONLY THAT NECESSARY FOR THE EXIT. DO NOT CLEAR ADJACENT AREAS UNTIL THE REQUIRED EROSION AND SEDIMENT CONTROL DEVICES ARE IN PLACE.
- GRADE THE LOCATION OF THE VIBRATION GRID SO THAT RUNOFF FROM THE UNIT WILL NOT FLOW INTO THE STREET, BUT WILL FLOW TOWARDS AN APPROPRIATE SEDIMENT-TRAPPING DEVICE.
- ENSURE THAT THE INSTALLATION OF THE VIBRATION GRID INCLUDES ADEQUATE SEDIMENT STORAGE VOLUME UNDER THE GRID. WHERE NECESSARY, INSTALL SUITABLE PRECAST SEDIMENT COLLECTION CHAMBERS.
- PLACE A ROCK PAD/RAMP FORMING A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK OVER THE ROADWAY BETWEEN THE VIBRATION GRID AND THE SEALED STREET TO PREVENT TYRES FROM PICKING UP MORE SOIL AFTER THEY HAVE BEEN CLEANED.
- THE TOTAL LENGTH OF THE VIBRATION GRID AND ROCK RAMPS SHOULD BE AT LEAST 15m WHERE PRACTICABLE, AND AS WIDE AS THE FULL WIDTH OF THE ENTRY OR EXIT AND AT LEAST 3m. THE ROCK RAMP SHOULD COMMENCE AT THE EDGE OF THE OFF-SITE SEALED ROAD OR PAVEMENT.
- FLARE THE END OF THE ROCK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF THE TURNING VEHICLES DO NOT TRAVEL OVER UNPROTECTED SOIL.
- IF THE FOOTPATH IS OPEN TO PEDESTRIAN MOVEMENT, THEN COVER THE COARSE ROCK WITH FINE AGGREGATE OR GRAVEL, OR OTHERWISE TAKE WHATEVER MEASURES ARE NEEDED TO MAKE THE AREA SAFE.

NO.	DATE	ISSUED FOR REVIEW	REVISION	AUTHORIZED
A	24/06/16	ISSUED FOR REVIEW		J.P.

ASSOCIATE CONSULTANT	
----------------------	--



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CLIENT	MARANOA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES
TITLE	NOTES AND DETAILS SHEET 3 OF 4

PROJECT	ROMA LEVEE STAGE 2 PROJECT
STATUS	PRELIMINARY

DESIGNED	DRAWN	APPROVED	DATE	DRAWING NUMBER
A.K.	N.C.	J.P.	24/06	2016-378C-C204
WORK ORDER NUMBER	DESIGN NUMBER	SCALE @ 1:	REV	A
15201	378C	NTS		

GHD

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0		Sch. 4(4)(6) - Disclosing personal information				

RTI RELEASE - DSDMIP

www.ghd.com



File: 2016/19469
Enquires to: Department of Development, Facilities and Environmental Services
Phone: 1300 007 662
Post: PO Box 620, Roma QLD 4455
Email: planning@maranoa.qld.gov.au



18 July 2016

Department of Infrastructure, Local Government and Planning
128 Margaret Street
Toowoomba, QLD 4350

Attention: Maria Johnson

Dear Maria

RE: Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b) Described as Lot 21 on R8614; Lot 41 on R8614; Lot 96 on M5398; Lot 343 on R8614; and Lot 342 on WV219

Maranoa Regional Council recently provided the Department of Infrastructure Local Government and Planning (the Department) with an information response for the above noted development application. Having reviewed the response the Department has requested additional details be provided.

Attached with this correspondence is;

- Department of Environment and Heritage Protection (DEHP) email dated 4 July 2016;
- Response to the DEHP email dated 4 July 2016;
- Recommendation of suitable grasses/vegetation for the Western levee and Eastern Diversion Channel prepared by Lomandra Environmental Consultancy dated March 2016; and
- Roma Stage 2 Flood Mitigation Project Construction Specification Drawings – Eastern Diversion Channel

This information is intended to be read in conjunction with the materials provided as part of the original development application and the materials that were provided as part of the formal information response.

Maranoa Regional Council
Development Services
1 Cartwright Street
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Phone: 1300 007 662 Fax: 07 4624 6990
www.maranoa.qld.gov.au

Postal Address:
PO Box 620
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ABN: 99 324 089 164

File: 2016/19469
Enquires to: Department of Development, Facilities and Environmental Services
Phone: 1300 007 662
Post: PO Box 620, Roma QLD 4455
Email: planning@maranoa.qld.gov.au



Should you have any questions please contact the Department of Development, Facilities and Environmental services on telephone 1300 007 662.

Yours sincerely

Sch. 4(4)(6) - Disclosing
personal information

Danielle Pearn
Manager Planning & Building Development

- Attachment 1 - Department of Environment and Heritage Protection (DEHP) email dated 4 July 2016
- Attachment 2 - Supplementary information
- Attachment 3 - Recommendation of suitable grasses/vegetation for the Western levee and Eastern Diversion Channel
- Attachment 4 - Roma Stage 2 Flood Mitigation Project Construction Specification Drawings – Eastern Diversion Channel

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WORKING FOR YOU. GROWING WITH YOU

Attachment 1 - Department of Environment and Heritage Protection
(DEHP) email dated 4 July 2016

RTI RELEASE - DSDMIP

Christopher Tickner

From: ROSIAK Dorota <Dorota.Rosiak@ehp.qld.gov.au>
Sent: Monday, 4 July 2016 12:10 PM
To: Christopher Tickner
Cc: Maria.Johnson@dilgp.qld.gov.au; GRAY Amanda
Subject: RE: 2016/19469 - Maranoa Regional Council - OpWorks "Diversion Channel" - Lot 21 on R8614, Lot 41 on R8614, Lot 96 on M5398, Lot B on SP127242 and Lot 342 on WV219 - Information request



Queensland
Government

Hi Christopher,

As per our discussion from this morning, considering the short duration of the works, your response addressing acoustic impacts, air quality impacts and surface water impacts seems to be sufficient. However, in terms of site values, such as regional ecosystems, flora communities, fauna - including endangered or vulnerable species and their habitats; it appears that the response does not address issues around impacts that potentially will be associated with the proposal on these values, and does not specify mitigating measures that will be in place to minimise the impacts.

Under the Environmental Offsets framework the proponent is required to identify prescribed environmental matters (Matters of State Environmental Significance or MSES) that are likely to be affected by the activity (this requirement has been satisfied by the information provided in the *Ecological Assessment Report* prepared by GHD) and also demonstrate how the impacts in the first instance will be avoided, and if avoidance cannot be achieved, it needs to be demonstrated that the impacts will be carefully managed and minimised. Additionally, if after avoidance and mitigation, there is still an impact on MSES, the assessment needs to be undertaken to determine if the impacts is likely to be significant.

To enable further assessment please demonstrate how the impact on the prescribed environmental matters has been avoided (e.g. in selecting a project location have you chosen a site where the prescribed environmental matters are in the poorest condition; or have you chosen a site that avoids habitat for vulnerable species; or the footprint of the project area has been reduced to minimise impact; or the ancillary facilities are to be located in areas where there are no or poor condition prescribed environmental matters). If the impact cannot be avoided demonstrate what mitigating measures will be applied to minimise the impact.

After that consideration, the impact will still be there, determine - based on the *Significant Residual Impact Guideline* - if the impact is significant.

The relevant guidelines that may assist you in preparation of this additional information can be found at:


<http://www.qld.gov.au/environment/pollution/management/offsets/>

Please provide this information as soon as possible. Should you have any questions, please do not hesitate to contact me.

Kind regards,

Dot

Dorota Rosiak
Senior Environmental Officer

 Please consider the environment before printing this e-mail

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RTI RELEASE - DSD/MIP

Attachment 2 - Response to the DEHP email dated 4 July 2016

RTI RELEASE - DSDMIP

Information Requested (IR)

IR 1

How the impact on the prescribed environmental matters have been avoided (e.g. in selecting a project location have you chosen a site where the prescribed environmental matters are in the poorest condition; or have you chosen a site that avoids habitat for vulnerable species; or the footprint of the project area has been reduced to minimize impact; or the ancillary facilities are to be located in areas where there are no poor condition prescribed environmental matters)

IR Response

The design and alignment of the diversion channel has been informed by;

- **Hydrological efficiency** – the major determining factor for the alignment and design of the diversion channel is its hydrological efficiency. The primary purpose of the diversion channel is to redirect flows away from the urban areas of Roma during flood events and to reduce peak flows at critical points along Bungil Creek when Bungil Creek reaches capacity. The location of the diversion channel is critical to its function.
- **Minimizing environmental impacts** – ecological investigations were undertaken within the project footprint to determine ecological constraints and provide recommendations to mitigate impacts. The results of the ecological investigation are contained in the Ecological Assessment Report prepared by GHD dated February 2016 (submitted as part of the original application).
- **Community input** - extensive community consultation was undertaken to inform the design and alignment of the diversion channel. Information received during public consultation resulted in revisions to the original concept, taking into account property boundaries and potential impacts to properties and people.

Avoiding impacts to prescribed environmental values has not always been possible. Unlike a building, there are limits as to how the diversion channel can be manipulated to avoid disturbance i.e. its alignment has been predetermined by existing flood mitigation infrastructure (Stage 1 Earthen Levee), hydrology, topography and the orientation of Bungil Creek.

Recognising that environmental values will be impacted by the diversion channel, Council will/has put in place mitigation measures to limit disturbance. Ongoing operation and maintenance works associated with the channel will also ensure that the impacts on environmental values are monitored and, wherever possible, limited and/or restored. Rehabilitation measures are also planned to make the channel look and function (as much as possible) as a natural part of the existing ecological system.

IR 2

If the impact cannot be avoided, demonstrate what mitigating measures will be applied to minimize the impact

IR Response

Ecological values inside the project footprint have been identified in the Ecological Assessment Report prepared by GHD dated February 2016. The values identified in the Report and the mitigation measures proposed to protect them are detailed below.

Threatened ecological communities

An area of Weeping Myall Woodland has been identified in the vicinity of the proposed diversion channel (outside the project footprint). The proposed activity will not have a direct impact on this community (i.e. no clearing); however there is a possibility that the change in hydrological conditions that result from the channel could impact the current flooding regime of the community. To mitigate this possible impact, Council will;

- refer the application for assessment against the Environmental Protection and Biodiversity Conservation Act (if deemed necessary);
- determine appropriate control measures with the interested government agencies through conditions of the development approval;
- monitor the health of the community as part of ongoing maintenance and operation of the diversion channel and report any significant changes to the relevant government agencies.

Remnant Regional Ecosystems

The project footprint will not entirely avoid impacts to mapped Remnant Vegetation, which is located at the eastern and western extents of the proposed diversion channel. To minimise the impacts to Remnant Vegetation Council will;

- prepare an Environmental Management Plan prior to construction, which will detail measures to minimise clearing and avoid unnecessary disturbance.
- employ an arborist to be present prior to and during removal of remnant vegetation.
- clearly mark the remnant vegetation that needs to be removed to avoid any accidental clearing;
- obtain all necessary and relevant permits when required.
- employ a competent and suitably qualified person/organisation to remove the trees.

Terrestrial fauna

The Ecological Assessment identifies terrestrial habitat that may support threatened species within the project footprint. The report identifies the need for a Significant Species Management Program (SSMP), which can be prepared when and if terrestrial fauna is encountered during construction. Should the Department of Environment and Heritage Protection (DEHP) consider it necessary, it is respectfully requested that the requirement to prepare an SSMP (in the event that terrestrial fauna is encountered) form a condition of development approval.

To mitigate against potential impacts to terrestrial fauna Council will also;

- educate staff, including contractors, in relation to the risk of fauna injury and deaths and how to manage animals which are displaced, including threatened species.
- employ a suitably qualified and licensed spotter to capture and relocate any fauna disturbed. The spotter will be present prior to and during any clearing.
- determine appropriate control measures with the appropriate state bodies prior to clearing any habitat (SSMP).

Aquatic values

Erosion and sediment control measures are proposed to stabilise the banks of Bungil Creek. These measures are restricted to the banks of Bungil Creek and will not impact flows or aquatic values.

A water license from the Department of Natural Resources and Mines to divert a watercourse has been applied for and is being assessed as part of a separate permitting process. Conditions imposed as part of the water license will be strictly adhered to by Council.

Item 3

If after that consideration, the impact will still be there, determine – based on the *Significant Residual Impact Guideline* – if the impact is significant.

Discussions between the DEHP, GHD consulting Engineers and MRC have determined that the proposed activity is unlikely to have a Significant Residual Impact.

The Significant Impact Guidelines provide the following criteria for determining if there will be a Significant Residual Impact -

- the clearing removes an extent of more than 5 hectares of Of Concern Regional Ecosystem;
- the clearing results in the extent of remaining Of Concern Regional Ecosystem being less than 5 hectares; or
- clearing results in the separation of Of Concern Regional Ecosystems.

The proposed clearing does not exceed these thresholds. The extent of Of Concern Regional Ecosystems that is proposed to be removed is less than 5 hectares, and the existing total extent of Of Concern vegetation in the project footprint is already less than 5 hectares. The clearing of vegetation will not result in the separation of Of Concern Regional Ecosystems.

The Environmental Protection Act guidelines provides additional clarity on this matter. In the EP Act guidelines, a Significant Residual Impact for the type of Of Concern Ecosystem vegetation that is located in the project footprint is considered not significant if clearing is less than 2 hectares. As the area to be cleared is 0.68 hectares, the impact is not considered to be significant.

Attached with this response is a copy of the report prepared by Lomandra Environmental Consultancy dated March 2016. The report contains recommendations of suitable grasses/vegetation for rehabilitation of the diversion channel. The recommendations contained in this report will be further refined and then implemented once the diversion channel has been constructed. An operations and maintenance manual will also be prepared to ensure that revegetation of the diversion channel is successful.

RTI RELEASE

**Attachment 3 - Recommendation of suitable grasses/vegetation for
the Western levee and Eastern Diversion Channel**

RTI RELEASE - DSDMIP



ALWAYS RELIABLE ALWAYS PROFESSIONAL

ABN 32 840 427 824

Recommendation of suitable grasses/
vegetation for the Western Levee and
Eastern Diversion Channel.



Lomandra Environmental Consultancy
Prepared by Fambisai C. Makamure
March 2016



Disclaimer: While every attempt has been made to ensure that the information in this publication is correct at the time of printing, errors can occur. The information is provided as advisory to the designated project. Once signed this document is binding. Specific issues relevant to your workplace should be considered in light of this and on an individual basis.

Controlled Document



Contents

1. Introduction.....	4
2. Suitable Grasses and or Vegetation Recommendation.....	4
3. Scope of Works.....	10
4. Revegetation Scope of Works.	12
5. Conclusion.....	14
6. References.....	15



1. Introduction

The aim of this proposal is for the Recommendation of suitable grasses and or vegetation for the Western Levee and Eastern Diversion Channel. We will look at the scopes of work and other relevant issues. After construction of the levee, the disturbed soil makes natural re-vegetation difficult. Such a site can be a serious sediment source for many years furthermore this may inhibit the structure from having a longer function lifespan as designed.

2. Suitable Grasses and or Vegetation Recommendation

Based on the general assumption that textures of the soil in the town of Roma as clay, the following recommendations of plant types that can be planted have been made. We advise anything in the lomandra family that has the ability to withstand drought, wet weather, including flooding and low temperatures of up to -1 Degree Celsius. Therefore in this case, the plants recommended are the longifolia, hystrix and confertifolia. It is strongly advised including an irrigation system be put to ensure establishment. Furthermore it is strongly advised that soil testing be done before planting is done to ensure proper soil rehabilitation techniques are applied ensuring the elimination of failure.

2.1 Lomandra longifolia

Occurs in eastern parts of eastern Australia, from Cape York to Tasmania, with annual rainfall patterns between 650 to 2000 mm. It is a widespread and common species on sandy or gravelly watercourses or alluvial plains, also in gullies and forested hillsides. This is a tufted plant with leaves up to 1 m long and less than 1 cm wide, unless damaged it has several small teeth near the apex. The inflorescence has 2 major branches at each node compared to *L. hystrix*, which has about 4 per node and the teeth are quite widely separated, up to 10 cm from the tip as shown below.



**Height**

1 meter to 1.5 meters

Width

1 meter to 1.5 meters

Habit

Large strappy leaved plant with broad, lime green-to-green foliage

Flowering and seeds

Flowering in spring to early summer and fruiting in summer; mature seeds shed quickly. Germinates in 8-10 weeks from fresh seed [1; 11], at 25°C with no pre-treatment required [90].

Cultivation and uses

One of the best river or creek bank stabilisers available; it is also of high wildlife value as a shelter for ground fauna and for nectar [1] The tough leaves were used by Aborigines for fine baskets, mats, eel traps, and binding wounds [11].

Climate parameters

Mean annual rainfall: 650-2000 mm

Rainfall distribution pattern: summer, uniform or winter

Mean annual temperature: 9-20 °C

Mean max. temperature of the hottest month: 19-31 °C

Mean min. temperature of the coldest month: 0-11 °C

Frosts (approx. no. per year): greater than 20

Frost intensity: light to moderate (0 to -5°C)

Altitude: 10-900 metres

Tolerance of extremes in climate

Drought: known to be moderately drought tolerant

Wind: tolerates salt-laden coastal winds

Soil factors

Texture: clay loam, loam, sandy loam, sandy clay loam or sand

Soil pH reaction: neutral (6.5-7.5) (?)

Soil depth: moderate to deep (30-100 cm or greater)

Drainage: poorly to imperfectly drained

Salinity: non-saline

Biological traits under cultivation

Longevity: short-lived less than 15 years

Growth rate: fast

Root system: shallow and spreading

Erosion control potential: excellent for sandy sites

Shade tolerance: tolerates partial shade

Soil factors

Texture: clay loam, loam, sandy loam, sandy clay loam or sand

Soil pH reaction: neutral (6.5-7.5)

Soil depth: moderate to deep (30-100 cm or greater)

Drainage: poorly to imperfectly drained

Salinity: non-saline

Biological traits under cultivation



Longevity: short-lived less than 15 years

Growth rate: fast

Root system: shallow and spreading

Erosion control potential: excellent for sandy sites

Shade tolerance: tolerates partial shade

Grows to 80cm in height, space 30cm apart for mass planting or 50cm apart for specimen planting

Native to: Australia.

Planting season: Any.

2.2 Lomandra Hystrix

Lomandra hystrix naturally grows on the edge of fresh and brackish water creeks, swamps, rivers and in moist gullies. It tolerates dry conditions, but does better in climates with summer rainfall or with top up summer watering. Ideal for most soils, an example of the plant is in the images below.



Common name

Creek Mat-Rush

Height

0.5 meter to 1.0 meter

Width

1 meter to 1.5 meters

Habit

This is a large strappy leaved plant with broad, lime green-to-green foliage.

Flowers and Fruit

Spring & Summer with openly arranged yellow flowers amongst, and slightly above, the foliage.

Aspect

Lomandra hystrix will grow in complete full sun and also up to 90% full shade; hystrix is one of the most shade tolerant Lomandra varieties. It needs a sheltered coastal aspect with protection from sea



winds and is tolerant of high humidity. It will grow inland in frost-free microclimates, it handles cold to -1°C & very light frost.

Soil Type

Loams, clay loam to clay.

Maintenance

Trim foliage by half in spring every 3 to 5 years, if needed. Fertilize with slow release.

Mulch Type

No problems with any well composted, processed mulch type.

Climate parameters

Mean annual rainfall: 650-2000 mm

Rainfall distribution pattern: summer, uniform or winter

Mean annual temperature: $9-20^{\circ}\text{C}$

Mean maximum temperature of the hottest month: $19-31^{\circ}\text{C}$

Mean minimum temperature of the coldest month: $0-11^{\circ}\text{C}$

Frosts (approx. no. per year): greater than 20

Frost intensity: light to moderate (0 to -5°C)

Altitude: 10-900 metres

Tolerance of extremes in climate

Drought: known to be moderately drought tolerant

Wind: tolerates salt-laden coastal winds

Biological traits under cultivation

Longevity: short-lived less than 15 years

Growth rate: fast

Root system: shallow and spreading

Erosion control potential: excellent for sandy sites

Shade tolerance: tolerates partial shade

Soil factors

Texture: clay loam, loam, sandy loam, sandy clay loam or sand

Soil pH reaction: neutral (6.5-7.5)

Soil depth: moderate to deep (30-100 cm or greater)

Drainage: poorly to imperfectly drained

Salinity: non-saline

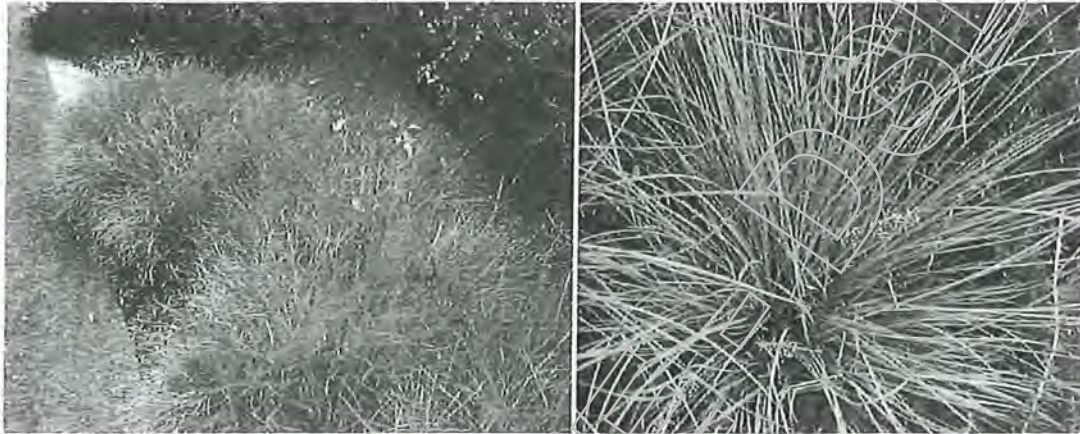
Planting Rates

Mass planting: Hydro-mulching after overnight treatment in warm water, Viro-tubes 5 to 7/m², Pots 3 to 5/m² Specimen planting; Viro-tubes 3/m², Pots 1 to 3/m²



2.3 Lomandra confertifolia

This is a very vigorous narrow leaved Lomandra that develops a graceful weeping habit as it matures it is a dependable selection for large scale plantings either in rows beside roadways or in parks and gardens. It can be planted in all climate zones and is tolerant of sandy through to heavy self-mulching clay soil types. Within Australia it can be planted from Climate Zone 1 to 4. It is Planted 30 – 50 cm. two images below give an example of the plant and the ground coverage.



Common Name

Cracker Jack

Plant Type

Grass or grass-like

Height

0.3 - 0.4 meters

Width

0.3 - 0.7 meters

Flower Colour:

Cream

Flowering Time:

Spring

Soil Ph Level

Mildly acid, Neutral, Mildly alkaline

Soil Type: Sandy, Loamy, Sandy loam, Clay loam, Poor soil

Plant Environment

Low maintenance, Coastal garden, Drought resistant

Climate Zone

Warm temperate, Cool temperate, Mediterranean, Cool, Semi-arid, Arid

Lower Temperatures

Can take High to medium frost tolerance temperatures as low as -7°C. As a perennial this plant can become dormant until conditions are suitable for new growth.

Upper Temperatures: Tolerates periods of dry spells with temperatures extending from mid 30's°C to Low 40's°C for short spell.

**Growth Habit**

Evergreen; Rhizomatous perennial

Coastal Tolerance: Medium

Drought Tolerance: Medium

Lifespan:

Perennial

Soil Moisture

Dry, Well-drained, Moist moderate drainage

Special Uses

Erosion control, Pollution tolerant, fast growing

Attracts Wildlife including Bees, Other insects, Lizards

Irrigation: No watering required once established if planted in suitable conditions. Will require water over long dry periods.

Pruning: None Light

Frost Tolerance: High

Clay & Heavy Soil Tolerance: Medium / Well Drained

Origin: Australian Plant

Fertilizing: Slow release low phosphorus fertilizer.

2.3.1 Caution Note:

Lomandra confertifolia is a smaller slow growing weaker *Lomandra* compared to the more robust *longifolia*, *fluviatilis*, or *hystrix* types. *Lomandra confertifolia* types have been used on many sites, but as they are slow to establish, they often die due to lack of water in establishment, or are out competed by weeds. If *Lomandra confertifolia* types are used, the smallest size to use is a 140mm pot, but due to the slowness of establishment a minimum size of 175mm would be better.

The other problem in using *Lomandra confertifolia* types in the landscape is that they discolor much worse than *longifolia* or *fluviatilis* types in frosts. They also struggle in the dry due to their less vigorous root system. In nature they are generally found in a slightly shaded area. The best place to use *Lomandra confertifolia* types is an area, where they can be maintained, and weeds can be removed. Used in mass plantings, they will be almost always overtaken by weeds if not taken care off

Wingarra is the toughest of all *confertifolia* types, being unique in the fact it spreads from rhizomes, and given maintenance for the first 18 months, it will spread and outcompete weeds. But it still needs a longer maintenance schedule than say *Lomandra longifolia* types like Tanika, Nyalla, or *hystrix* types. All *lomandras* can be cut to ground level although this would only be done once every 5 years or so



3. Scope of Works

We recommend that the scope of works, SOW, addresses the nature of the project, risks involved the need for expertise as well as time to revegetate with suitable and robust grasses/vegetation for the stabilization and erosion control for the western levee eastern channel disturbed areas from construction.

3.1 Nature

Every contract is unique in nature and therefore the SOW pertaining to this will have to be written accordingly.

- This involves a complete understanding of the project requirements, the type of work involved, duration and other criteria so that an efficient contract can be established. In this case, there needs to be a trail of the plants and methods applied. Further on specification that the grasses and or plants being used should be of the lomandra family, with respect to the natural flora of the region, resilience of plant family and functionality.
- Many a times, there is a failure to give attention to details that draws up an inappropriate scope of works document just to complete the formalities and get the project started. What occur are poor outcomes usually at the end of the project. Therefore it must include the ability of the organisations involved to re-evaluate, inhibit and correct a job or process that wastes resources and time.

3.2 Risks Involved

The SOW is the backbone of the project depending on which the project is carried out smoothly.

- However, there are many risks involved such as financial implications, penalties, legal risks, violation of agreement, risk to organization's reputation etc. that can spruce up because of a poorly written scope of works
- The scope of work needs to be written by quality document writers with relevant information from the designers to the end users and those who maintain after the project. Careful consideration would allow an in-depth knowledge of the processes, operations and financial requirements of the project. Sometimes companies fall short in providing such competent resources due to poor understanding.

3.3 Assumptions

When made should be based on tangible fact that can be further investigated to allow more specification and should be written to avoid confusion.

- For example Roma town consistently is composed of mostly clay soils, therefore if planting to ensure most plants live it would benefit survival of the plants the gypsum is added at a minimum ratio of 1kg per square meter. Furthermore if stock piled topsoil is going to be added which will be used as extra top soil, it would benefit to mix the soil with Gypsum (calcium sulphate) to recondition the soil as it is stockpiled ensuring good mixing. This allows the reconditioning of the soil when it is used for topsoil planting. *(Putting the gypsum in the soil stockpile will catalyse growth and sustainability of the vegetation cover put)* To calculate the total desired amount of gypsum needed feasibility test is to be conducted.



- Since water is hard to get without compromising the guidelines set out by the DEPH irrigation is needed as there is a water body nearby.

3.4 Methodology

How the project is going to be carried out and completed needs to be outlined.

- There should be room to allow a stop to the job if unreasonable differences occur the use of local suppliers whenever possible to sure the immediate regions sustainable economic development and benefit.

3.5 Maintenance

Include the appropriate personnel to come up with a clearly defined, reasonable maintenance regime of the vegetation to ensure sustainability and affordability.

- For example the maintenance teams would not like jute mesh to be used because it tends to get caught in machinery and cause serious trip hazard when maintaining. This changes option to what and how you plant.

3.6 Price

There should be a clearly define the project cost for developing the application, resource expenses, overheads, pricing assumptions based on fixed-fee or time and materials project, payment terms and schedule etc.

- If there are too many variables projected feasibility studies are done to give a reasonable financial guide.

3.7 Considerable Time/Schedule:

This is one of the most serious challenges. Organisations just don't want to spend time in charting out a good agreement and want to jump right ahead into beginning the project. Thus the contracted party should deliver the project to Maranoa Regional Council by a certain date, providing weekly status reports and project updates. Define the task / project start and finish dates, timelines for different phases of the project and the various milestones. Allow wing for quick correction if needed. This would be based on a physical trial run.

3.8 Acceptance

This must clearly outline the inspection requirements, testing and validation processes, approval process, vegetation success, client sign-offs and acceptance.



4. Revegetation Scope of Works

The revegetation of manufactured slopes and other disturbed areas adjacent to areas of native vegetation shall be accomplished in a manner so as to provide visual and horticultural compatibility with other indigenous native plant materials. We recommend the following guidelines be included as elements to be covered by the criteria for slope revegetation and brush management. Restrictions may apply as part of environmental mitigation efforts. Transitional landscape treatments of the landscapes may be required or considered by the parks and maintenance Manager or team leader. When so required, the following guidelines shall apply:

4.1-1.01: The plant varieties and stocks for transitional landscapes shall typically consist of a combination of appropriate and compatible native species.

4.1-1.02: The mix of native plant materials should be used exclusively and generally varies if possible

4.1-1.03: Weeds

When topsoil is added the soil naturally works as a seed bank therefore when weed start coming appropriate weed control is to be done. Therefore noxious weeds and invasive plants that sprout in transition areas shall be promptly removed.

4.1-1.05: Permanent irrigation is to be applied in the portions of transition areas contiguous to the existing native vegetation.

4.1-1.06: Required mulching and hydro seeding as specified in the landscape regulations, shall follow the guidelines in Sections 4.3 and 4.4 below.

4.1-1.07: Required slope revegetation shall follow the guidelines in Section 4.2 of below.

4.1-2 General Revegetation

4.1-2.01: Revegetation on manufactured slopes and other disturbed areas that are not adjacent to native vegetation shall be accomplished to provide a stable soil cover that prevents erosion.

4.1-2.02: Required planting mulching and or hydro seeding as specified in the landscape regulations shall follow the guidelines in Sections 4.3 and 4.4 of the Landscape Standards. 4.1-2.03 Required slope revegetation shall follow the guidelines in Section 4.2 of the Landscape Slope Revegetation Guidelines below. 4.2

4.1-2.03: Sourcing of plants and materials should be kept within region to limit invasive weeds, to boost local business and community spirit unless if pricing and quality of materials is not good and or competitive then external sourcing is permissible.

4.1.2.04: Soil is considered to be clay based; therefore gypsum has to be added at a ratio of 1kg per square meter as a minimum requirement to insure the vitality of the vegetation cover being put.



4.2 SLOPE REVEGETATION GUIDELINES

These guidelines establish the acceptable standards for the design and installation of slope revegetation.

- 4.2-1:** The Parks Manager may alter Requirements for revegetation where cut slopes are not subject to erosion due to their rocky character.
- 4.2-2:** A minimum of 98% of specified vegetation cover coverage of all areas where 10 percent of the total slope area shall be planted with tube stock. Seeded plantings, at least 90 percent of the viable seed count shall be of the lomandra variety. This ratio can be altered by authorisation from the Parks Manager
- 4.2-3:** All the plant materials shall be appropriate to the site conditions, irrigation, and water conserving and appropriately spaced to control soil erosion.

4.3 MULCHING PROCEDURES

The following procedures will be followed when mulching is required by the landscape regulations or when proposed by the applicant.

- 4.3-1:** Jute netting and other approved geo-textile materials May be used but should be avoided if possible. If unavoidable they are to be installed and secured per manufacturer's specifications and in a manner precluding sheet flows and rilling below the material surface.

4.4 HYDROSEEDING PROCEDURES

- 4.4-1:** Seed mixes shall be specified by availability of seed.
- 4.4-2:** Equipment used for the application of slurry shall have a built-in agitation system to suspend and homogeneously mix the slurry. The slurry mix shall be dyed. The equipment must have a pump capable of applying slurry uniformly.

4.5 MAINTENANCE REQUIREMENTS

- 4.5-1** Permanently irrigated slopes shall be maintained for a period no less than 90 days or as agreed to by Council.
- 4.5-2** Council shall maintain non-permanently irrigated areas for a period not less than 25 months
- 4.5-3** The Permitted Party as approved by the Parks Manager shall maintain all revegetated areas. The maintenance period begins on the first day following acceptance and maybe extended at the resolve of the Parks Manager.
- 4.5-4** Prior to final approval, the Parks Manager may require corrective action including but not limited to, replanting, the provision or modification of irrigation systems, and the repair of any soil erosion or slope slippage and unsuccessful; vegetation cover



5. Conclusion

The recommendations encompass the following:

1. The spending time on understanding client requirements, change management procedures, contractors and supplier involved, escalation process, payment methods etc.
2. When doing anything with vegetation, define the wanted and unwanted vegetation. For example the wanted specified vegetation is only Lomandra Longifolia, Lomandra Hystrix and Confertifolia, which can be changed or added by the agreed consultation with the parks and gardens Management.
3. Share the information with team members, discuss and formulate the document giving attention to the minute details.
4. Describe each and every functionality and process thoroughly, even if it involves lot of time and resources.
5. State assumptions clearly, define the governance structure and give complete outline of the project management procedures.
6. Do a site feasibility test to project cost and problems.
7. Setting the objectives and set realistic timelines.
8. Mention warranty terms, maintenance agreement, service levels and other important terms and conditions.
9. Adopt simple and straightforward language that's not only easy to understand but also eliminates ambiguities.
10. Do relevant site testing and sourcing from local suppliers if and when possible.
11. Everything should be done as agreed unless advised as acceptable by council Principal after consultation from the parks and gardens management team.
12. When rehabilitating soil the general knowledge is that most soils in the Roma town area is clay based. Thus it is safe to assume that to ensure good vegetation cover during rehabilitation, the minimum ratio of Gypsum to Soil is 1kg per Square meter. To this soil testing is necessary once disturbed topsoil is introduced.



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6.1 Internet links

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PlantNet NSW Flora Online – species description & distribution: <http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Lomandra~longifolia>

South Australia Flora Online – species description & distribution: <http://www.flora.sa.gov.au/cgi-bin/texhtml.cgi?form=speciesfacts&family=Liliaceae&genus=Lomandra&species=longifolia>



Consultancy Agreement

Services

1. We will undertake the services in accordance with an agreement and using due skill, care and diligence.

2. Any questions you have in relation to our services can be directed to our Project Director.

3. You will ensure that you and your employees, agents and contractors:

- (a) cooperate with us; and
- (b) do not interfere with or delay the services.

Information and Documents

4. To help us understand your requirements in connection with the services and the project, you will:

- (a) tell us any specific requirements you have;
- (b) provide any information and documents we ask you to provide;
- (c) answer any questions we ask you; and
- (d) provide in writing any comments you (or your employees, agents or contractors) have on any document on which we ask for your comments.

5. You confirm that information you (or your employees, agents or contractors) provide to us is complete and accurate. You understand that we will not check, and we do not accept any liability in connection with, any information you provide to us unless checking that information is part of the services.

Payment

6. You will pay the fees, other amounts payable under an agreement and applicable tax in accordance with the procedure detailed below.

7. We will invoice you for the fees relating to the services undertaken, and other amounts due under an agreement, during the period covered by the invoice.

8. Within the agreed time for payment set out in the agreement details (or otherwise, 14 days) after we send you an invoice, you will pay the invoice in full and without set off, deduction, counterclaim or withholding. If we ask you to do so, you will pay our final invoice in full and without set off, deduction, counterclaim or withholding before we deliver the final version of our reports or other documents.

9. If you fail to pay any amount due under the agreement in full by the date due:

- (a) you will pay interest at the rate of 1.5% per month on all overdue amounts, including unpaid interest, accruing daily until the amount is paid in full; and
- (b) We may keep any documents we have prepared in connection with the services and:
 - (i) Stop undertaking the services; or
 - (ii) End the agreement by giving you written notice.

10. You will pay for any additional services we undertake, and any liability, cost or expense we incur, if:

- (a) The scope or timing of the services or project change;
- (b) Any information you (or your employees, agents or contractors) provide to us is not complete and accurate;
- (c) Part or all of the services are delayed or suspended (other than as a result of our breach of the agreement);
- (d) During or after completion of the services, we are required to give evidence before, or provide any information to, a court or other competent authority;
- (e) You fail to pay an amount due under the agreement; or
- (f) you end the agreement before we have completed the services.

11. All amounts in the agreement and other documents we give you that relate to the fees or amounts payable under the agreement are exclusive of GST, VAT or other applicable service tax unless expressly included.

12. The amount you will pay for any additional services will be the amount we agree with you (or otherwise, the amount calculated by multiplying the number of hours our employees spend undertaking the additional services by the hourly rates and any amount due to our sub consultants or subcontractors plus 12.5%). We may ask you to confirm in writing that you will pay for any additional services, in which case, we are not required to commence the relevant additional services until we receive your written confirmation.

Insurance

13. We will maintain professional indemnity and public liability insurance. We will give you certificates of currency if you ask us for them at any time before we complete the services.

Liability

14. To the maximum extent permitted by law, any liability we have to you is limited (in the aggregate) to the lesser of AUD2 million or ten times the fees paid under the agreement, and you release us from any further liability.

15. To the extent that we are not permitted by law to limit our liability as detailed in the previous clause, any liability we have to you is limited to re-supplying the services.

16. On the date that is one year after the date we send you our final invoice for the services, you release us and our servants, employees, agents and sub-consultants from all liability. For the purposes of this clause, we contract on our own behalf and also on



behalf of each of our servants, employees, agents and sub consultants.

Intellectual Property

17. We own all Intellectual property arising from or in connection with the services. We grant you a royalty free license to use our intellectual property for the purposes of the project.

Confidentiality, documents and information

18. All information a party provides is confidential and must not be disclosed to any other person (unless the disclosure is authorised or required by law). You:

- (a) Will not alter in any way or copy any report or document we prepare to any other person without our prior written consent; and
- (b) Will only use any report or document we prepare for the purposes of the project; and
- (c) Authorise us to disclose any information you provide to our employees, sub-consultants and others involved with the services.

Ending the agreement

19. Subject to the next clause, either party may end the agreement at any time by giving the other party at least 7 days notice. If the agreement is ended, we will send you an invoice for services undertaken to the date the agreement is ended.

20. The sections headed "payment", "liability", "intellectual property", "confidentiality, documents and information" and "general matters" continue to operate after this agreement is ended.

General matters

21. The agreement applies to all services we undertake (including any additional services and any services undertaken before you executed the agreement).

22. If there is any inconsistency between these terms and any other document or agreement between the parties, these terms will prevail.

23. The agreement is the entire agreement. The only duties, obligations and responsibilities we have arising from or in connection with the subject matter covered by the agreement (including the services) are those expressly set out in the agreement and any other duties, obligations and responsibilities we might have are excluded.

24. You authorise us to destroy documents we prepare or hold in connection with the services or the project 7 years after the date we send you our final invoice for the services.

25. If any of these terms would be invalid, unenforceable or void, the relevant term must be read down to the maximum extent possible to prevent that occurring.

26. The agreement can only be amended or varied in a written document signed by both parties. We can only waive our rights under or in connection with the agreement by a written document signed by one of our directors.

27. You will indemnify us against any claim by, or liability to, a third party arising from, in respect of or in connection with the services and all expenses we incur defending or settling such claim or liability.

28. Neither party may assign or transfer the agreement or any right or obligation under the agreement without the other party's written consent.

29. You agree that we can publish articles, photographs and other illustrations relating to the services and the project unless you tell us in writing otherwise within 7 days of executing the agreement.

Definitions

30. Unless the context otherwise requires, in the agreement: "agreement" means the agreement executed by the parties in connection with the services, including these terms, the agreement details and our proposal. "Document" includes a written or electronic document "fees" means the amount set out in the agreement details including disbursements "hourly rate(s)" means the relevant hourly rate(s) set out in the agreement details (or otherwise the rate(s) that Lomandra normally charges for work undertaken by the relevant Lomandra employee(s) at the time the work is undertaken) "information" includes documents and information provided before execution of the agreement "liability" means liability for loss or damage, whether arising under, in connection with or for breach of the agreement, or in connection with the performance or non-performance of the services and any additional services, whether such liability arises in contract, in tort (including negligence), under statute or otherwise, and whether arising in connection with one or more events "project" means the project(s) that the services relate to "proposal" means any proposal (and if more than one, the final proposal) we gave you in relation to the services "services" means the services set out in the agreement details (or otherwise the services we undertake) "third party" means a person who is not a party, but does not include our employees, agents, subcontractors and sub consultants. "we", "us" and "Lomandra" means that Lomandra Environmental Consultants set out in the agreement details. "you" and "the Client" means the person(s) set out in the agreement details (and if more than one person, "you" means each of those persons severally and all of them jointly, except for the purposes of clauses 14 and 15 where "you" means all of those persons) including that person's permitted successors

**Attachment 4 - Roma Stage 2 Flood Mitigation Project Construction
Specification Drawings – Eastern Diversion Channel**

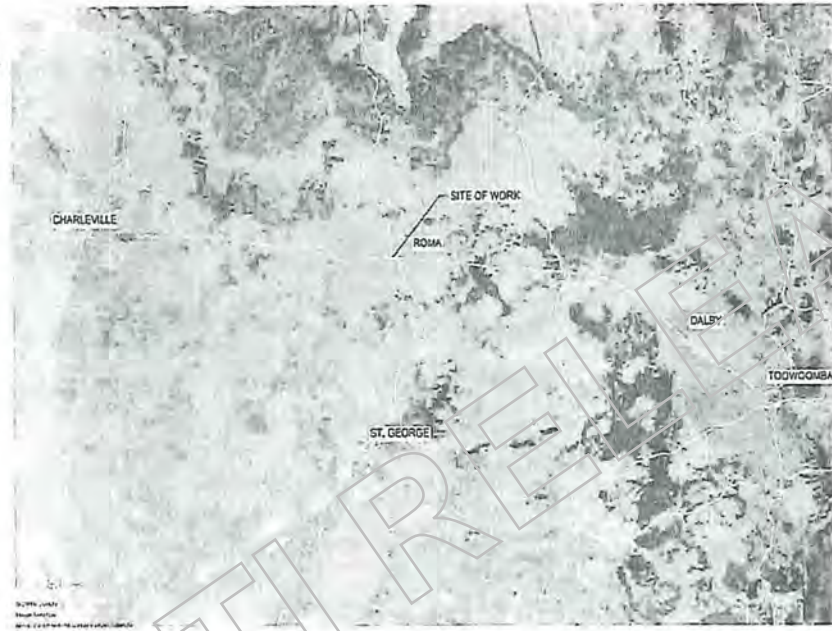
RTI RELEASE - DSDMIP

MARANOA REGIONAL COUNCIL

ROMA FLOOD MITIGATION PROJECT - STAGE 2

EASTERN DIVERSION DRAIN

41-29431



HANDY-GOOGLE EARTH PHOTO (EXTRACTED BY MAPION 2016)
LOCALITY PLAN
 NTS

DRAWING LIST

DRAWING No.	DRAWING TITLE
2016-378C-0001	LOCALITY PLAN AND COVER SHEET
2016-378C-0002	GENERAL NOTES - SHEET 1
2016-378C-0003	GENERAL NOTES - SHEET 2
2016-378C-0004	GENERAL ARRANGEMENT PLAN
2016-378C-0005	LAYOUT PLAN
2016-378C-0006	TYPICAL SECTIONS - DRAIN
2016-378C-0007	TYPICAL SECTIONS - ASHBURN ROAD
2016-378C-0008	LONGITUDINAL SECTION - SHEET 1
2016-378C-0009	LONGITUDINAL SECTION - SHEET 2
2016-378C-0010	ASHBURN ROAD CAUSEWAY DETAILS
2016-378C-0011	ANNOTATED SECTIONS - SHEET 1
2016-378C-0012	ANNOTATED SECTIONS - SHEET 2
2016-378C-0013	ANNOTATED SECTIONS - SHEET 3
2016-378C-0014	ANNOTATED SECTIONS - ASHBURN ROAD
2016-378C-0015	DROP STRUCTURE - PLAN AND DETAILS
2016-378C-0016	RELOCATION OF SERVICES
2016-378C-0017	SIGNAGE GENERAL ARRANGEMENT
2016-378C-0018	BOOM GATE DETAILS
2016-378C-0019	FENCES AND GATES

ASSOCIATE CREATIVE: 				1 CARTWRIGHT STREET P.O BOX 42, MITCHELL QLD 4455 Phone: 1300 007 602 Fax: (07) 4524 6500 Email: council@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au <small>© COPYRIGHT OF MARANOA REGIONAL COUNCIL, 2016</small>		CLIENT: MARANOA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES		PROJECT: ROMA FLOOD MITIGATION PROJECT - STAGE 2		PROJECT NUMBER: 	
TITLE: EASTERN DIVERSION DRAIN LOCALITY PLAN AND COVER SHEET		STATUS: FOR CONSTRUCTION		DESIGNER: J.K.	DRAWN: M.M.	APPROVER: J.P.	DATE: 05/16	DRAWING NUMBER: 2016-378C-0001	SCALE 1:1 NTS	REV: D	



GENERAL

- G1 READ THESE DRAWINGS IN CONJUNCTION WITH OTHER ENGINEERING DRAWINGS, SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED. THE CONSTRUCTION NOTES SHALL APPLY UNLESS OTHERWISE VARIED BY THE DRAWINGS OR SPECIFICATIONS.
- G2 NOMINATION OF PROPRIETARY ITEMS DOES NOT INDICATE EXCLUSIVE PREFERENCE BUT INDICATES THE REQUIRED PROPERTIES OF THE ITEM. SIMILAR ALTERNATIVES HAVING THE REQUIRED PROPERTIES MAY BE OFFERED FOR APPROVAL BY THE SUPERINTENDENT.
- G3 REFER ANY DISCREPANCY TO THE SUPERINTENDENT BEFORE PROCEEDING WITH THE WORK.
- G4 DO NOT OBTAIN DIMENSIONS BY SCALING FROM THE DRAWINGS. ALL DIMENSIONS ARE IN METRES AND ALL LEVELS IN METRES, UNO.
- G5 VERIFY SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED.
- G6 MAINTAIN STRUCTURE IN STABLE CONDITION DURING CONSTRUCTION. NO PART SHALL BE OVERSTRESSED. PROVIDE TEMPORARY BRACING AS REQUIRED. CONTACT SUPERINTENDENT IF ANY STRUCTURE BECOMES UNSTABLE DURING CONSTRUCTION.
- G7 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE STANDARDS ASSOCIATION OF AUSTRALIA CODES AND THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITY.
- G8 UNO - UNLESS NOTED OTHERWISE
- G9 TBC - TO BE CONFIRMED
- G10 ALL SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF WORKS.

SURVEY

- V1 TOPOGRAPHIC DETAIL SURVEY PROVIDED BY BENNET & BENNET SURVEYORS AND PLANNERS DATED 4 OF DECEMBER 2015.
- V2 SURVEY LEVEL DATUM TO AHD.
- V3 SURVEY LOCATION DATUM IS MGA 94 ZONE 55.
- V4 GROUND CONTROL SURVEY BY RTK GPS, +/-10mm X, Y, Z ACCURACY.
- V5 GROUND SURVEY OF CREEK AND ROAD NETWORKS BY TOTAL STATION EDM, +/-25mm X,Y,Z ACCURACY (DATE OF CAPTURE 11/12/2015 - 10/12/2015).
- V6 AERIAL SURVEY OF REMAINDER OF SITE BY PHOTOGRAMMETRY, +/-50mm ACCURACY (DATE OF CAPTURE 4/12/2015).
- V7 GENERAL LIMITS OF SURVEY:
COORDINATES:
X = 678559 - 680205
Y = 705920 - 7060655
AREA = 0.4424km²

STRIPPING AND EXCAVATION

- ST1 TOPSOIL TO BE STRIPPED AND STOCKPILED ON SITE FOR REUSE.
- ST2 MAXIMUM TOPSOIL STRIPPING DEPTH IS 150mm. CONTRACTOR TO REQUEST PERMISSION FOR EXCAVATION BELOW THIS DEPTH. ROAD STRIPPING TO BE IN ACCORDANCE WITH THE SPECIFICATION.

CONCRETE

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

C2 QUALITY OF CONCRETE ELEMENTS SHALL BE AS FOLLOWS:

STRUCTURAL ELEMENT	EXPOSURE CLASS	COVER TO REINF. (mm)	F _c	MAX AGG. SIZE (mm)	SLUMP (mm)	TESTING
ALL ELEVATIONS	B1	50	32	20	80±10	PROJECT
CAUSEWAY SLAB	A2	50	25	20	80±10	PROJECT

- C3 ADDITIVES SHALL NOT BE USED WITHOUT THE SUPERINTENDENT'S PRIOR APPROVAL.
- C4 CONCRETE IS TO BE COMPACTED USING VIBRATORS.
- C5 WHERE PUMPING OF CONCRETE IS PROPOSED, THE CONCRETE MIX SHALL BE SO DESIGNED TO MEET ALL REQUIREMENTS OF THE SPECIFICATION EXCEPT THAT THE SLUMP SHALL NOT EXCEED 80mm WITH A TOLERANCE OF +20mm
- C6 PROVIDE ALL EXPOSED EDGES AND CORNERS WITH 20 CHAMFERS.
- C7 FORM ALL CONSTRUCTION JOINTS AND USE ONLY WHERE SHOWN OR APPROVED BY THE SUPERINTENDENT.
- C8 NO HOLES, CHASES OR EMBEDMENT OF PIPES, OTHER THAN THOSE SHOWN ON THE STRUCTURAL ENGINEER'S DRAWINGS SHALL BE MADE WITHOUT THE APPROVAL OF THE SUPERINTENDENT.
- C9 CURING OF CONCRETE SHALL BE COMMENCED AS SOON AS POSSIBLE AFTER PLACING OR STRIPPING. REFER 'CURING' IN AS 3600 AND THE SPECIFICATION. ACCEPTABLE CURING METHODS ARE AS FOLLOWS:-
- WATER IMMERSION
- WATER SPRAY BENEATH APPROVED PLASTIC SHEETING
- APPROVED WAX EMULSION CURING COMPOUND
- APPROVED CHLORINATED RUBBER CURING COMPOUND

C10 FORMWORK AND ITS REMOVAL TO BE IN ACCORDANCE WITH AS 3610.

C11 CONSTRUCTION TOLERANCES TO BE IN ACCORDANCE WITH AS 3610.

C12 FORMED SURFACE FINISHES TO BE IN ACCORDANCE WITH AS 3610. THE ACCEPTANCE CRITERIA FOR SURFACE FINISHES AS NOTED ON THE DRAWINGS SHALL BE AS FOLLOWS:
FORMED SURFACES
CLASS F1
* ASS310 - CLASS 1 FINISH
* GRADUAL IRREGULARITIES LESS THAN 6mm
* GRADUAL IRREGULARITIES LESS THAN 6mm
* BLOWHOLES TO APPENDIX 8, FIGURES B1 (a) AND (b)
* BLOWHOLE DEPTH (LESS THAN 6mm)

DEFINITION: OFFSETS RESULTING FROM DISPLACED OR MISPLACED FORM SECTIONS FROM LOOSE KNOTS OR OTHERWISE DEFECTIVE FORMS, TO BE CLASSED AS ABRUPT IRREGULARITIES AND BE ASSESSED BY DIRECT MEASUREMENT. GRADUAL IRREGULARITIES TO BE MEASURED FROM A STRAIGHT TEMPLATE 1.5m LONG. FINISHED SURFACE FINISH PROHIBITED.

UNFORMED SURFACES
CLASS U1 - (SCREEDED FINISH)
* ABRUPT AND GRADUAL IRREGULARITIES LESS THAN 10mm
CLASS U2 - (WOOD FLOAT FINISH)
* ABRUPT AND GRADUAL IRREGULARITIES LESS THAN 5mm
CLASS U1 - (STEEL TROWELLED FINISH)

DEFINITION: VERTICAL OFFSETS TO BE CLASSED AS ABRUPT IRREGULARITIES AND BE ASSESSED BY DIRECT MEASUREMENT. GRADUAL IRREGULARITIES TO BE MEASURED FROM A STRAIGHT TEMPLATE 3m LONG. THE FINISHING OPERATIONS SHALL PRODUCE A DENSELY COMPACTED UNIFORM SURFACE ESSENTIALLY TRUE TO LINE, WITH A DENSE LAYER OF AGGREGATES AND A MINIMUM OF FINE MATERIAL AT THE SURFACE.

C13 FINISHED FORMED SLAB SURFACES:
CLASS 1 TOLERANCE - TRUE PLANES WITHIN 3 IN 3000
SURFACE FINISH - POWER TROWEL AND STEEL FLOAT FINISH.

C14 SP20 DENOTES 20 MPa CONCRETE. SP32 DENOTES 32 MPa CONCRETE. REFER TO SPECIFICATION.

C15 SURFACE FINISH DENOTED THUS

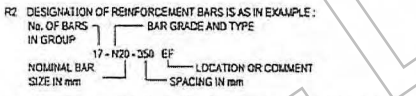
C16 UNLESS SHOWN OTHERWISE, UNFORMED SURFACES SHALL BE U1 AND FORMED SURFACES SHALL BE F1.

C17 IN NO CASE SHALL CONCRETE BE DROPPED FROM A HEIGHT EXCEEDING 1.5m. CONCRETE POUR LIFT HEIGHTS SHALL BE LIMITED AS FOLLOWS:

- FOR SECTIONS WITH A MINIMUM DIMENSION LESS THAN OR EQUAL TO 0.8m, THE POUR HEIGHT SHALL BE LIMITED SUCH THAT THE COMPACTION REQUIREMENTS AND THE RESTRICTION ON CONCRETE DROP HEIGHT CAN BE MET.

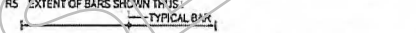
REINFORCEMENT

R1 SYMBOLS ON DRAWINGS FOR GRADE AND TYPE OF REINFORCEMENT ARE AS FOLLOWS:
R DENOTES STRUCTURAL GRADE 230 PLAIN ROUND BAR TO AS2671
SL DENOTES HARD DRAWN WIRE REINFORCING FABRIC TO AS2671
N DENOTES NORMAL DUCTILITY BAR TO AS2671
L DENOTES LOW DUCTILITY BAR TO AS2671



R3 THE FOLLOWING ABBREVIATIONS APPLY TO THE LOCATION OF REINFORCEMENT:
EW - EACH WAY FF - FAR FACE CP - CENTRALLY PLACED
EF - EACH FACE BF - BOTTOM BU - BOTTOM UNDER (LAID FIRST)
NF - NEAR FACE T - TOP T/O - TOP OVER (LAID LAST)
NSOP - NOT SHOWN ON PLAN LV - LENGTHS VARY

R4 UNO, COGS AND HOOKS TO BE STANDARDS IN ACCORDANCE WITH AS 3600.



R6 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND IS NOT NECESSARILY IN TRUE PROJECTION.

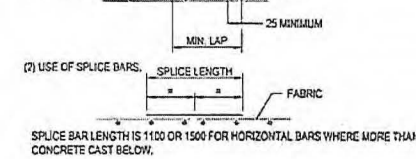
R7 MAINTAIN MINIMUM CLEAR CONCRETE COVER TO REINFORCEMENT (INCLUDING FITTINGS) BY APPROVED CHAIRS, SPACERS, OR TIES AS REQUIRED TO PROVIDE ADEQUATE SUPPORT. FOR SLABS, SUPPORTS SHALL BE SPACED AT 750 MAXIMUM CROSS CENTRES FOR FABRIC AND BARS UP TO AND INCLUDING 16 DIA. AND 1200 MAXIMUM CROSS CENTRES FOR BARS OVER 16 DIA.

R8 SPLICE REINFORCEMENT ONLY AT LOCATIONS SHOWN ON DRAWINGS. OR AS APPROVED BY SUPERINTENDENT. LAP LENGTH BARS SHALL BE AS BELOW:

BAR SIZE	N12	N15	N20	N24	N28	N32
VERTICAL BARS & HORIZONTAL BARS WITH LESS THAN 300mm CONCRETE BELOW THE BAR	350	470	620	830	1050	1300
HORIZONTAL BARS WITH MORE THAN 300mm CONCRETE BELOW THE BAR	450	610	800	1070	1370	1680

NOTE: STAGGER LAPS WHERE POSSIBLE

R9 FABRIC SPLICES SHALL BE MADE BY EITHER OF THE TWO FOLLOWING METHODS:



R10 WELDING OF REINFORCEMENT IS ONLY PERMITTED WHERE SHOWN ON THE DRAWINGS OR OTHERWISE APPROVED BY THE SUPERINTENDENT.

R11 DOWELS SHALL BE SAWN TO LENGTH. DOWEL ALIGNMENT TO BE MAINTAINED BY USE OF A SUPPORT ASSEMBLY SUITABLE TO ENSURE A HORIZONTAL AND VERTICAL ALIGNMENT TOLERANCE OF 5 IN 100.

STRUCTURAL STEEL

S1 ALL STEELWORK SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH AS 4100 AND RELEVANT CODES LISTED IN THE PREFACE THEREOF.

S2 ALL STEELWORK SHALL BE NEW, ROLLED STEEL SHALL BE MIN. GRADE 300 TO AS 3678. CIRCULAR SECTIONS SHALL BE MIN. GRADE 350 TO AS 1163. SHS/RS SECTIONS SHALL BE GRADE 350 TO AS 1163.

S3 ALL BOLTS TO BE COMMERCIAL GRADE 4.6'S TO AS 1111, NUTS TO AS 1112 AND WASHERS TO AS 1237 UNLESS OTHERWISE NOTED. BOLTS DENOTED HIGH STRENGTH (H.S.) SHALL BE GRADE 8.8'S TO AS 1252. ALL FIXINGS SHALL BE HOT DIP GALVANIZED.

S4 ALL WELDING SHALL BE TO AS 1554, PART 1, CURRENT EDITION. WELDS SHALL BE 6mm CONTINUOUS FILLET UNLESS OTHERWISE NOTED. ELECTRODE CLASSIFICATION SHALL BE E41XX.

S5 SECTIONS SHALL NOT BE SPLICED OTHER THAN AT JOINTS SHOWN, UNLESS APPROVED BY THE ENGINEER.

S6 TREATMENT:
CLASS 2.5 SANDBLAST AND ONE COAT OF INORGANIC ZINC SILICATE TO 75 MICRONS. TOUCH UP DAMAGED AREAS. SITE WELDING AND BOLT ASSEMBLIES WITH ORGANIC ZINC SILICATE AFTER ERECTION. OVER COAT WITH TRADE QUALITY 'OFF WHITE' EXTERIOR ACRYLIC PAINT.

S7 ASPHALTIC PAINT STEELWORK IN CONTACT WITH SOIL (INCLUDING UNDERSIDE OF BASE PLATES) OR AS OTHERWISE SPECIFIED TO HAVE 2 COATS OF ASPHALTIC PAINT (AS 3887) WITH A MINIMUM DRY FILM THICKNESS = 400 MICROMETRES IN ADDITION TO ANY OTHER CORROSION TREATMENT.

S8 SITE WELDING ENSURE STEEL IS CLEANED BACK TO WHITE METAL SURFACE AND FREE OF DUST.

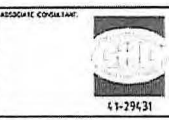
WELDING TO BE IN ACCORDANCE WITH NOTES ABOVE.

TOUCH UP PAINT WORK TO ORIGINAL COLOUR OR AS SPECIFIED.

S9 MAINTAIN STRUCTURE IN A STABLE CONDITION TO THE SATISFACTION OF THE SUPERINTENDENT DURING CONSTRUCTION. NO PART SHALL BE OVERSTRESSED.

S10 UNLESS OTHERWISE SHOWN, ALL CIRCULAR AND RECTANGULAR HOLLOW SECTIONS TO BE SEALED WITH 1mm PLATE FULLY WELDED.

3	17/02/16	ISSUED FOR CONSTRUCTION	J.P.
CODE	DATE	REVISION	AUTHORISED



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CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES
PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2
STATUS
FOR CONSTRUCTION
DRAWING NUMBER
2016-378C-0002
SCALE & DATE
NTS
REV
0

DESIGNED	DRAWN	APPROVED	DATE	DRAWING NUMBER
J.K.	M.M.	J.P.	05/16	2016-378C-0002
REVISION NUMBER	15001	SECTION NUMBER	378C	SCALE & DATE
				NTS
				REV
				0

ROADWORKS

- RW1 GENERAL**
RW1.1 THE CONTRACTOR SHALL CHECK, CONFIRM AND SATISFY THEMSELVES THAT ALL DIMENSIONS AND LEVELS ALONG WITH EXISTING SERVICE LOCATIONS ARE CORRECT PRIOR TO CONSTRUCTION WORKS COMMENCING ON SITE.
RW1.2 THE CONTRACTOR SHALL NOTIFY THE SUPERVISING SUPERINTENDENT IMMEDIATELY OF ANY DISCREPANCIES OR ERRORS THAT MAY BE PRESENT WITHIN THESE PLANS.
- RW2 SETOUT**
RW2.1 REFER TYPICAL CROSS SECTIONS, ROAD LAYOUT PLANS, LONGITUDINAL SECTIONS AND CONTROL LINE SETOUT PLANS FOR SETOUT DETAILS.
- RW3 EXISTING WORKS**
RW3.1 NEW ROAD SURFACE, PAVEMENT FORMATION TO MATCH SMOOTHLY AND NEATLY WITH EXISTING SURFACES. LEVELS AND ALIGNMENT MAY BE VARIED WHERE NECESSARY TO ACHIEVE SMOOTH FINISH AS DIRECTED BY SUPERINTENDENT. THE CONTRACTOR SHALL ALLOW FOR UNDERTAKING OUTBACKS OF EXISTING FORMATION AS REQUIRED TO ACHIEVE THIS REQUIREMENT.
- RW4 NEW WORKS**
RW4.1 BATTER SLOPES ARE TO BE GRADED / VARIED UNFORMALLY BETWEEN CROSS SECTIONS. REFER CROSS SECTIONS AND TYPICAL CROSS SECTIONS FOR FURTHER DETAILS.
RW4.2 PAVEMENTS SHALL BE CONSTRUCTED TO DETAILS AS SHOWN AND NOTED ON TYPICAL CROSS SECTIONS.
RW4.3 ALL WORK IS TO BE COMPLETED IN ACCORDANCE WITH THE RELEVANT LOCAL AUTHORITY SPECIFICATIONS AND REQUIREMENTS.
RW4.4 EXCESS MATERIAL FROM EXCAVATION SHALL BE STOCKPILED ON-SITE WHERE DIRECTED BY THE SUPERINTENDENT OR ALTERNATIVELY REMOVED FROM SITE AND DEPOSITED AT A PRE-DETERMINED LOCATION PRIOR TO EARTHWORK COMMENCING ON SITE.
RW4.5 ALL EXISTING SERVICES SHALL BE CHECKED FOR CLEARANCE PRIOR TO CONSTRUCTION.
- RW5 SPECIFIC LOCAL AUTHORITY REQUIREMENTS**
RW5.1 AREAS FOR PARKING OF CONSTRUCTION PLANT, ETC. SHALL BE KEPT FREE OF ANY CONTAMINANTS (EG OIL, FUEL).
RW5.2 EMBANKMENT MATERIAL PLACED IN THE ZONE ABOVE A HEIGHT OF 300mm BELOW THE SUBGRADE SHALL NOT CONTAIN ROCK PARTICLES WITH ANY DIMENSION GREATER THAN 50mm.
RW5.3 CSR TESTING TO BE TO DEPARTMENT OF TRANSPORT MAIN ROADS OR AUSTRALIAN TESTING STANDARD REQUIREMENTS.
RW5.4 PROPERTY ACCESS FOR LOCAL PROPERTY OWNERS TO BE MAINTAINED AT ALL TIMES.
- RW6 PAVEMENT NOTES**
RW6.1 COMPACT UNBOUND PAVEMENT MATERIAL TO A MINIMUM 100% STANDARD DRY DENSITY COMPACTION LEVEL.
RW6.2 BASE COURSE SHALL BE COMPACTED TO A MINIMUM 100% RELATIVE DRY DENSITY COMPACTION LEVEL.
RW6.3 SUBGRADE MATERIAL SHALL BE COMPACTED TO MINIMUM 85% STANDARD DRY DENSITY COMPACTION LEVEL.
RW6.4 TESTING TO BE UNDERTAKEN IN ACCORDANCE WITH LOCAL AUTHORITY REQUIREMENTS.

STORMWATER DRAINAGE

- SW1 GENERAL**
SW1.1 THE CONTRACTOR SHALL ENSURE THAT ADEQUATE EROSION AND SEDIMENTATION CONTROL MEASURES ARE IN PLACE PRIOR TO COMMENCING ANY WORKS.
SW1.2 ALL NEW AND EXISTING STORMWATER DRAINAGE NETWORKS SHALL BE KEPT FREE OF SEDIMENT AND DEBRIS.
- SW2 STORMWATER PIPE AND CULVERTS**
SW2.1 ALL STORMWATER DRAINAGE PIPES SHALL BE CLASS 2 R.C.P UNLESS NOTED OTHERWISE ON PLANS OR LONGITUDINAL SECTIONS.
SW2.2 ALL PIPES SHALL BE RUBBER RING JOINTED. ALTERNATIVE STORMWATER DRAINAGE PIPE TYPES MAY BE USED SUBJECT TO THE PRIOR APPROVAL OF THE SUPERINTENDENT.
SW2.3 STORMWATER DRAINAGE PIPES SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH THE REFERENCED STANDARD DRAWINGS.
SW2.4 EXCAVATION, BEDDING, BACKFILLING AND COMPACTION AROUND STORMWATER DRAINAGE PIPES SHALL BE STRICTLY IN ACCORDANCE WITH SPECIFICATION AND STANDARD DRAWINGS.
SW2.5 MINIMUM CLEAR COVER TO STORMWATER PIPES OR CULVERTS SHALL BE IN ACCORDANCE WITH MANUFACTURERS REQUIREMENTS AND SPECIFICATIONS.
SW2.6 MINIMUM VERTICAL AND HORIZONTAL SEPARATION BETWEEN STORMWATER PIPES OR CULVERTS AND ANY OTHER SERVICE OR CONDUIT SHALL BE 300mm.
SW2.7 CLASS OF STORMWATER PIPES HAVE BEEN DESIGNED FOR IN SERVICE CONDITIONS. CONTRACTORS ARE TO ENSURE PIPE CLASSES ARE SUITABLE FOR CONSTRUCTION METHODS USED ON SITE.
- SW3 STORMWATER STRUCTURES**
SW3.1 STORMWATER STRUCTURES TO BE LOCATED AS INDICATED ON THE STORMWATER SECTIONS.
SW3.2 ALTERNATIVE STRUCTURE TYPES MAY BE USED, SUBJECT TO THE PRIOR APPROVAL BY THE SUPERINTENDENT AND LOCAL AUTHORITY.
SW3.3 PIPE OPENINGS ARE TO BE LOCATED WITHIN A SINGLE WALL OF SQUARE / RECTANGULAR PITS (IE PIPES SHALL NOT BE PERMITTED TO ENTER THROUGH THE CORNER OF THE PIT STRUCTURE).
SW3.4 ALL HEADWALLS SHALL BE PROVIDED WITH APRONS AND WINGWALLS AS INDICATED ON THE DRAWINGS.
- SW4 OUTLET PROTECTION**
SW4.1 OUTLET PROTECTION SHALL BE PROVIDED AT ALL HEADWALL / ENDWALL OUTLET POINTS WITHIN THE EXTENT OF WORKS.
SW4.2 REFER STORMWATER SECTIONS FOR OUTLET PROTECTION METHODS TO BE USED.
SW4.3 GRADE OUTLETS TO FALL AT MINIMUM 1% UNLESS INDICATED OTHERWISE ON THE DRAWING.
SW4.4 UNDERTAKE LOCALISED EARTHWORKS AROUND PROPOSED OUTLET LOCATIONS TO MATCH TOP OF OUTLET TO FINISHED SURFACE PROFILE.
SW4.5 BACKFILL BEHIND HEADWALL USING APPROVED GENERAL FILL MATERIAL IN ACCORDANCE WITH CONTRACT REQUIREMENTS AND SPECIFICATIONS.

FOUNDATIONS

- F1** FOOTINGS HAVE BEEN DESIGNED FOR AN ALLOWABLE BEARING PRESSURE OF 100 kPa (WALL, FOOTINGS DESIGNED FOR ROCK FOUNDATION).
- F2** FOUNDATION LEVELS SHOWN ARE CONTRACT LEVELS - THE FINAL LEVELS SHALL BE AS DIRECTED BY THE SUPERINTENDENT.
- F3** FOUNDATION MATERIAL BENEATH SLABS ON GROUND SHALL BE COMPACTED TO 85% STANDARD COMPACTION IN ACCORDANCE WITH AS 1288. WALL FOOTINGS FOUNDED ON ROCK SHALL BE FOUNDED ON CLEANED ROCK (MAY INYSLITE), AND BACKFILL SHALL BE CONCRETE OF THE SAME GRADE AS THE WALL.
- F4** THE CONTRACTOR IS TO ENGAGE A GEOTECHNICAL ENGINEER TO VERIFY THE BEARING CAPACITY OF THE FOUNDATION PRIOR TO PLACEMENT OF MASS CONCRETE OR SAND BEDDING.
- F5** REFER TO THE GEOTECHNICAL REPORT FOR SITE SPECIFIC GEOTECHNICAL INFORMATION.
- F6** REFER TO THE GEOTECHNICAL REPORT FOR DETAILS OF BULK EXCAVATION AND BACKFILL SPECIFICATIONS.

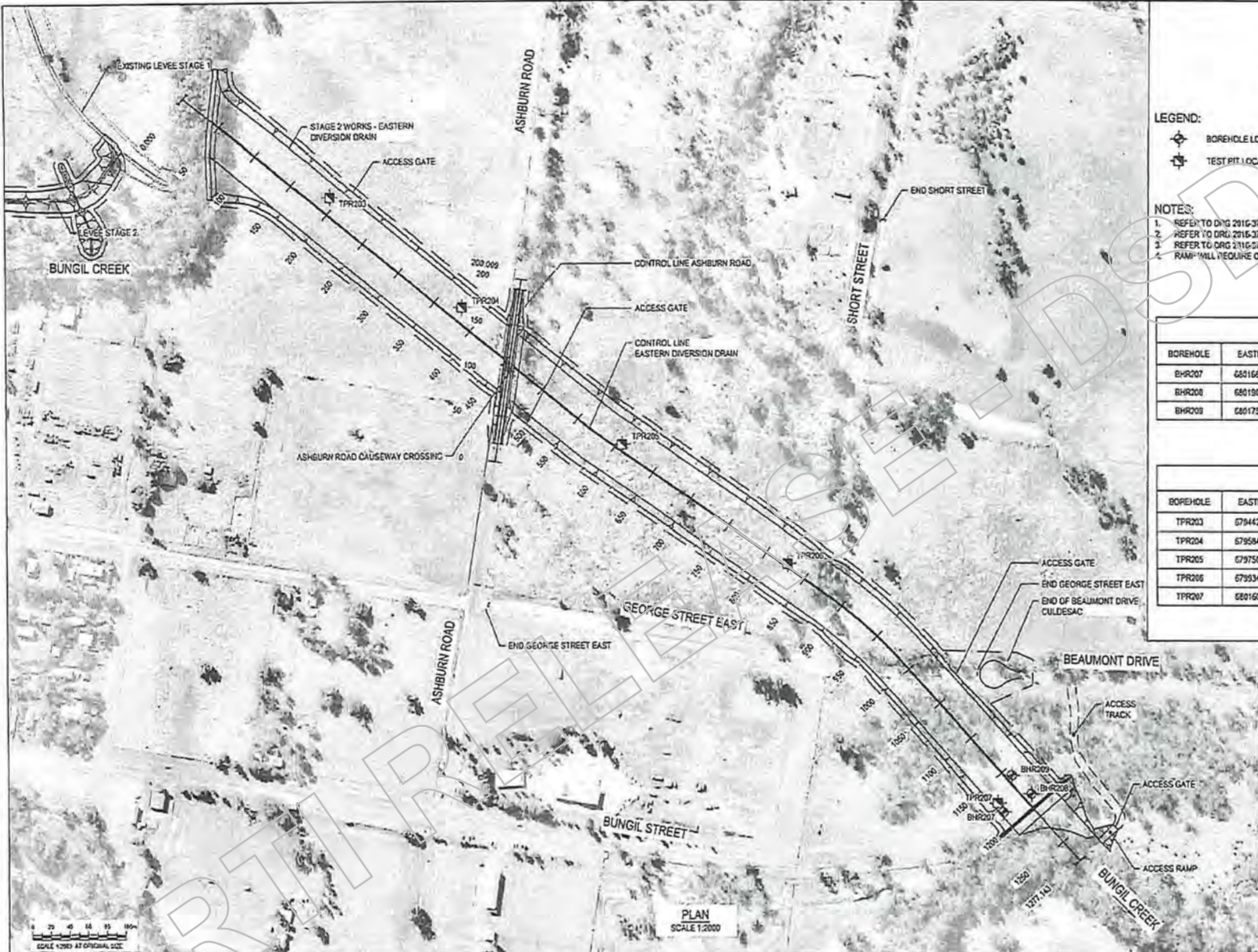
FOUNDATIONS (CONTINUED)

- F7** ALL LOOSE MATERIAL AND WATER IS TO BE REMOVED FROM FOUNDATION AREAS. FORMWORK IS TO BE USED IF THE SUPERFICIAL FOUNDATIONS ARE UNSTABLE.
- F8** IF THE APPROVED BEARING CAPACITY OF THE FOUNDATION MATERIAL IS ACHIEVED AT THE DESIGN LEVEL OF THE SOFFIT OF FOOTINGS, PROVIDE 50mm CONCRETE BLINDING LAYER BELOW FOOTINGS. ELSEWHERE, THE EXCAVATION BELOW FOOTINGS TO SATISFACTORY FOUNDATION MATERIAL IS TO BE BACKFILLED TO FOOTING SOFFIT DESIGN LEVEL WITH 500 MASS CONCRETE.



DRAFT FOR RELEASE - DSDMM

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DATE: 07/05/16 DRAWN FOR CONSTRUCTION: J.P. CHECKED: [] DATE: []				STATUS FOR CONSTRUCTION		DESIGNER: J.K. DRAWN: M.M. APPROVED: J.P. DATE: 05/16		PROJECT NUMBER 2015-378C-0003	
				WORK ORDER NUMBER: 15201		CHECK NUMBER: 378C		SCALE: NTS SHEET: 0	



LEGEND:

- ⊕ BOREHOLE LOCATION (GHD 2015)
- ⊙ TEST PIT LOCATION (GHD 2015)

NOTES:

1. REFER TO DRG 2016-378C-G001 AND 2016-378C-G003 FOR GENERAL NOTES.
2. REFER TO DRG 2016-378C-C001 FOR DROP STRUCTURES PLAN AND DETAILS.
3. REFER TO DRG 2016-378C-C011 FOR RELOCATION OF SERVICES.
4. RAMP WILL REQUIRE ONGOING MAINTENANCE TO MAINTAIN ACCESS.

BOREHOLE LOCATIONS				
BOREHOLE	EASTING	NORTHING	RL	DEPTH
BHR207	660166.000	7659786.000	296.750	8.00m
BHR208	660196.000	7659800.000	296.750	8.40m
BHR209	660175.000	7659820.000	296.750	7.50m

TEST PIT LOCATIONS				
BOREHOLE	EASTING	NORTHING	RL	DEPTH
TPR203	679442.000	7660450.000	298.250	3.50m
TPR204	679584.000	7660330.000	297.500	3.60m
TPR205	679756.000	7660180.000	297.250	3.90m
TPR206	679934.000	7660050.000	296.500	3.80m
TPR207	680160.000	7659790.000	296.750	4.60m

PLAN
SCALE 1:2000

0	03/05/16	ROAD FOR CONSTRUCTION	J.P.
CODE	DATE	REVISION	AUTHORISED

ASSOCIATE CONSULTANT

41-29431

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CLIENT
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DEPARTMENT OF INFRASTRUCTURE SERVICES

FILE
EASTERN DIVERSION DRAIN
GENERAL ARRANGEMENT PLAN

PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2

STATUS
FOR CONSTRUCTION

DESIGNED J.K.	DRAWN M.M.	APPROVED J.P.	DATE 05/16	SHEET NUMBER 2016-378C-C001
WORK ORDER NUMBER 15201	DESIGN NUMBER 378C	SCALE A1 1:2000	SHEET NO. 0	

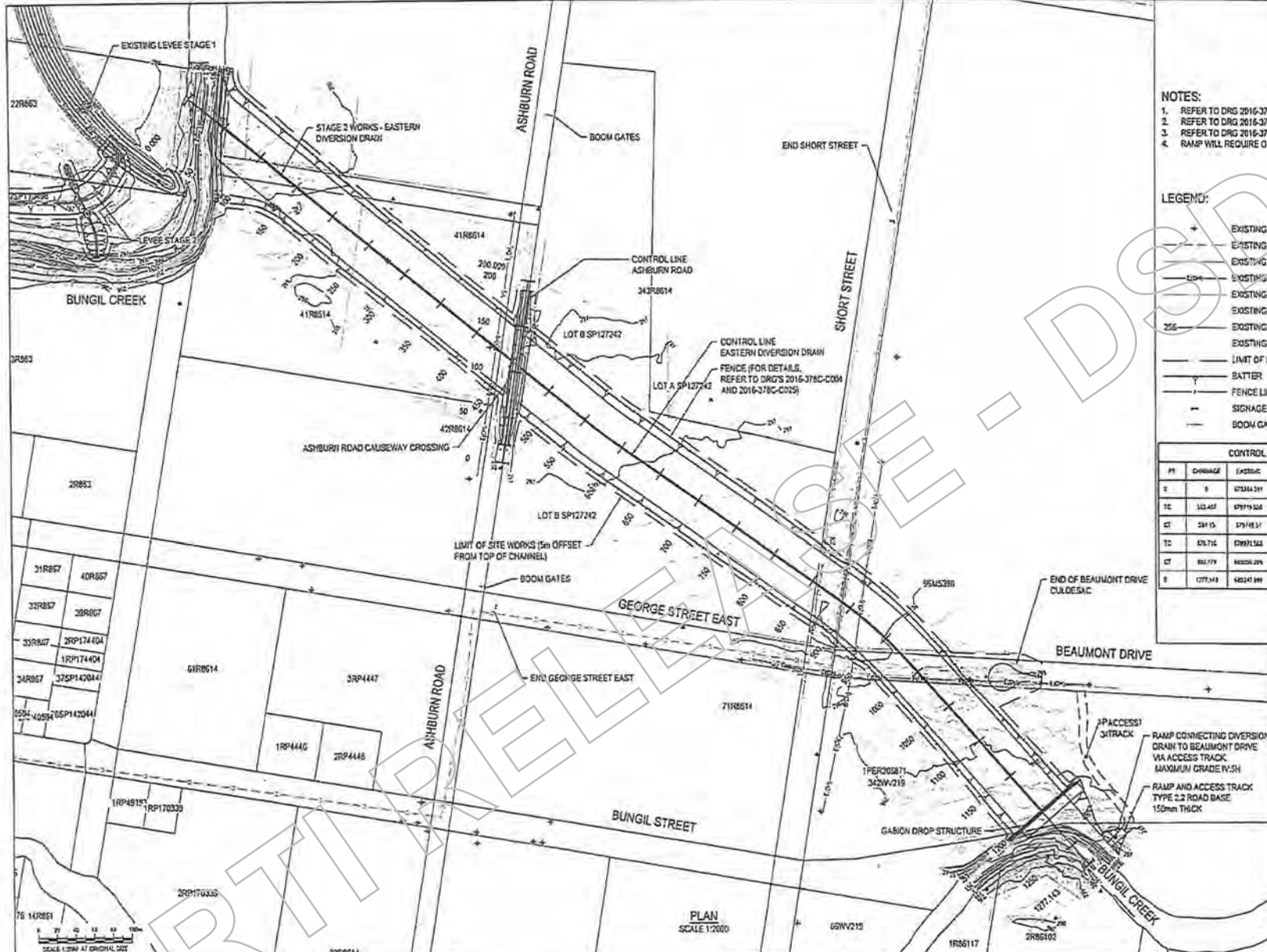


- NOTES:**
1. REFER TO DRG 2016-378C-0002 AND 2016-378C-C000 FOR GENERAL NOTES.
 2. REFER TO DRG 2016-378C-C000 FOR DRIP STRUCTURES PLAN AND DETAILS.
 3. REFER TO DRG 2016-378C-C001 FOR RELIABILITY OF SERVICES.
 4. RAMP WILL REQUIRE ONGOING MAINTENANCE TO MAINTAIN ACCESS.

- LEGEND:**
- EXISTING POWER POLES
 - EXISTING METEOROLOGICAL COMMUNICATIONS CABLE
 - EXISTING TELESTRA
 - EXISTING ELECTRICAL OVERHEAD
 - EXISTING FENCE LINE
 - EXISTING CONTOUR MINOR
 - EXISTING CONTOUR MAJOR
 - EXISTING TREE
 - LIMIT OF SITE WORKS
 - BATTERY
 - FENCE LINE
 - SIGNAGE
 - BOOM GATE

CONTROL LINE SETOUT - EASTERN DIVERSION DRAIN

PT	CORNER	EASTING	NORTHING	XY	BEARING	APP. BEARING	DTM ELEVATION	DEP. REDUCED
B	B	67344.211	76525.827				127.7274 77	
TC	163.457	47979.568	76685.803	39.453	128.9724 77		128.7724 77	5.03
CT	58.15	57478.37	76512.267	29.434	124.4752 01	-0.39	124.4752 01	
TC	67.716	67997.563	76220.147	39.028	124.4752 02		124.4752 02	5.06
CT	82.179	68328.295	75938.029	29.612	124.7286 70	0.06	124.7286 70	
B	177.143	68234.891	75817.229		117.2932 72			



PLAN SCALE 1:2000

DATE	ISSUED FOR CONSTRUCTION	APP. NO.



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CLIENT
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DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE
EASTERN DIVERSION DRAIN
LAYOUT PLAN

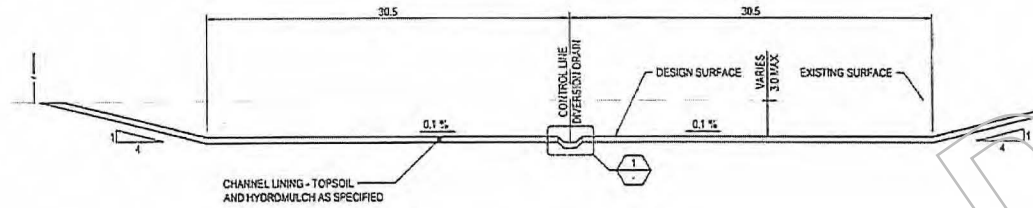
PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2

STAGE
FOR CONSTRUCTION

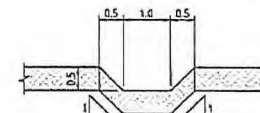
DESIGNED	DRAWN	APPROVED	DATE	PROJECT NUMBER
J.K.	M.M.	J.P.	05/16	2016-378C-C002
PROJECT NUMBER	SCALE	DATE	APP.	
15201	1:2000	1:2000	D	



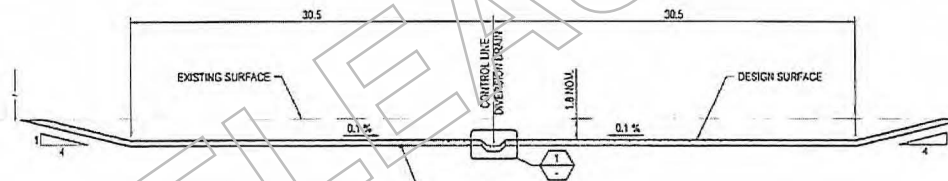
NOTE:
1. FOR CONTROL LINE SETOUT REFER TO DRG 2016-378C-C002.



TYPICAL SECTION B
DIVERSION DRAIN
CH 5m - 449m AND 465m - 1200m
SCALE 1:200

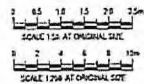


CENTRAL V - DRAIN
1 DETAIL
SCALE 1:50

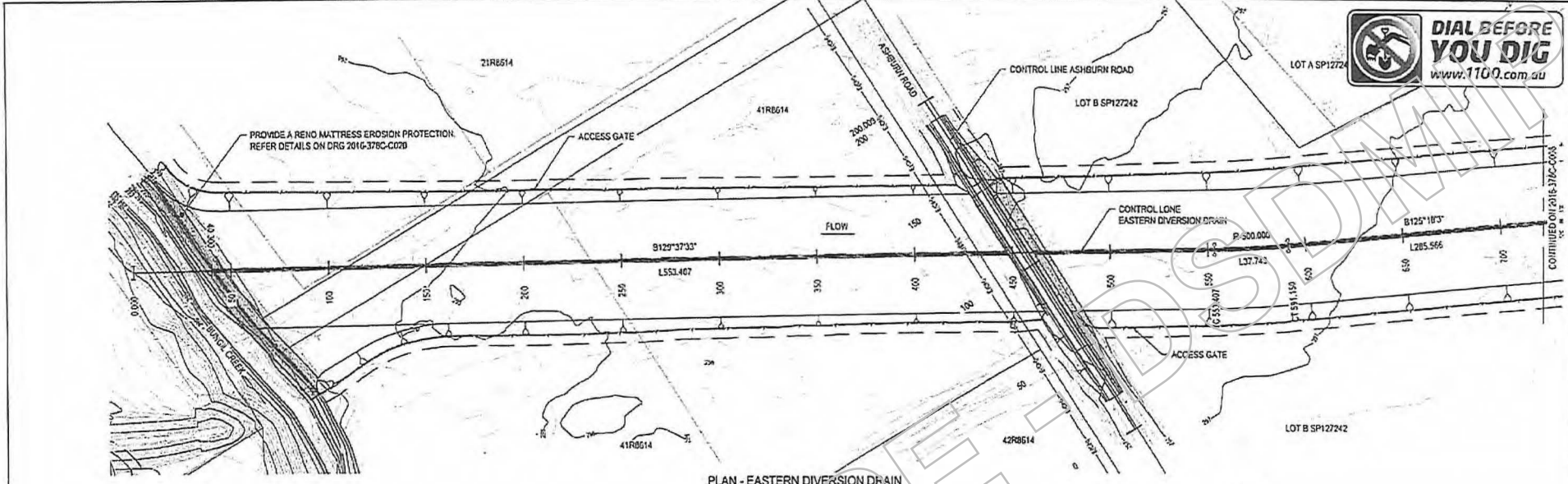


TYPICAL SECTION A
DIVERSION DRAIN
CH 0 - 5m
SCALE 1:200

EROSION PROTECTION
AT DIVERSION ENTRANCE, RENO MATRESS
 $d_{50} = 230 @ 125 (MIN.)$ THICKNESS

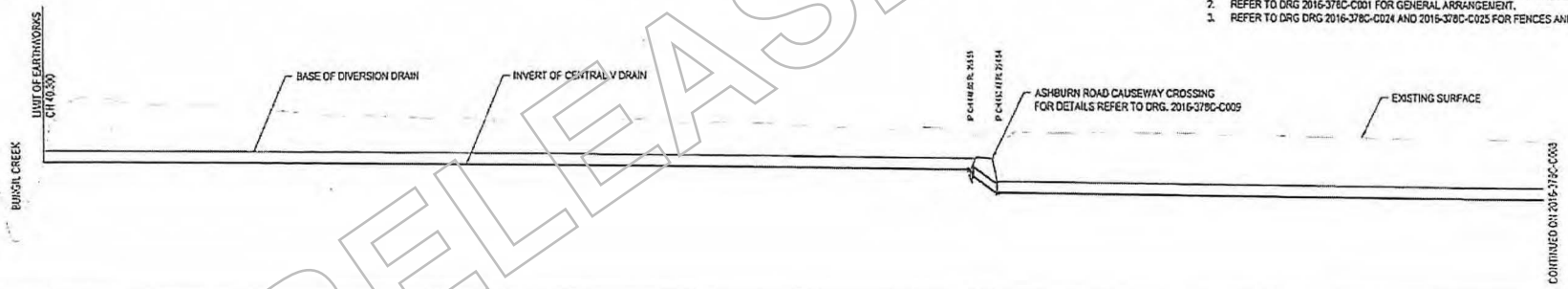


		1 CARTWRIGHT STREET P.O BOX 42, MITCHELL QLD 4465 Phone: 1300 607 662 Fax: (07) 4624 6500 Email: council@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au <small>SUPPLY OF MARANOA REGION, SINCE 2014</small>		MARANOA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES TITLE: EASTERN DIVERSION DRAIN TYPICAL SECTIONS - DRAIN		ROAD: ROMA FLOOD MITIGATION PROJECT - STAGE 2 STATUS: FOR CONSTRUCTION		PROJECT NUMBER: 2016-378C-C004 SCALE & #: 1:200 REV: D	
DESIGNED: J.K. DATE: 15/01	DRAWN: M.M. DATE: 05/16	APPROVED: J.P. DATE: 05/16	DESIGN NUMBER: 378C	SCALE: 1:200	REV: D				
DATE: 27/05/16	STATUS: FOR CONSTRUCTION	REVISION:	AUTHORISED: J.P.	4-1-29431					



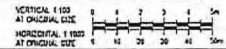
PLAN - EASTERN DIVERSION DRAIN
SCALE 1:1000

- NOTES:
1. REFER TO DRG 2016-378C-C002 AND DRG 2016-378C-C002 FOR GENERAL NOTES.
 2. REFER TO DRG 2016-378C-C001 FOR GENERAL ARRANGEMENT.
 3. REFER TO DRG DRG 2016-378C-C024 AND 2016-378C-C025 FOR FENCES AND GATES.



VERTICAL ALIGNMENT		HORIZONTAL ALIGNMENT	
L=147.30m C=+1%		L=118.1m C=+1%	
L=193.51m C=+1%		L=127.7m C=+1%	
L=245.57m C=+1%		L=245.57m C=+1%	
LEVEL DIFFERENCE CUT - / FILL +	DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL	CHAINAGE
	0+000 287.774	0+000 287.774	0+000
	0+100 285.965	0+100 285.965	0+100
	0+200 284.272	0+200 284.272	0+200
	0+300 282.685	0+300 282.685	0+300
	0+400 281.105	0+400 281.105	0+400
	0+500 280.530	0+500 280.530	0+500
	0+600 280.955	0+600 280.955	0+600
	0+700 281.380	0+700 281.380	0+700
	0+800 281.805	0+800 281.805	0+800
	0+900 282.230	0+900 282.230	0+900
	1+000 282.655	1+000 282.655	1+000

LONGITUDINAL SECTION - EASTERN DIVERSION DRAIN
HORZ 1:1000 VERT 1:100



NO	DATE	ISSUED FOR CONSTRUCTION	REVISION	AUTHORIZED
0	27/05/16	ISSUED FOR CONSTRUCTION		J.P.

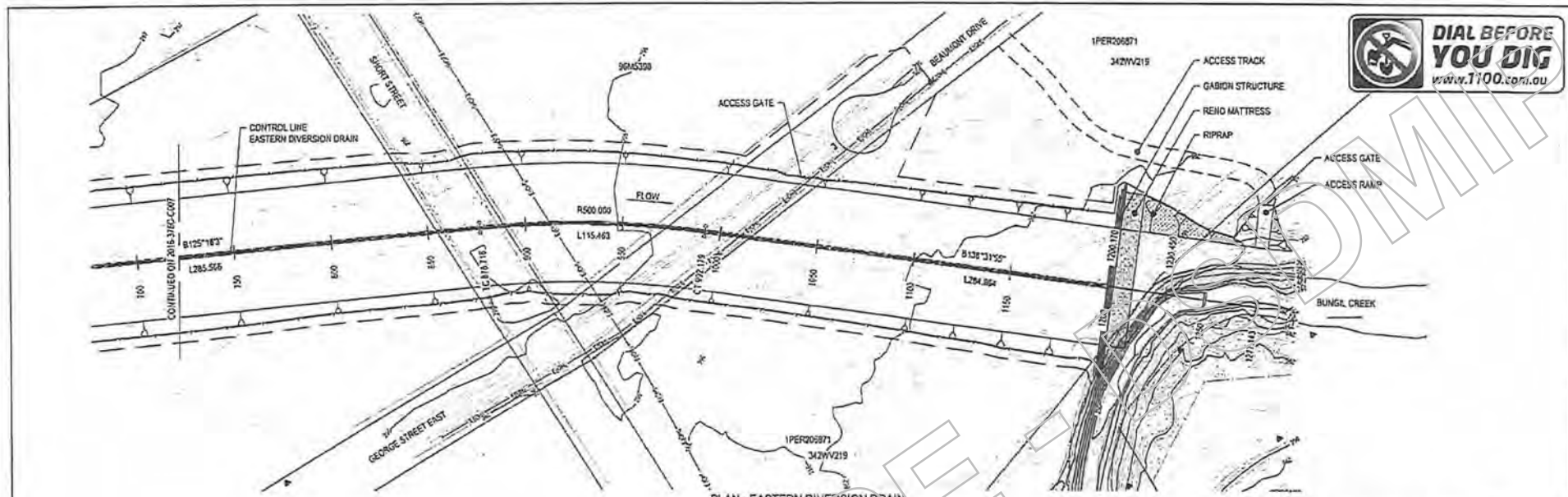


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DEPARTMENT OF INFRASTRUCTURE SERVICES
TITLE
EASTERN DIVERSION DRAIN
LONGITUDINAL SECTION - SHEET 1

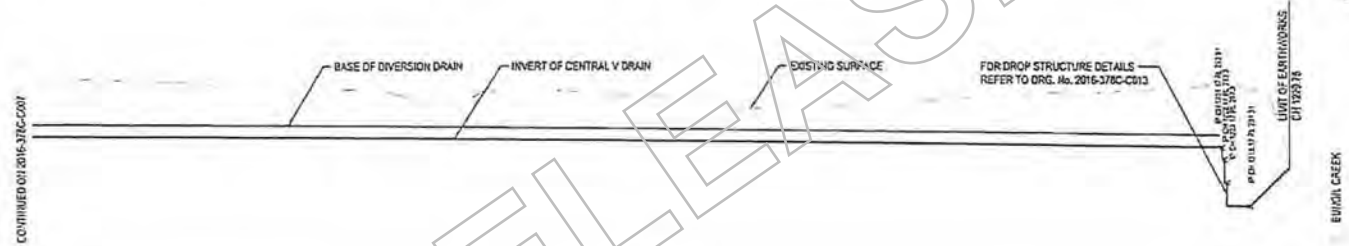
PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2
STATUS
FOR CONSTRUCTION
DESIGNED BY
J.K.
DRAWN BY
M.M.
APPROVED BY
J.P.
DATE
05/16
WORK BOOK NUMBER
15001
DESIGN NUMBER
378C

PROJECT NORTH
DRAWING NUMBER
2016-378C-C007
SCALE # AT
AS SHOWN
REV
0



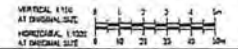
PLAN - EASTERN DIVERSION DRAIN
SCALE 1:1000

- NOTES:
1. REFER TO DRG 2016-378C-C002 AND DRG 2016-378C-C003 FOR GENERAL NOTES.
 2. REFER TO DRG 2016-378C-C001 FOR GENERAL ARRANGEMENT.
 3. REFER TO DRG 2016-378C-C004 AND 2016-378C-C025 FOR FENCES AND GATES.



CHAINAGE	EXISTING SURFACE LEVEL	DESIGN SURFACE LEVEL	CUT - / FILL +	LEVEL DIFFERENCE
70.000	75.837	74.326	-2.517	
100.000	75.631	74.454	-2.178	
130.000	76.365	74.205	-2.160	
160.000	75.158	74.192	-1.966	
190.000	76.221	74.105	-2.116	
220.000	75.975	74.054	-1.921	
250.000	75.568	74.004	-1.564	
280.000	76.612	74.954	-1.658	
310.000	75.537	73.354	-2.183	
340.000	76.120	74.854	-2.266	
370.000	75.177	73.104	-2.073	
400.000	75.160	73.404	-1.756	
430.000	75.160	73.404	-1.756	
460.000	75.160	73.404	-1.756	
490.000	75.160	73.404	-1.756	
520.000	75.160	73.404	-1.756	
550.000	75.160	73.404	-1.756	
580.000	75.160	73.404	-1.756	
610.000	75.160	73.404	-1.756	
640.000	75.160	73.404	-1.756	
670.000	75.160	73.404	-1.756	
700.000	75.160	73.404	-1.756	
730.000	75.160	73.404	-1.756	
760.000	75.160	73.404	-1.756	
790.000	75.160	73.404	-1.756	
820.000	75.160	73.404	-1.756	
850.000	75.160	73.404	-1.756	
880.000	75.160	73.404	-1.756	
910.000	75.160	73.404	-1.756	
940.000	75.160	73.404	-1.756	
970.000	75.160	73.404	-1.756	
1000.000	75.160	73.404	-1.756	

LONGITUDINAL SECTION - DRAI EAST
HORZ 1:1000 VERT 1:100



NO.	DATE	REVISION	AUTHORIZED
1	27/02/16	ISSUED FOR CONSTRUCTION	J.P.

ARCHITECTURAL CONSULTING

41-29431

1 CARTWRIGHT STREET
P.O. BOX 42, MITCHELL QLD 4465

Phone: 1300 007 462
Fax: (07) 4524 6620
Email: enquiries@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

CLIENT: MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

PROJECT: ROMA FLOOD MITIGATION PROJECT - STAGE 2

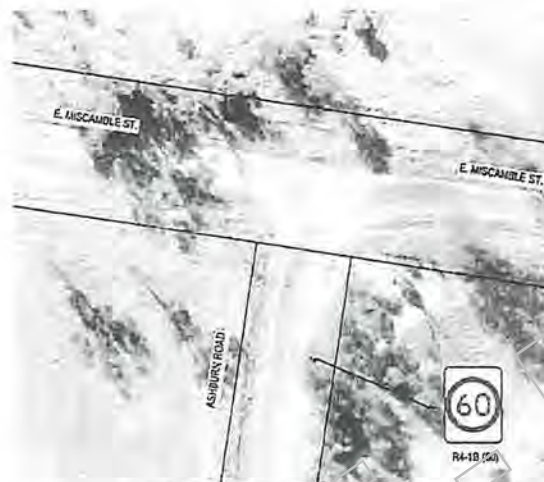
TITLE: EASTERN DIVERSION DRAIN
LONGITUDINAL SECTION - SHEET 2

DESIGNED: J.K. M.M. J.P. 05/10
DRAWN: J.P. 05/10
CHECKED: J.P. 05/10
DATE: 05/10

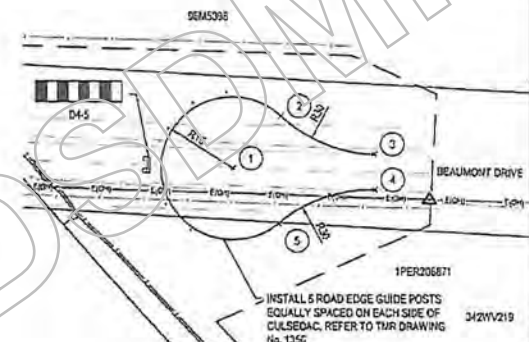
PROJECT NUMBER: 201E-378C-C008
SCALE: AS SHOWN
REV: 0



NOTE:
1. ROAD EDGE GUIDE POSTS SPACING TO BE IN ACCORDANCE WITH MUTCD PART 2



PLAN - INTERSECTION OF ASHBURN ROAD AND E. MISCAMBLE STREET
SCALE 1:500



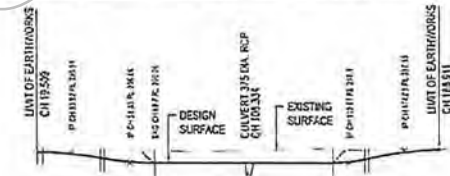
PLAN - BEAUMONT DRIVE CULDESAC
SCALE 1:500

CONTROL LINE SETOUT - ASHBURN ROAD

TYPE	CHANGEGE	EASTING	NORTHING	APP DIRECTION	DEP DIRECTION
S	D	875616.415	7060161.783		81°32'15.53"
C		200.009	875647.848	7060394.625	81°32'15.53"

CULDESAC SETOUT TABLE

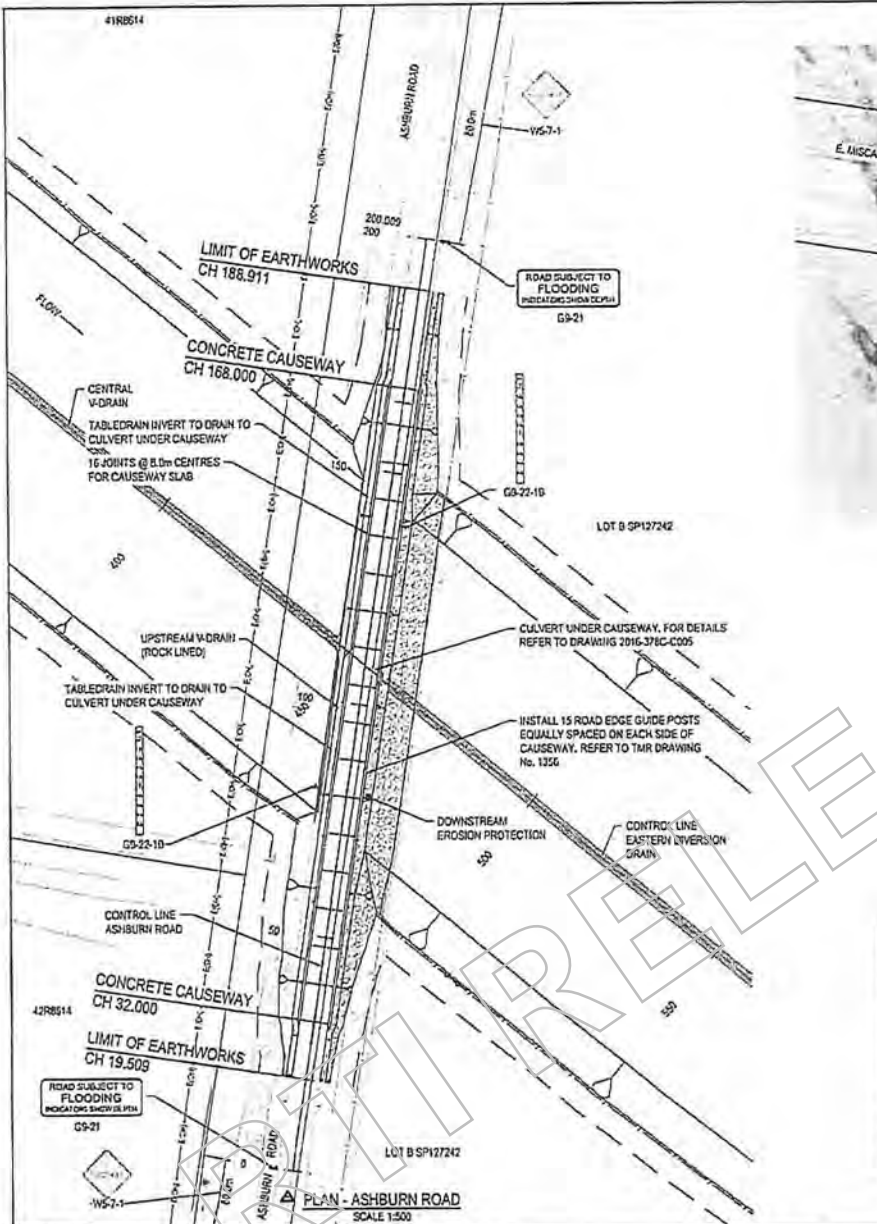
POINT	EASTING	NORTHING
1	680155.067	705929.291
2	680166.145	705940.809
3	680185.683	705932.357
4	680105.763	705925.352
5	680165.626	705918.315



DATUM RL 291.00

CHANGEGE	0+000	19+500	20+000	40+000	60+000	80+000	100+000	120+000	140+000	160+000	180+000	193+511	200+000
LEVEL DIFFERENCE CUT - FILL	-0.000	-0.002	-0.334	-0.030	-1.005	-1.015	-1.051	-1.154	-0.658	-0.024	-0.000		
DESIGN SURFACE LEVEL	226.876	226.874	226.540	226.121	225.066	225.051	224.997	224.843	224.185	223.527	223.150	223.150	223.150
EXISTING SURFACE LEVEL	226.876	226.872	226.874	226.151	226.066	225.036	224.946	224.893	224.245	223.567	223.150	223.150	223.150

LONGITUDINAL SECTION - ASHBURN ROAD
HORZ 1:1000 VERT 1:200



PLAN - ASHBURN ROAD
SCALE 1:500

NO.	DATE	BY	REVISION	AUTHORIZED
0	17/05/16	J.P.	ISSUED FOR CONSTRUCTION	



1 CARTWRIGHT STREET
P.O. BOX 42, MITCHELL QLD 4465
Phone: 1300 637 662
Fax: (07) 4624 6600
Email: council@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2

DATE
FOR CONSTRUCTION

DESIGNED BY: J.K.
CHECKED BY: M.M.
APPROVED BY: J.P.
DATE: 05/16
DRAWING NUMBER: 2016-378C-C009
SCALE: AS SHOWN



DATUM R.L. 254.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 250.000

DATUM R.L. 254.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 200.000

DATUM R.L. 254.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 150.000

DATUM R.L. 254.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 100.000

DATUM R.L. 250.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 50.000

DATUM R.L. 253.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 450.000

DATUM R.L. 254.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 400.000

DATUM R.L. 254.00

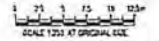
DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 350.000

DATUM R.L. 254.00

DESIGN SURFACE LEVEL									
DEPTH CUT-/FILL-									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE									

CH 300.000



				1 CANTWRIGHT STREET P.O. BOX 42, MITCHELL QLD 4465 Phone: 1300 957 562 Fax: (07) 4524 5630 Email: info@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au <small>(Approved by National Planning Scheme, 2014)</small>		ROMANA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES EASTERN DIVERSION DRAIN ANNOTATED SECTIONS - SHEET 1		ROMA FLOOD MITIGATION PROJECT - STAGE 2 FOR CONSTRUCTION		PROJECT NUMBER: 2016-378C-C015 DRAWN BY: J.P. DATE: 05/16 SCALE: 1:250 SHEET NUMBER: 378C	
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DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	296.855								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-33.703	296.848	0.000					30.500	295.797

CH 700.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	297.000								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-33.450	297.004	0.000					30.500	296.656

CH 650.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	297.167								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-39.491	297.163	0.000					30.500	297.015

CH 600.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	297.142								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-33.113	297.143	0.000					30.500	297.210

CH 550.000

DATUM R.L. 293.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	297.010								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-33.201	297.010	0.000					30.500	297.264

CH 500.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	295.267								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-37.130	295.292	0.000					30.500	295.165

CH 900.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	294.853								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-33.174	295.833	0.000					30.500	295.255

CH 850.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	296.465								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-37.533	296.493	0.000					30.500	295.439

CH 800.000

DATUM R.L. 292.00		1 in 4		0.1%		0.1%		1 in 4	
DESIGN SURFACE LEVEL	295.725								
DEPTH CUT - / FILL +									
EXISTING SURFACE LEVEL									
OFFSET FROM CENTRELINE	-34.263	295.723	0.000					30.500	295.612

CH 750.000



DATE	ISSUED FOR CONSTRUCTION	REVISION	AUTHORIZED
07/25/18			J.P.
CODE			

ASSOCIATE CONSULTANT

41-29431

1 CARTWRIGHT STREET
P.O. BOX 42, MITCHELL QLD 4465

Phone: 1300 007 667
Fax: (07) 4574 6650
Email: council@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

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CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE
EASTERN DIVERSION DRAIN
ANNOTATED SECTIONS - SHEET 2

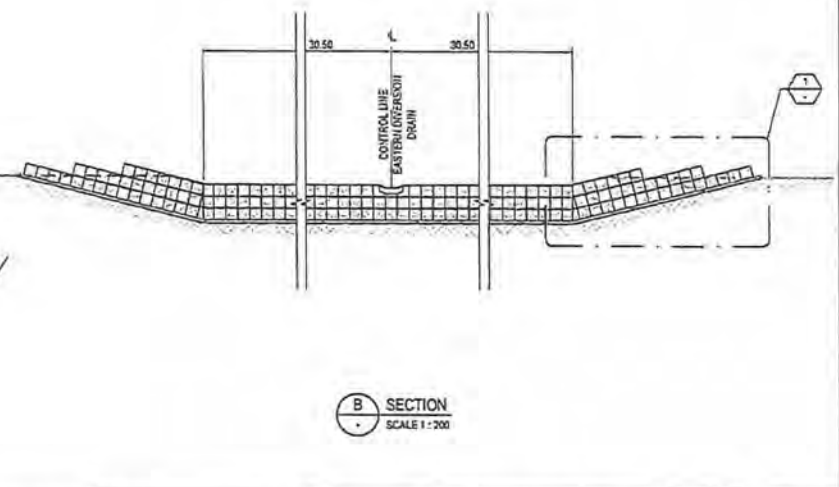
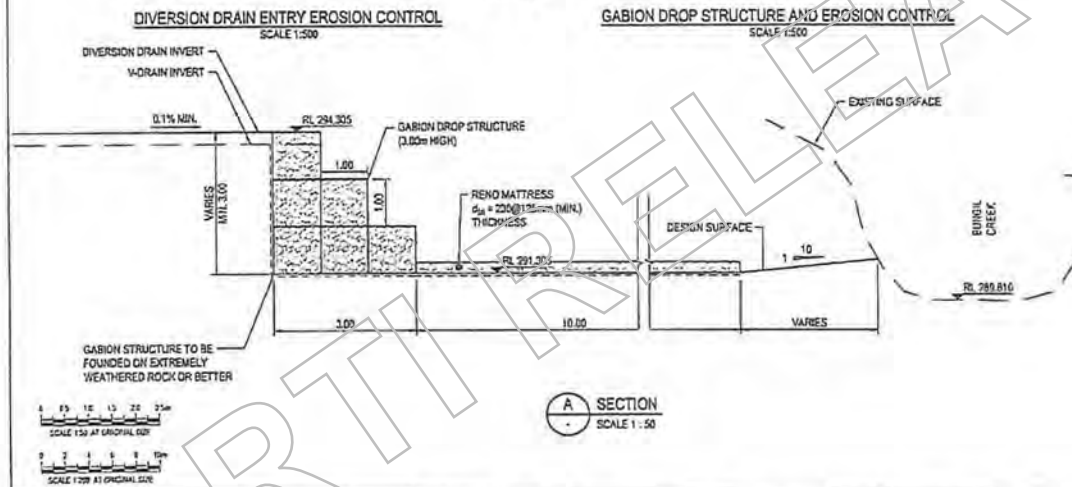
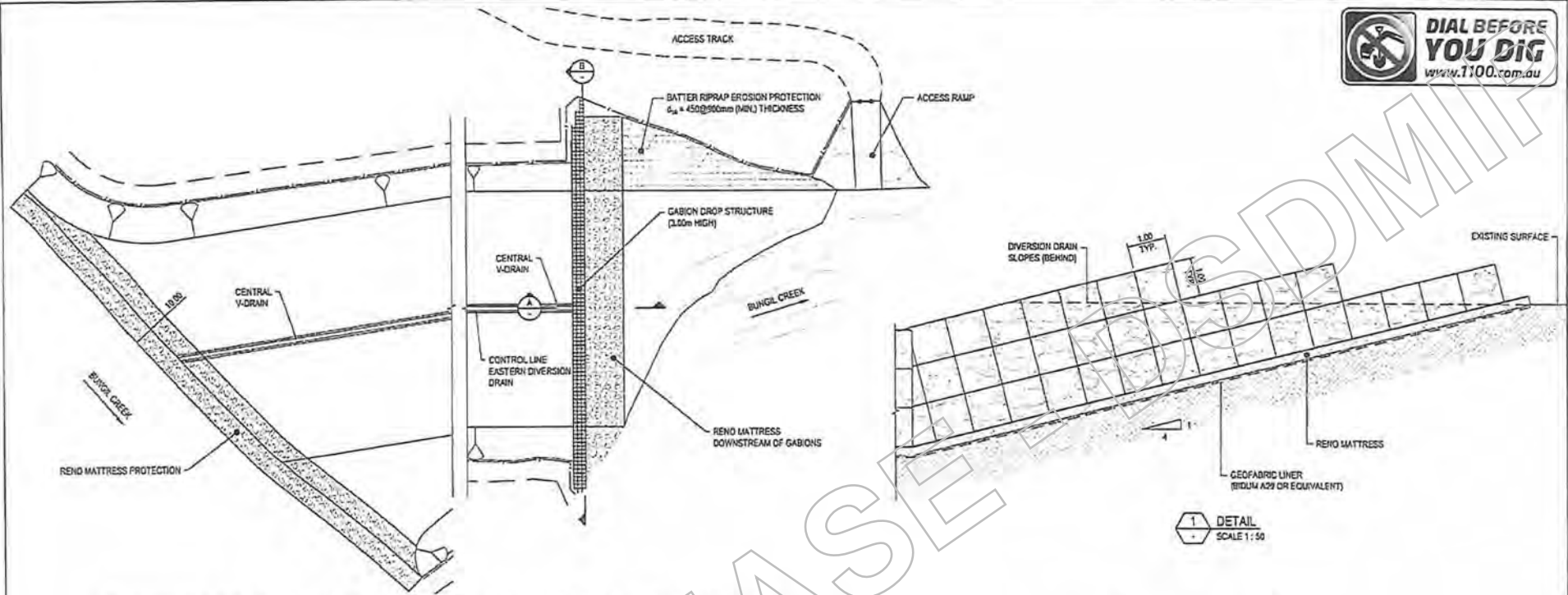
PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2

STAGE
FOR CONSTRUCTION

PROJECT NUMBER
2015-378C-C016

SCALE R.A. 1:250

REV 0



DATE	17/10/16	FOR CONSTRUCTION	J.P.
CODE	REVISED	REVISED	AUTHORIZED

ASSOCIATE CONSULTANT

61-29431

1 CARTWRIGHT STREET
P.O. BOX 47, MITCHELL QLD 4465
Phone: 1300 087 562
Fax: (07) 4624 5650
Email: central@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au
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15097
MARANOA REGIONAL COUNCIL
15201

PROJECT: ROMA FLOOD MITIGATION PROJECT - STAGE 2
DRAWN: J.K. M.W. J.P. 05/16
CHECKED: 378C
SCALE: AS SHOWN

PROJECT NUMBER: 2016-378C-C020
SCALE: AS SHOWN
REV: 0



0	27/05/16	ISSUED FOR CONSTRUCTION	J.P.
CODE	DATE	REVISION	AUTHORIZED

ASBESTOS CONSULTANT

41-29431

1 CARTWRIGHT STREET
P.O. BOX 42, MITCHELL QLD 4165
Phone: 1300 807 662
Fax: (07) 4524 6650
Email: council@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au
COURTESY OF MARANOA REGIONAL COUNCIL

DRAWN: MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE: EASTERN DIVERSION DRAIN
SIGNAGE GENERAL ARRANGEMENT

PROJECT: STAGE 2 ROMA FLOOD MITIGATION PROJECT

STATUS: FOR CONSTRUCTION

PROJECT NORTH

DRAWING NUMBER: 2016-378C-C022

SCALE: AS SHOWN

DATE: 05/16

DESIGNED: J.K. M.M. J.P.

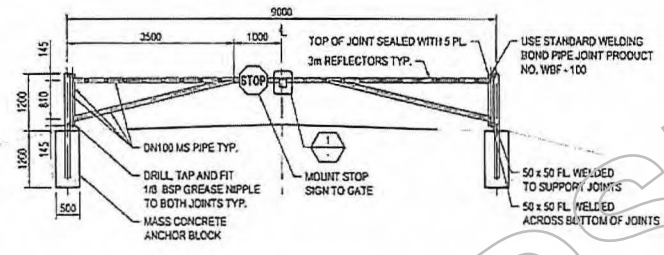
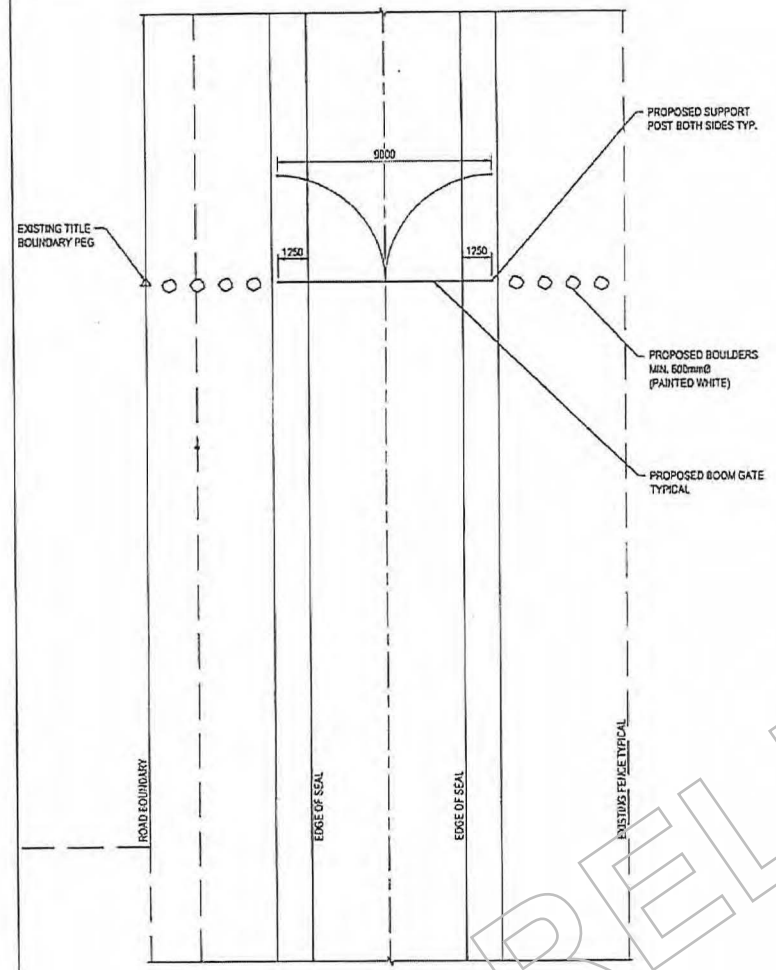
WORK UNDER MARRAS DESIGN NUMBER: 15201

REV: 0

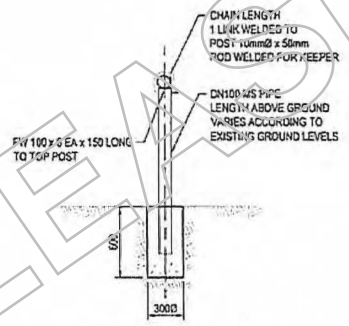


NOTES:

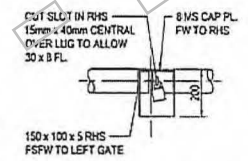
1. REFER TO DRG 2016-378C-C001 FOR LOCATION OF GATES.
2. CONTRACTOR TO CONFIRM ALL ALL DIMENSIONS ON SITE PRIOR TO FABRICATION.



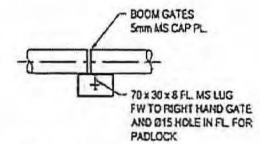
TYPICAL BOOM GATE ELEVATION
SCALE 1:20



TYPICAL BOOM GATE SUPPORT POST DETAIL
SCALE 1:20

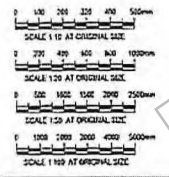


PADLOCK ENCLOSURE ELEVATION



PADLOCK ENCLOSURE PLAN
SCALE 1:10

PLAN
SCALE 1:100



DATE	ISSUED FOR CONSTRUCTION	REVISION	AUTHORIZED
01/07/18			J.P.

ASSOCIATE CONSULTANT

41-29431

maranoa
RURAL COUNCIL

1 CARTWRIGHT STREET
P.O. BOX 42, MITCHELL QLD 4465
Phone: 1300 007 652
Fax: (07) 4624 6050
Email: council@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au
L2019008 8" MINOR REVISION 08/24/18

CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2

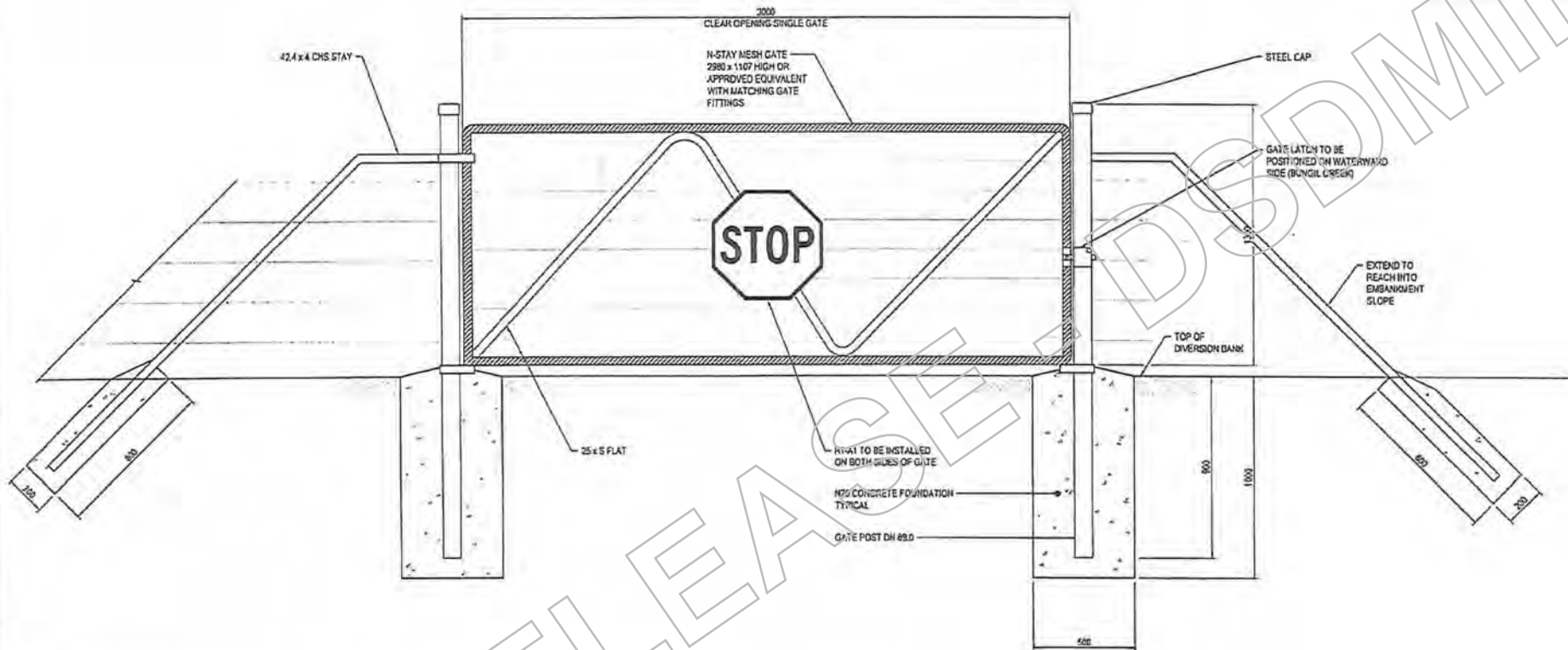
DATE
EASTERN DIVERSION DRAIN

STATUS
FOR CONSTRUCTION

BOOM GATE DETAILS

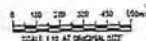
DESIGNED	CHECKED	APPROVED	DRAWN	DRAWING NUMBER
J.K.	M.W.	J.P.	05/18	2016-378C-C024
WORK ORDER NUMBER	DRAWING NUMBER	SCALE	AS SHOWN	REV
15001	378C			0

PROJECT NORTH



- NOTES:**
- REFER TO DRS 2015-376C-C001 FOR LOCATIONS OF GATE.
 - ALL METALWORK INCLUDING POSTS, FRAMES AND WIRE SHALL BE HOT-DIPPED GALVANISED IN ACCORDANCE WITH THE RELEVANT AUSTRALIAN STANDARD.
 - GALVANISED STEEL AND CAPS TO BE PROVIDED TO ALL POSTS. ALL POSTS TO BE VERTICAL. CORNER POSTS TO BE ADOPTED WHERE THE CHANGE IN ANGLE IN HORIZONTAL ALIGNMENT EXCEEDS 15 DEGREES. PROVIDE CORNER POSTS AT PROPERTY BOUNDARIES.
 - STAYS TO BE PROVIDED AT END POSTS, GATE POSTS, CORNER POSTS AND EVERY EIGHTH POST.
 - STANDARD COUPLINGS MAY BE USED AS AN ALTERNATIVE TO WELDS FOR ALL CONNECTIONS EXCEPT GOOSE NECKED STAYS WHICH SHALL BE WELDED TO POSTS.
 - ALL WELDS TO BE 5mm THICK CONTINUOUS FILLET WELDS WITH COLD GALVANISING TREATMENT TO BE COMPLETED WELDS.
 - ALL CONCRETE SHALL BE AS NOTED IN SPECIFICATION.
 - CHAINWIRE TO BE FIXED USING WIRE TIES AS FOLLOWS:
 - TO POSTS AT 370 CENTRES, AND;
 - TO TENSION WIRES AND HORIZONTAL RAILS AT 100 CENTRES.

TYPICAL SINGLE GATE TO TOP OF DIVERSION BANK
SCALE 1:10



NO	DATE	REVISION	AUTHORISED
0	27/05/16	ISSUED FOR CONSTRUCTION	J.P.

AGGREGATE CONSULTANT

41-29431

maranoa

1 CARTWRIGHT STREET
P.O. BOX 42, MITCHELL QLD 4465

Phone: 1300 007 057
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Email: council@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

1 DEPARTMENT OF INFRASTRUCTURE SERVICES, QUEENSLAND

CLIENT
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE
EASTERN DIVERSION DRAIN
FENCES AND GATES.

PROJECT
ROMA FLOOD MITIGATION PROJECT - STAGE 2

STATUS
FOR CONSTRUCTION

DESIGNED	DRAWN	APPROVED	DATE	DRAWING NUMBER
J.K.	M.M.	J.P.	05/16	2016-378C-C025

HOW MANY SHEETS: 15/201
SHEET NUMBER: 378C
SCALE: AS SHOWN
REV: 0



Queensland
Government

Department of Infrastructure,
Local Government and Planning

Our reference: SDA-0416-029601
Your reference:

19 April 2016

Chief Executive Officer
Maranoa Regional Council
P.O. Box 620
Roma QLD 4455

Dear Madam

Notice of Receipt of Development Application - Development Permit - Operational Works (construction of diversion channel)

Tiffin Street, Roma QLD 4455
George Street, Roma QLD 4455

The Department of Infrastructure, Local Government and Planning (DILGP), acknowledges receipt of your development application under section 260 of the *Sustainable Planning Act 2009* (the act) on 19 April 2016.

Site details

Street address: Tiffin Street ROMA QLD 4455
51-85 George Street ROMA QLD 4455
153 George Street ROMA QLD 4455
88-156 George Street ROMA QLD 4455

Real property description: Lot 21 on R8614
Lot 41 on R8614
Lot 96 on M5398
Lot 343 on R8614
Lot 342 on WV219

Local government area: Maranoa Regional Council

Application details

Proposed development: Development Permit for Operational Works (construction of

Page 1

Darling Downs South West Regional Office
128 Margaret Street
PO Box 825
Toowoomba QLD 4350

diversion channel)

Aspects of development and type of development approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)	Code Assessment

Please be advised that this notice should not be taken to be an acknowledgement notice, as this is not required for the development application under section 267 of the act.

DIGLP is proceeding with its assessment of the development application. The department will continue with its assessment of the development application and must decide the application within 20 business days, unless otherwise extended.

For more information, please contact Maria Johnson, Planning Officer, on 4616 7307 or via email at maria.johnson@dilgp.qld.gov.au.

Yours sincerely



Maria Johnson
Planning Officer

DILGP assessment report—assessment manager

DILGP reference: SDA-0416-029601
DILGP regional office: SARA Darling Downs South West

1.0 Application details

Lot on plan	Street address
Lot 21 & 41 R8614	2A Tiffin Street, Roma QLD
Lot 96 on M5398	Miscamble Street, Roma QLD
Lot 343 on R8614	George Road, Roma QLD
Lot 342 on WV219	

Local government area: Maranoa Regional Council
Applicant name: Maranoa Regional Council
Applicant contact details: planning@maranoa.qld.gov.au
P.O. Box 620
Roma QLD 4455

2.0 Aspects of development and type of approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)	Code Assessment

3.0 Matters of interest to the state

The development application has the following matters of interest to the state under the following provisions of the *Sustainable Planning Regulation 2009*:

Table 3.1—Schedule 6 matters of interest

Item reference	Relevant technical agency
Schedule 6, Table 3, Item 1: If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development.	Department of Environment and Heritage Protection (DEHP)
Schedule 6, Table 3, Item 2: If tables 1 and 2 do not apply and the application is for - (a) operational work for the clearing of native vegetation; and (b) no other assessable development	Department of Natural Resources and Mines (DNRM)

4.0 Assessment by technical agencies

4.1 Furthering the purpose of the Act and the Department

The application is assessed in light of all relevant State interests, including:

- Advancing the purpose of the *Sustainable Planning Act 2009* in ensuring the development assessment process is accountable, effective and efficient and delivers sustainable outcomes
- the State Planning Policy
- Regional Plans
- the State Development Assessment Provisions

Decisions made by DILGP also seek to further the interests of the Department in maintaining a balance between prosperity, sustainability and liveability.

4.2 Assessment by technical agencies

This application was referred to DEHP and DNRM (vegetation) for their technical assessment under the SDAP. A summary of the consideration and assessment of the Module 8 and Module 4 is contained below:

Module 4 - Environmentally Relevant Activities

Site Suitability

The choice of the site at which the activity is to be carried out minimises serious environmental harm on areas of high conservation value and special significance, and sensitive land uses at adjacent places.

Assessment 1:

- It is noted that the proposed development is in conjunction with the implementation of Stage 2 of the flood mitigation measures for the township of Roma.
- Assessment has been conducted and complies with the code.
- A condition have been recommended for plans to be attached to this approval.

Location of activity on the site:

The location for the activity on the site protects all environmental values relevant to adjacent sensitive land uses.

Assessment 2:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

The activity avoids adverse impacts on matters of state environmental significance or, where this is not reasonably possible, impacts are minimised and, where this is not reasonably possible, an environmental offset is provided for any significant residual impact to matters of state environmental matters that are prescribed environmental matters.

Assessment 3:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Development avoids or minimises and offsets any adverse impacts on riparian areas and ecological corridors located in a strategic environmental area.

Assessment 4:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Critical design requirements

The design of the facility at which the activity is to be carried out permits the activity to be carried out in accordance with best practice environmental management.

Assessment 5:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Development avoids or minimises any adverse impacts from pollutants on environmental values and water quality objectives for receiving waters (surface and groundwater) on site or leaving a site located in a strategic environmental area.

Assessment 6:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Module 8: Native vegetation clearingClearing to reasonably avoid and minimise impacts

Clearing only occurs where the applicant has demonstrated that the development has first reasonably avoided, and then reasonably minimised the impacts of development.

Assessment 7:

- It is noted that clearing is not in an area where a compliance notice, enforcement notice or offset has been issued.
- No conditions have been recommended.

Clearing on land in particular circumstances

Clearing in an area must not be inconsistent with or impact on any of the following unless a better environmental outcome can be achieved:

- (1) a declared area, or
- (2) an exchange area, or
- (3) unlawfully cleared area, or
- (4) a restoration notice, or
- (5) an enforcement notice under the Sustainable Planning Act 2009 issued for a vegetation clearing offence, or
- (6) a compliance notice containing conditions about the restoration of vegetation, or
- (7) a Land Act notice, or
- (8) a trespass notice if the trespass related act under the Land Act 1994 for the notice is the clearing of vegetation on the relevant land, or
- (9) an area on a PMAV shown to be category A where the chief executive of the VMA reasonably believes that a vegetation clearing offence is being, or has been,

Assessment 8:

- It is noted that clearing is not in an area where a compliance notice, enforcement notice or offset has been issued.
- No conditions have been recommended.

Clearing on land that is an environmental offset area

Clearing on land that contains an existing environmental offset is consistent with the delivery plan or agreement for the environmental offset area.

Assessment 9:

- It is noted that clearing is not in an area where a compliance notice, enforcement notice or offset has been issued.
- No conditions have been recommended.

No clearing of vegetation as a result of the material change of use or reconfiguration of a lot:

Clearing as a result of the material change of use or reconfiguration of a lot will not occur.

Assessment 10:

- It is noted that due to works associated to the high flow diversion channel, the clearing of the regulated vegetation is not possible to be completed avoided.
- No conditions have been recommended.

Clearing that could already be done under an exemption

All clearing is limited to clearing that could be done under an exemption for the purpose of the development (as prescribed under Schedule 24, Parts 1 and 2 of the Sustainable Planning Regulation 2009) prior to the material change of use application being approved.

Assessment 11:

- It is noted that due to works associated to the high flow diversion channel, the clearing of the regulated vegetation is not possible to be completed avoided.
- No conditions have been recommended.

Limits to clearing:

Clearing is limited to the extent that is necessary:

- (1) for establishing a necessary fence, firebreak, road or vehicular track, or for constructing necessary built infrastructure (each relevant infrastructure), where the clearing cannot reasonably be avoided or minimised, or**
- (2) as a natural and ordinary consequence of other assessable development for which a development approval as defined under the repealed Integrated Planning Act 1997 was given, or a development application as defined under that Act was made, before 16 May 2003, or**
- (3) to ensure public safety, or**
- (4) for a coordinated project and any associated ancillary works — other than a coordinated project that involves high value agriculture clearing, or irrigated high value agriculture clearing.**

Assessment 12:

- It is noted that due to works associated to the high flow diversion channel, the clearing of the regulated vegetation is not possible to be completed avoided.
- No conditions have been recommended.

Wetlands

Maintain the current extent of vegetation associated with any natural wetland to protect:

- (1) water quality by filtering sediments, nutrients and other pollutants.**
- (2) aquatic habitat.**
- (3) terrestrial habitat.**

Assessment 13:

- It is noted that the vegetation management wetland map does not identify a wetland in the relevant subject area.
- No conditions have been recommended.

Watercourses and drainage features:

Maintain the current extent of vegetation associated with any watercourse or drainage feature to protect:

- (1) bank stability by protecting against bank erosion.**
- (2) water quality by filtering sediments, nutrients and other pollutant.**
- (3) aquatic habitat.**
- (4) terrestrial habitat.**

Assessment 14:

- DNRM have assessed two separately areas of proposed clearing.
- It is noted that it does not meet the code due to clearing being proposed in a watercourse.
- It is note that the clearing is unlikely to be a significant residual impact due to the linear structure of the levee and does not contain essential habitat and is less than one (1).
- A condition has been recommended to ensure development maintains general consistency of the code.

Connectivity (public safety and relevant infrastructure)

In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:

(1) is of sufficient size and configured in a way that maintains ecosystem functioning

(2) remains in the landscape despite threatening processes.

Assessment 15:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Connectivity (coordinated projects)

In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:

(1) is of sufficient size and configured in a way that maintains ecosystem functioning

(2) remains in the landscape despite threatening processes or where this is not reasonably possible, maintain the current extent of vegetation.

Assessment 16:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Soil erosion

Clearing does not result in:

(1) accelerated soil erosion including, but not limited to - mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding

(2) any associated loss of chemical, physical or biological fertility — including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients within or outside the lot(s) that are the subject of the application.

Assessment 17:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Salinity

Clearing does not contribute to land degradation through:

(1) waterlogging, or

(2) the salinisation of groundwater, surface water or soil.

Assessment 18:

- It is noted that the review of groundwater bore logs indicated that ground salinity does not pose a salinity hazard risk.
- Desk top audit confirmed that the proposed development will not make a measurable or significant difference to salinity.
- No conditions have been recommended.

Conserving endangered and of concern regional ecosystem

Maintain the current extent of endangered regional ecosystems and of concern regional ecosystems.

Assessment 19:

- It is noted that the area of cleared vegetation will not exceed two (2) ha.
- No conditions have been recommended.

Essential habitat

Maintain the current extent of essential habitat.

Assessment 20:

- No essential habitat is noted as part of this proposed development.
- No conditions have been recommended.

Acid sulfate soils

Clearing activities do not result in disturbance of acid sulfate soils or changes to the hydrology of the location that will either:

- (1) aerate horizons containing iron sulfides, or
(2) mobilise acid or metals.**

Assessment 21:

- It is noted that the proposed development is part of an acid sulphate hazard or risk area.
- No conditions have been recommended.

Agency recommendation to DILGP

DEHP and DNRM recommends four (4) standard conditions be attached to the approval, in relation to approved plans, erosion and mitigation controls and permit holders.

5.0 DILGP Considerations**5.1 Timeframes**

Application Received	19 April 2016
Referred DA Notice sent	19 April 2016
Information Request sent	29 April 2016
Extension to assessment period	18 July 2016
DEHP Technical Agency Assessment response received.	18 August 2016
DNRM Technical Agency Assessment response received.	18 August 2016
Decision Notice sent	23 August 2016

5.2 Application properly made or referred

The application was properly made and fee payment received on 19 April 2016.

5.3 Consideration of technical agency assessment and recommended conditions

DEHP has assessed the application against SDAP Module 4 and has recommended one (1) condition.

DNRM has assessed the application against SDAP Modules 8 and has recommended three (3) conditions.

6.0 Conclusions

6.1. DILGP as concurrence agency:

- Requires conditions to attach to any development approval as detailed below:

No.	Conditions of Development Approval	Condition Timing
1.	<p>The development must be carried out generally in accordance with the following plans:</p> <ul style="list-style-type: none"> Proposed Stage 2 <i>Regional Options Eastern Diversion Channel D - Details</i> prepared by GHD reference 41-25323-SK105 revision A. 	At all times.
2.	<p>The clearing of vegetation is limited to the extent identified as Area(s):</p> <ul style="list-style-type: none"> "Red - Clear And Grub Zones" on the plan titled "EASTERN DIVERSION DRAIN GENERAL ARRANGEMENT PLAN", <i>Drawing No. 2016-378C-C001, dated 27 May 2016</i> prepared by GHD for the Maranoa Regional Council. 	At all times.
3.	<p>The development must occur in accordance with the standards and specifications detailed in:</p> <p>a) <i>'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'</i>. In particular, maintain sediment control devices to achieve best practice design objectives.</p>	At all times.
4.	<p>Develop and implement a Rehabilitation Plan to be included in the <i>'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'</i>.</p>	Prior to the commencement of use and to be maintained at all times.
5.	<p>The permit holder is responsible for ensuring that:</p> <p>a) a full copy of the permit is held by; and</p> <p>b) the extent of clearing authorised by this permit is properly understood by, any person(s) engaged or employed to carry out the clearing of the vegetation under this permit.</p>	At all times.

7. Conclusion

DILGP has reviewed the recommendations provided by DEHP and DNRM and concludes that the assessment is valid and appropriately reflects DILGP's state interest.

8. Endorsement

Case officer	Maria Johnson	Planning Officer	4616 7307
Delegate	Ian McHugh	A/Manager (Planning)	4616 7307



DILGP assessment report—assessment manager

DILGP reference: SDA-0416-029601
DILGP regional office: SARA Darling Downs South West

1.0 Application details

Lot on plan	Street address
Lot 21 & 41 R8614	2A Tiffin Street, Roma QLD
Lot 96 on M5398	Miscamble Street, Roma QLD
Lot 343 on R8614	George Road, Roma QLD
Lot 342 on WV219	

Local government area: Maranoa Regional Council
Applicant name: Maranoa Regional Council
Applicant contact details: planning@maranoa.qld.gov.au
P.O. Box 620
Roma QLD 4455

2.0 Aspects of development and type of approval being sought

Nature of Development	Approval Type	Brief Proposal of Description	Level of Assessment
Operational Work	Development permit	Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)	Code Assessment

3.0 Matters of interest to the state

The development application has the following matters of interest to the state under the following provisions of the *Sustainable Planning Regulation 2009*:

Table 3.1—Schedule 6 matters of interest

Item reference	Relevant technical agency
Schedule 6, Table 3, Item 1: If tables 1 and 2 do not apply and the application is for - (a) development for an environmentally relevant activity; and (b) no other assessable development.	Department of Environment and Heritage Protection (DEHP)
Schedule 6, Table 3, Item 2: If tables 1 and 2 do not apply and the application is for - (a) operational work for the clearing of native vegetation; and (b) no other assessable development	Department of Natural Resources and Mines (DNRM)

4.0 Assessment by technical agencies

4.1 Furthering the purpose of the Act and the Department

The application is assessed in light of all relevant State interests, including:

- Advancing the purpose of the *Sustainable Planning Act 2009* in ensuring the development assessment process is accountable, effective and efficient and delivers sustainable outcomes
- the State Planning Policy
- Regional Plans
- the State Development Assessment Provisions

Decisions made by DILGP also seek to further the interests of the Department in maintaining a balance between prosperity, sustainability and liveability.

4.2 Assessment by technical agencies

This application was referred to DEHP and DNRM (vegetation) for their technical assessment under the SDAP. A summary of the consideration and assessment of the Module 4 and Module 8 is contained below:

Module 4 - Environmentally Relevant Activities

Site Suitability

The choice of the site at which the activity is to be carried out minimises serious environmental harm on areas of high conservation value and special significance, and sensitive land uses at adjacent places.

Assessment 1:

- It is noted that the proposed development is in conjunction with the implementation of Stage 2 of the flood mitigation measures for the township of Roma.
- Assessment has been conducted and complies with the code.
- A condition have been recommended for plans to be attached to this approval.

Location of activity on the site:

The location for the activity on the site protects all environmental values relevant to adjacent sensitive land uses.

Assessment 2:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

The activity avoids adverse impacts on matters of state environmental significance or, where this is not reasonably possible, impacts are minimised and, where this is not reasonably possible, an environmental offset is provided for any significant residual impact to matters of state environmental matters that are prescribed environmental matters.

Assessment 3:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Development avoids or minimises and offsets any adverse impacts on riparian areas and ecological corridors located in a strategic environmental area.

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The design of the facility at which the activity is to be carried out permits the activity to be carried out in accordance with best practice environmental management.

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Assessment 6:

- Assessment has been conducted and complies with the code.
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Module 8: Native vegetation clearingClearing to reasonably avoid and minimise impacts

Clearing only occurs where the applicant has demonstrated that the development has first reasonably avoided, and then reasonably minimised the impacts of development.

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- It is noted that clearing is not in an area where a compliance notice, enforcement notice or offset has been issued.
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- (4) a restoration notice, or
- (5) an enforcement notice under the Sustainable Planning Act 2009 issued for a vegetation clearing offence, or
- (6) a compliance notice containing conditions about the restoration of vegetation, or
- (7) a Land Act notice, or
- (8) a trespass notice if the trespass related act under the Land Act 1994 for the notice is the clearing of vegetation on the relevant land, or
- (9) an area on a PMAV shown to be category A where the chief executive of the VMA reasonably believes that a vegetation clearing offence is being, or has been,

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Clearing on land that contains an existing environmental offset is consistent with the delivery plan or agreement for the environmental offset area.

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All clearing is limited to clearing that could be done under an exemption for the purpose of the development (as prescribed under Schedule 24, Parts 1 and 2 of the Sustainable Planning Regulation 2009) prior to the material change of use application being approved.

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Clearing is limited to the extent that is necessary:

- (1) for establishing a necessary fence, firebreak, road or vehicular track, or for constructing necessary built infrastructure (each relevant infrastructure), where the clearing cannot reasonably be avoided or minimised, or**
- (2) as a natural and ordinary consequence of other assessable development for which a development approval as defined under the repealed Integrated Planning Act 1997 was given, or a development application as defined under that Act was made, before 16 May 2003, or**
- (3) to ensure public safety, or**
- (4) for a coordinated project and any associated ancillary works – other than a coordinated project that involves high value agriculture clearing, or irrigated high value agriculture clearing.**

Assessment 12:

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Wetlands

Maintain the current extent of vegetation associated with any natural wetland to protect:

- (1) water quality by filtering sediments, nutrients and other pollutants.**
- (2) aquatic habitat.**
- (3) terrestrial habitat.**

Assessment 13:

- It is noted that the vegetation management wetland map does not identify a wetland in the relevant subject area.
- No conditions have been recommended.

Watercourses and drainage features:

Maintain the current extent of vegetation associated with any watercourse or drainage feature to protect:

- (1) bank stability by protecting against bank erosion.**
- (2) water quality by filtering sediments, nutrients and other pollutant.**
- (3) aquatic habitat.**
- (4) terrestrial habitat.**

Assessment 14:

- DNRM have assessed two separate areas of proposed clearing.
- It is noted that it does not meet the code due to clearing being proposed in a watercourse.
- It is noted that the clearing is unlikely to have a significant residual impact due to the linear structure of the levee and does not contain essential habitat and is less than one (1) ha.
- A condition has been recommended to ensure the development maintains general consistency with the code.

Connectivity (public safety and relevant infrastructure)

In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:

- (1) is of sufficient size and configured in a way that maintains ecosystem functioning
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In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:

- (1) is of sufficient size and configured in a way that maintains ecosystem functioning
- (2) remains in the landscape despite threatening processes or where this is not reasonably possible, maintain the current extent of vegetation.

Assessment 16:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Soil erosion

Clearing does not result in:

- (1) accelerated soil erosion including, but not limited to - mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding
- (2) any associated loss of chemical, physical or biological fertility — including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients within or outside the lot(s) that are the subject of the application.

Assessment 17:

- Assessment has been conducted and complies with the code.
- No conditions have been recommended.

Salinity

Clearing does not contribute to land degradation through:

- (1) waterlogging, or
- (2) the salinisation of groundwater, surface water or soil.

Assessment 18:

- It is noted that the review of groundwater bore logs indicated that ground salinity does not pose a salinity hazard risk.
- Desk top audit confirmed that the proposed development will not make a measurable or significant difference to salinity.
- No conditions have been recommended.

Conserving endangered and of concern regional ecosystem**Maintain the current extent of endangered regional ecosystems and of concern regional ecosystems.****Assessment 19:**

- It is noted that the area of cleared vegetation will not exceed two (2) ha.
- No conditions have been recommended.

Essential habitat**Maintain the current extent of essential habitat.****Assessment 20:**

- No essential habitat is noted as part of this proposed development.
- No conditions have been recommended.

Acid sulfate soils**Clearing activities do not result in disturbance of acid sulfate soils or changes to the hydrology of the location that will either:**

- (1) aerate horizons containing iron sulfides, or
- (2) mobilise acid or metals.

Assessment 21:

- It is noted that the proposed development is not part of an acid sulphate hazard or risk area.
- No conditions have been recommended.

Agency recommendation to DILGP

DEHP and DNRM recommends four (4) standard conditions to be attached to the approval, in relation to approved plans, erosion and mitigation controls and permit holders.

5.0 DILGP Considerations**5.1 Timeframes**

Application Received	19 April 2016
Referred DA Notice sent	19 April 2016
Information Request sent	29 April 2016
Extension to assessment period	18 July 2016
DEHP Technical Agency Assessment response received.	18 August 2016
DNRM Technical Agency Assessment response received.	18 August 2016
Decision Notice sent	23 August 2016

5.2 Application properly made or referred

The application was properly made and fee payment received on 19 April 2016.

5.3 Consideration of technical agency assessment and recommended conditions

DEHP has assessed the application against SDAP Module 4 and has recommended one (1) condition.

DNRM has assessed the application against SDAP Modules 8 and has recommended three (3) conditions.

6.0 Conclusions

6.1. DILGP as concurrence agency:

- Requires conditions to attach to any development approval as detailed below:

No.	Conditions of Development Approval	Condition Timing
1.	The development must be carried out generally in accordance with the following plans: <ul style="list-style-type: none"> • Proposed Stage 2 <i>Regional Options Eastern Diversion Channel D - Details</i> prepared by GHD reference 41-25323-SK105 revision A. 	At all times.
2.	The clearing of vegetation is limited to the extent identified as Area(s): <ul style="list-style-type: none"> • "Red - Clear And Grub Zones" on the plan titled "EASTERN DIVERSION DRAIN GENERAL ARRANGEMENT PLAN", <i>Drawing No. 2016-378C-C001, dated 27 May 2016</i> prepared by GHD for the Maranoa Regional Council. 	At all times.
3.	The development must occur in accordance with the standards and specifications detailed in: <ul style="list-style-type: none"> a) <i>'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'</i>. In particular, maintain sediment control devices to achieve best practice design objectives. 	At all times.
4.	Develop and implement a Rehabilitation Plan to be included in the <i>'Maranoa Regional Council Roma Flood Mitigation Project – Stage 2a Eastern Diversion Drain Erosion and Sediment Control Plan, prepared by GHD, dated June 2016'</i> .	Prior to the commencement of use and to be maintained at all times.
5.	The permit holder is responsible for ensuring that: <ul style="list-style-type: none"> a) a full copy of the permit is held by; and b) the extent of clearing authorised by this permit is properly understood by, any person(s) engaged or employed to carry out the clearing of the vegetation under this permit. 	At all times.

7. Conclusion

DILGP has reviewed the recommendations provided by DEHP and DNRM and concludes that the assessment is valid and appropriately reflects DILGP's state interest.

8. Endorsement

Case officer	Maria Johnson	Planning Officer	4616 7307
Delegate	Ian McHugh	A/Manager (Planning)	4616 7307



Queensland
Government

Department of Infrastructure,
Local Government and Planning

Our reference: SDA-0416-029601

Your reference: 2016/19469

29 April 2016

Maranoa Regional Council
Building & Planning Services
P.O. Box 620
Roma QLD 4455

Attn: Danielle Pearn

Dear Danielle,

**Information Request — Assessment Manager
Development Permit for Operational Works (construction of high low diversion
channel associated with stage 2 flood mitigation works and concurrence
Environmental Relevant Authority (ERA) 16 2 (b))**

2A Tiffin Street, 51-85, 153, 88-156 George Street, and Miscamble Street, Roma QLD 4455
(Given under section 276 of the *Sustainable Planning Act 2009*)

The Department of Infrastructure, Local Government and Planning (DILGP) received your development application on 19 April 2016.

DILGP has carried out an initial review of the application and has determined that in accordance with section 276 of the *Sustainable Planning Act 2009*, the following additional information is requested to complete the assessment of the application:

Item	Information requested
ERA 16 2(B)	
1.	In accordance with the State Development Assessment Provisions (SDAP) further information is required to ensure that the activity does not have an adverse environmental effect beyond the site. Identify all potential impacts and provide mitigation measures to address risk for the following environmental values: 1. Acoustic impacts for all sensitive receptors; 2. Air quality impacts for all sensitive receptors and the management hierarchy for air emissions;

	<p>3. Water impacts existing on the site and surrounding vicinity;</p> <p>4. Rehabilitation measures to be used once the relevant activity ceases.</p>
Watercourses and drainage features	
2.	<p>Provide an erosion and sediment control plan, compiled by a suitably qualified person and in accordance with the following document:</p> <ul style="list-style-type: none"> • Best Practice Erosion and Sediment Control, IECA 2008 International Erosion Control Association (Australia), Picton NSW <p>Note: Consideration should also be given to the effect the diversion channel will have on hydraulic flow and potential scour within the bed and banks of Bungil Creek.</p>

In accordance with section 276(6) of the *Sustainable Planning Act 2009*, the following advice is provided:

Item	Advice provided
Department of Environment and Heritage Protection:	
1.	<p>The technical guideline explaining how to provide the necessary information can be accessed through the following link:</p> <ul style="list-style-type: none"> a) Noise impacts: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-noise-impacts.pdf b) Air Impacts: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-air-impacts.pdf c) Water impacts: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-water-impacts.pdf d) Land Impacts: https://www.ehp.qld.gov.au/assets/documents/regulation/era-gl-land-impacts.pdf
2.	Address environmental objectives and performance outcomes for the ERA prescribed in Schedule 5, table 1 and 2 of the <i>Environmental Protection Regulation 2008</i> .

An inspection of the proposed works area is an integral part of the assessment of your application. DILGP, or a representative of Department of Environment and Heritage Protection and the Department of Natural Resources and Mines, may contact you to arrange an inspection of the works area.

Under section 278 of the *Sustainable Planning Act 2009*, when responding to this request you must advise whether you are supplying all of the information requested, part of the information requested, or none of the information requested. If you are supplying part or none of the information requested, you are also required to provide written notice asking the department to proceed with the assessment of the application.

The due date for receipt of this information is 6 months. Unless a response to this request for further information has been received from you within this period or any extension during

this period, your application will lapse.

A pro forma is attached to this notice to assist you in providing an information request response which complies with the requirements of the *Sustainable Planning Act 2009*.

Please be advised that the application will be assessed on the basis of the information provided. It is therefore recommended that you respond to all of the information requested by DILGP. Further details regarding the information request response period and the lapsing of development applications are set out in sections 279 and 280 of the *Sustainable Planning Act 2009*.

Your response to the information request must be submitted to DiLGP through MyDAS or alternatively emailed to ToowoombaSARA@dilgp.qld.gov.au.

If you require any further information, please contact Maria Johnson, Planning Officer, on 4616 7307, or via email maria.johnson@dilgp.qld.gov.au, who will be pleased to assist.

Yours sincerely



Darren Cooper
A/Manager (Planning)

Our reference: 2016/19469
Your reference: SDA-0416-029601

Attn: ToowoombaSARA

Response to information request—assessment manager

(Given under section 278 of the *Sustainable Planning Act 2009*)

Street address: 2A Tiffin Street, Roma QLD 4455
Miscamble Street, Roma QLD 4455
51-85 George Street, Roma QLD 4455
153 George Street, Roma QLD 4455
88-156 George Street, Roma QLD 4455

Real property description: Lot 21 on R8614
Lot 41 on R8614
Lot 96 on M5398
Lot 343 on R8614
Lot 342 on WV219

Local government area: Maranoa Regional Council

As the applicant of the above development application, I am responding to your information request by:

- Enclosing all of the information requested.
- Enclosing part of the information requested and asking that the requesting authority proceed with the assessment of the application.
- Advising that I do not intend to supply any of the information requested and asking that the requesting authority proceed with the assessment of the application.

Name of applicant: Maranoa Regional Council

Signature of applicant:

Date:



Queensland
Government

Department of Infrastructure,
Local Government and Planning

Our reference: SDA-0416-029601
Your reference: 2016/19469

18 July 2016

Maranoa Regional Council
P.O. Box 620
Roma QLD 4455
planning@maranoa.qld.gov.au

Attn: Danielle Pearn

Dear Danielle

**Notice to Extend Decision Making Period - Development Permit - Operational Works
(construction of a high flow diversion channel and concurrence environmental
authority for extractive activities - era 16 (2)(b))**

2A Tiffin Street, Roma, QLD 4455

Miscamble Street, Roma QLD 4455

51-58 George Street, Roma QLD 4455

88-156 George Street, Roma QLD 4455

(Given under section 318(2) of the *Sustainable Planning Act 2009*)

Please be advised that the Department of Infrastructure, Local Government and Planning (DILGP) is extending the decision making period for your application by 20 business days, as permitted under section 318(2) of the *Sustainable Planning Act 2009*.

The new date by which DILGP must decide application is 18 August 2016.

If you require any further information, please contact Maria Johnson, Planning Officer on 4616 7307, or via email maria.johnson@dilgp.qld.gov.au who will be able to assist.

Yours sincerely



Ian McHugh
A/Manager (Planning)

RTI RELEASE - DSDMIP



Queensland
Government

Department of Infrastructure,
Local Government and Planning

Our reference: SDA-0416-029601

Your reference: 2016/19469

18 July 2016

Maranoa Regional Council
P.O. Box 620
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The new date by which DILGP must decide application is 18 August 2016.

If you require any further information, please contact Maria Johnson, Planning Officer on 4616 7307, or via email maria.johnson@dilgp.qld.gov.au who will be able to assist.

Yours sincerely



Ian McHugh
A/Manager (Planning)

RTI RELEASE - DSDMIP

4.1 Concurrence environmentally relevant activities state code

Response column key:
 Achieved
 P/S Performance solution
 N/A Not applicable

Table 4.1.2: All environmentally relevant activities

Performance outcomes	Acceptable outcomes	Response	Comment
Site suitability			
<p>PO1 The choice of the site at which the activity is to be carried out minimises serious environmental harm on areas of high conservation value and special significance, and sensitive land uses at adjacent places.</p>	<p>AO1.1 Both of the following apply:</p> <p>(1) areas of high conservation value and special significance likely to be affected by the activity are identified and evaluated, and any adverse effects on these areas are minimised, including any edge effects on the areas</p> <p>(2) the activity does not have an adverse effect beyond the site.</p> <p>OR</p>	✓	<p>Areas of high conservation value and special significance likely to be affected by the construction of the channel have been assessed and are discussed in the attached Ecological Assessment report prepared by GHD and dated February 2016.</p> <p>The channel has been designed to work in conjunction with the already constructed Stage 1 earthen levee bank and divert water away from the town of Roma in extreme flood events. The effects of re-diverting flood waters will have an impact beyond the site; however the channel has been designed to minimise wider impacts on remnant vegetation, limit inconvenience to nearby land owners affected by the channel and ensure best hydraulic flood mitigation performance.</p> <p>The channel will also help to decrease flows along Bungil Creek at critical points and during flood events.</p>
	<p>AO1.2 Both of the following apply:</p> <p>(1) areas of high conservation value and special significance likely to be affected by the proposal are identified and evaluated and any adverse effects on the areas are minimised, including any edge effects on the areas</p> <p>(2) critical design requirements will prevent emissions having an irreversible or widespread impact on adjacent areas.</p>	✓	<p>Areas of high conservation value and special significance likely to be affected by the construction of the channel have been assessed and are discussed in the attached Ecological Assessment report prepared by GHD and dated February 2016.</p> <p>During extreme flood events, the channel will work to redirect flows to minimise widespread impact on the town of Roma and on adjacent areas.</p>

Performance outcomes	Acceptable outcomes	Response	Comment
Location of activity on the site			
PO2 The location for the activity on the site protects all environmental values relevant to adjacent sensitive land uses.	AO2.1 The location of the activity means there will be no adverse effect on any environmental values. OR	✓	<p>The flood mitigation measures proposed for the town of Roma, including the proposed diversion channel, have been designed to have the least amount of disturbance on environmental values. The attached Ecological Assessment Report prepared by GHD dated February 2016 further describes the environmental communities and contains recommendations for minimising potential impacts.</p> <p>Upon completion of the channel it is anticipated that water flows during flood events will be better managed to protect areas of environmental value.</p>
	AO2.2 Both of the following apply: (1) the activity and components of the activity are located on the site in a way that prevents or minimises adverse effects on the use of adjacent land and allows for effective management of the environmental impacts of the activity. (2) areas used for storing environmentally hazardous materials in bulk are located to take into consideration the likelihood of flooding.	✓	<p>The alignment of the channel has been selected after extensive community consultation, detailed surveying and identification of site constraints. Its alignment has been chosen as it will have the least amount of environmental impact and result in the least amount of inconvenience to those whose land would be affected by the construction of the channel.</p> <p>The channel will prevent and minimise impact on adjoining land uses by redirecting flows away from nearby properties during major flood events.</p> <p>The proposal does not include storing environmentally hazardous materials in bulk.</p>
PO3 The activity avoids adverse impacts on matters of state environmental significance or, where this is not reasonably possible, impacts are minimised and, where this is not reasonably possible, an environmental offset is provided for any significant	AO3.1 Matters of state environmental significance likely to be affected by the activity are identified and evaluated, and any adverse effects on the matters of state environmental significance are avoided or, where this cannot be reasonably achieved, impacts are minimised, and where this cannot be reasonably achieved, an environmental offset is provided for any significant	✓	<p>Matters of state environmental significance are discussed in the attached Ecological Assessment Report prepared by GHD dated February 2016.</p> <p>Water redirected away by the channel during major flood events has been considered in the context of wider</p>

Performance outcomes	Acceptable outcomes	Response	Comment
residual impact to matters of state environmental matters that are prescribed environmental matters.	residual impact to matters of state environmental significance that are prescribed environmental matters. Editor's note: Applications for development should identify anticipated losses, and outline what actions are proposed to be undertaken to offset the loss in accordance with the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offset Policy</i> .		impacts on areas of environmental significance. It has been designed to avoid adverse impacts on these areas to the greatest extent possible.
PO4 Development avoids or minimises and offsets any adverse impacts on riparian areas and ecological corridors located in a strategic environmental area.	AO4.1 Development is set back from a waterway by at least 200 metres. AND	✓	The channel encroaches on the 200m setback but is not considered an impediment to the function of a watercourse. It will only be active during major flood events, when it is expected to work in conjunction with the Stage 1 levee and assist in diverting flows when Bungil Creek is at capacity.
	AO4.2 Development minimises adverse impacts on fish passage during works and the carrying out of the activity. AND	N/A	The channel will not have an adverse impact on fish habitat.
	AO4.3 Clearing of riparian vegetation is minimised or, where this cannot be reasonably achieved, an environmental offset is provided for any significant residual impact. AND	✓	Should an offset be required, MRC would respectfully request that it from part of a condition of approval.
	AO4.4 Natural regeneration of native plant species is facilitated in cleared riparian areas.	N/A	The proposed channel will be re-vegetated with native grasses upon completion of excavation works.
Critical design requirements			
PO5 The design of the facility at which the activity is to be carried out permits the activity to be carried out in accordance with best practice environmental management.	AO5.1 The activity does not involve the storage, production, treatment or release of hazardous contaminants, or involve a regulated structure. OR	N/A	The activity does not involve the storage, production, treatment or release of hazardous contaminants, or involve a regulated structure.
	AO5.2 Development ensures that— (1) all storage provided for hazardous contaminants		

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>includes secondary containment to prevent or minimise releases to the environment from spillage or leaks.</p> <p>(2) regulated structures must comply with the <i>Manual for assessing consequence categories and hydraulic performance of structures</i>, Department of Environment and Heritage Protection, 2013.</p> <p>(3) containers are provided for the storage of hazardous contaminants and are secured to prevent the removal of the containers from the site by a flood event.</p> <p>(4) the design of the facility—</p> <p>(a) prevents or minimises the production of hazardous contaminants and waste, or</p> <p>(b) contains and treats hazardous contaminants, rather than releasing them.</p>	N/A	The activity does not include a facility or include the use of hazardous contaminants.
<p>PO6 Development avoids or minimises any adverse impacts from pollutants on environmental values and water quality objectives for receiving waters (surface and groundwater) on site or leaving a site located in a strategic environmental area.</p>	<p>AO6.1 Development demonstrates current best practice environmental management to meet relevant environmental values and water quality objectives of the <i>Environmental Protection (Water) Policy</i> or relevant to the ERA to be carried out on the site.</p> <p>OR</p>	✓	Refer to the attached Ecological Assessment Report prepared by GHD and the Hydrology and Hydraulics for Stage 2 – Regional Mitigation Options dated January 2014 and the Hydrology and Hydraulics for Stage 2 Local Mitigation Options dated December 2013.
	<p>AO6.2 All stormwater, wastewater, discharges and overflows leaving the site are:</p> <p>(1) treated to the quality of the receiving waters prior to discharge, or</p> <p>(2) reclaimed or re-used such that there is no export of pollutants to receiving waters.</p>	✓	Refer to above reports.

Table 4.1.3: Environmentally relevant activities in a strategic environmental area

Performance outcomes	Acceptable outcomes	Response	Comment
Concurrence ERA 16 (extractive and screening activities)—other than riverine quarry extraction			
Geomorphic processes			
PO1 Bed and bank stability is preserved.	AO1.1 Excavation in the bed of a stream is limited to scour depth. AND	N/A	Excavation is not occurring in the bed of a stream.
	AO1.2 Excavation in the bed of a stream is less than one-third of the bed width. AND	N/A	Excavation is not occurring in the bed of a stream.
	AO1.3 Clearing of in-stream vegetation is limited to the minimum area required for the activity to be carried out. AND	N/A	There is no instream clearing of vegetation.
	AO1.4 The final stream profile does not direct flow into a bank.	N/A	The excavation will not alter the stream profile.
Concurrence ERA 16 (extractive and screening activities)—riverine quarry material extraction			
Geomorphic and hydrological processes			
PO2 Extraction must occur from areas of active deposition including: (1) aggrading bars, or (2) sand slugs, or (3) benches and islands, or (4) sediment pockets in bedrock channels.	No acceptable outcome is prescribed.	N/A	The proposal is for the construction of a diversion channel associated with Stage 2 flood mitigation works. The channel will be excavated to a depth of 3.5 metres and will be approximately 1,200m in length, requiring the excavation of approximately 130,000 tonnes of material. Some of the excavated material will be used in the construction of the Western levee, with the excess material stockpiled at the Roma tip. There will be no ongoing excavation required, only minimal maintenance (mowing and irrigation).
PO3 Excavation must not occur below the current bed level of a watercourse or waters.	No acceptable outcome is prescribed.	N/A	The channel will assist with excess flows in Bungil Creek during flooding events. It will be excavated to a depth to ensure proper function during these extreme weather events.
PO4 Bed and bank stability is preserved during the operation or the carrying out of the activity.	AO4.1 Vehicle access tracks and crossings associated with the activity have scour protection on the bed immediately downstream of the crossing. AND	N/A	Additional vehicle access tracks and crossings of Bungil Creek will not be required. The proposed diversion channel will assist with excess flows during flood events only, and will not be a permeant water diversion.

Performance outcomes	Acceptable outcomes	Response	Comment
	AO4.2 Access ramps and tracks are kept to a minimum and constructed to minimise erosion and turbulence problems at times of high flow. AND		
	AO4.3 Ramps cut into the bank for vehicle access are orientated downstream. AND	N/A	
	AO9.4 Vehicle crossings are orientated perpendicular to the stream channel $\pm 10^\circ$. AND	N/A	
	AO4.5 Where vehicle crossings are required, these will be at stream-bed level; OR if it can be demonstrated that stream-bed level crossings are inappropriate, any culverts for vehicle crossing are aligned with the direction of natural stream flow, when that flow is of a depth equal to the culvert height. AND	N/A	
	AO4.6 The activity includes measures to prevent stormwater erosion in drains and cuttings on the bank. AND	N/A	
	AO4.7 Stream-bed controls are located upstream and downstream of the site. AND	N/A	
	AO4.8 Excavation in the stream-bed is less than one-third of the bed width. AND	N/A	
	AO4.9 Clearing of in-stream vegetation is limited to the minimum area required for the activity to occur.	N/A	
PO5 Bed and bank stability is preserved.	AO5.1 The stream is rehabilitated as near as possible to its natural state after the activity has been conducted. AND	N/A	
	AO5.2 Exposed bank areas are prepared to facilitate	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
	natural regeneration of native plant species. AND		
	AO5.3 Stream-bed and bank controls are retained upstream and downstream of the site of the activity.	N/A	

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8.1 Queensland vegetation management state code

Table 8.1.3: General

Response column key:
 Achieved
 P/S Performance solution
 N/A Not applicable

Performance outcomes	Acceptable outcomes	Response	Comment
Clearing to reasonably avoid and minimise impacts			
<p>PO1 Clearing only occurs where the applicant has demonstrated that the development has first reasonably avoided, and then reasonably minimised the impacts of development.</p>	No acceptable outcome is prescribed.	✓	<p>Remnant vegetation is mapped at both ends of the diversion channel. It is unlikely that the proposal will completely avoid disturbance to these areas. However, measures will be implemented to ensure that there is no unnecessary clearing, including clearly demarcating vegetation during removal and locating any ancillary works within areas that have already been cleared.</p> <p>Remnant vegetation is present all along the length of Bungil Creek and it is unlikely that the channel (given its primary function) would be able to completely avoid disturbance at any location along the watercourse.</p>
Clearing on land in particular circumstances			
<p>PO2 Clearing in an area must not be inconsistent with or impact on any of the following unless a better environmental outcome can be achieved:</p> <ul style="list-style-type: none"> (1) a declared area, or (2) an exchange area, or (3) unlawfully cleared area, or (4) a restoration notice, or 	No acceptable outcome is prescribed.	✓	<p>Vegetation clearing will not be inconsistent with or impact on any of the identified areas in PO2.</p>

Performance outcomes	Acceptable outcomes	Response	Comment
<p>(5) an enforcement notice under the <i>Sustainable Planning Act 2009</i> issued for a vegetation clearing offence, or</p> <p>(6) a compliance notice containing conditions about the restoration of vegetation, or</p> <p>(7) a Land Act notice, or</p> <p>(8) a trespass notice if the trespass related act under the <i>Land Act 1994</i> for the notice is the clearing of vegetation on the relevant land, or</p> <p>(9) an area on a PMAV shown to be category A where the chief executive of the VMA reasonably believes that a vegetation clearing offence is being, or has been, committed in relation to the area.</p>			
Clearing on land that is an environmental offset area			
<p>PO3 Clearing on land that contains an existing environmental offset is consistent with the delivery plan or agreement for the environmental offset area.</p> <p>Editor's note: Environmental offset agreements may also be described as an 'agreed delivery arrangement' or 'delivery agreement'. Clearing should be</p>	<p>AO3.1 Clearing is consistent with the offset delivery plan or agreement for the environmental offset area.</p> <p>OR</p> <p>AO3.2 An additional environmental offset is provided that is consistent with the relevant <i>Queensland Environmental Offsets Policy</i>.</p>	N/A	Clearing will not occur in an area of existing environmental offset.
		N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
consistent with any agreement however described.			
No clearing of vegetation as a result of the material change of use or reconfiguration of a lot			
PO4 Clearing as a result of the material change of use or reconfiguration of a lot will not occur.	No acceptable outcome is prescribed.	N/A	The proposal does not involve a material change of use or a reconfiguration of a lot. The application is for an Operational Work for a diversion channel associated with flood mitigation works.
Clearing that could already be done under an exemption			
PO5 All clearing is limited to clearing that could be done under an exemption for the purpose of the development (as prescribed under Schedule 24, Parts 1 and 2 of the Sustainable Planning Regulation 2009) prior to the material change of use application being approved.	No acceptable outcome is prescribed.	N/A	The application does not involve a material change of use.

Table 8.1.4: Public safety, relevant infrastructure and coordinated projects

Performance outcomes	Acceptable outcomes	Response	Comment
Limits to clearing			
PO1 Clearing is limited to the extent that is necessary: (1) for establishing a necessary fence, firebreak, road or vehicular track, or for constructing necessary built infrastructure (each relevant infrastructure), where the clearing cannot reasonably be avoided or minimised, or (2) as a natural and ordinary	No acceptable outcome is prescribed.	✓	The proposed clearing is required as part of the construction of a high flow diversion channel that is operationally related to flood mitigation works in Roma. The channel will divert flows away from the urban areas of Roma during flood events and help with flows when Bungil Creek reaches capacity. As remnant vegetation runs the length of Bungil Creek it is unlikely that the channel could be located to completely avoid impact. The construction of the channel is considered an integral part of the flood mitigation works in Roma and will play a

Performance outcomes	Acceptable outcomes	Response	Comment
<p>consequence of other assessable development for which a development approval as defined under the repealed <i>Integrated Planning Act 1997</i> was given, or a development application as defined under that Act was made, before 16 May 2003, or</p> <p>(3) to ensure public safety, or</p> <p>(4) for a coordinated project and any associated ancillary works—other than a coordinated project that involves high value agriculture clearing, or irrigated high value agriculture clearing.</p>			pivotal role in ensuring public safety during flood events.
Wetlands			
<p>PO2 Maintain the current extent of vegetation associated with any natural wetland to protect:</p> <p>(1) water quality by filtering sediments, nutrients and other pollutants</p> <p>(2) aquatic habitat</p> <p>(3) terrestrial habitat.</p>	<p>AO2.1 Clearing does not occur in or within 100 metres of any natural wetland. OR</p>	N/A	The proposal will not occur within 100 metres of any natural wetland.
	<p>AO2.2 Clearing only occurs within 100 metres of any natural wetland where:</p> <p>(1) the clearing does not occur within 50 metres of the defining bank of any natural wetland, or</p> <p>(2) the widths stipulated by Table 1 are not exceeded.</p> <p>OR</p>	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>AO2.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impacts from clearing of vegetation associated with a natural wetland.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>	N/A	
Watercourses and drainage features			
<p>PO3 Maintain the current extent of vegetation associated with any watercourse or drainage feature to protect:</p> <p>(1) bank stability by protecting against bank erosion</p> <p>(2) water quality by filtering sediments, nutrients and other pollutants</p> <p>(3) aquatic habitat</p> <p>(4) terrestrial habitat.</p>	<p>AO3.1 Clearing does not occur:</p> <p>(1) in any watercourse or drainage feature, or</p> <p>(2) within the relevant distance stipulated by Table 2 of the defining bank of any watercourse or drainage feature.</p> <p>OR</p>		<p>Remnant vegetation at the eastern and western extent of the proposed diversion channel will be cleared to enable proper function of the proposed channel. Once constructed, the channel, including both its eastern and western extents will be revegetated with native grasses that will help both channel function and serve to ensure bank stability. The vegetation planted will help the channel to filter sediments, nutrients and other pollutants when operational.</p> <p>The primary function of the channel is to redirect flows in flood events. Aside from clearing native vegetation at the time of construction, there will be no ongoing impact on terrestrial habitat.</p>
	<p>AO3.2 Clearing only occurs within any watercourse or drainage feature, or within the relevant distance stipulated by Table 2 of the defining bank of any watercourse or drainage feature where:</p>	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>(1) the clearing does not occur within 5 metres of the defining bank, or</p> <p>(2) the widths stipulated by Table 1 is not exceeded</p> <p>OR</p> <p>AO3.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of vegetation associated with any watercourse or drainage feature.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>	✓	Should DNRM require an environmental offset, MRC would respectfully request that this requirement form part of conditions of development approval.
Connectivity (public safety and relevant infrastructure)			
<p>PO4 In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:</p> <p>(1) is of sufficient size and configured in a way that maintains ecosystem functioning</p> <p>(2) Remains in the landscape despite threatening processes.</p>	AO4.1 Clearing occurs in accordance with Table 3.	N/A	Remnant vegetation occurs along the length of Bungil Creek. Clearing of vegetation associated with the construction of the channel will not reduce vegetation along the length of the watercourse to less than 10ha.

Performance outcomes	Acceptable outcomes	Response	Comment
Connectivity (coordinated projects)			
<p>PO5 In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:</p> <p>(1) is of sufficient size and configured in a way that maintains ecosystem functioning</p> <p>(2) remains in the landscape despite threatening processes</p> <p>or where this is not reasonably possible, maintain the current extent of vegetation.</p>	<p>AO5.1 Clearing occurs in accordance with Table 3.</p> <p>OR</p>	N/A	
	<p>AO5.2 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of vegetation that forms a connectivity area.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.2 (Connectivity areas) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>	✓	Should DNRM require an environmental offset, MRC would respectfully request that this requirement form part of conditions of development approval.
Soil erosion			
<p>PO6 Clearing does not result in:</p> <p>(1) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding</p> <p>(2) any associated loss of chemical, physical or biological fertility—including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients</p> <p>within or outside the lot(s) that are the subject of the application.</p>	<p>AO6.1 Clearing is undertaken in accordance with a sediment and erosion control plan which avoids and minimises land degradation.</p> <p>OR</p>	✓	<p>Construction of the he proposed channel will be undertaken by MRC.</p> <p>Should DNRM require, a sediment and erosion control plan can be submitted prior to construction of the channel. MRC would respectfully request that if the sediment and erosion control plan is required than this requirement form part of conditions of development approval.</p>
	<p>AO6.2 The application is a development application where a local government is the assessment manager.</p>		

Performance outcomes	Acceptable outcomes	Response	Comment
Salinity			
PO7 Clearing does not contribute to land degradation through: (1) waterlogging, or (2) the salinisation of groundwater, surface water or soil.	AO7.1 Clearing does not occur in or within 200 metres of a discharge area or recharge area. OR	✓	Clearing will not occur within 200m of a discharge or recharge area.
	AO7.2 Clearing is less than: (1) 2 hectares, or (2) 10 metres wide.	✓	Clearing is less than 2 hectares.
Conserving endangered and of concern regional ecosystems			
PO8 Maintain the current extent of endangered regional ecosystems and of concern regional ecosystems.	AO8.1 Clearing does not occur in: (1) an endangered regional ecosystem, or (2) an of concern regional ecosystem. OR	✓	Clearing is not occurring in an endangered regional ecosystem or an of concern regional ecosystem.
	AO8.2 Clearing in an endangered regional ecosystem or an of concern regional ecosystem does not exceed the width or area prescribed in Table 1. OR	N/A	
	AO8.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of endangered regional ecosystems and of concern regional ecosystems. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant</i>	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
	<i>Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
Essential habitat			
PO9 Maintain the current extent of essential habitat.	AO9.1 Clearing does not occur in an area of essential habitat. OR		
	AO9.2 Clearing in essential habitat does not exceed the widths or areas prescribed in Table 1. OR		
	AO9.3 Clearing only occurs where an area of essential habitat is isolated and small in size and at risk from threatening processes, for the prescribed species. OR		
	AO9.4 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of essential habitat. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .	✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.
Acid sulfate soils			
PO10 Clearing activities do not result in disturbance of acid sulfate soils or changes to the hydrology of the location that will either:	AO10.1 Clearing does not occur in land zone 1, land zone 2 or land zone 3. OR	✓	The proposed channel is expected to divert flows during flood events. It will not function outside of these extreme weather events. It is unlikely that the clearing of remnant vegetation to construct the channel will result in disturbance

Performance outcomes	Acceptable outcomes	Response	Comment
(1) aerate horizons containing iron sulfides, or (2) mobilise acid or metals.			of acid sulphate soils or changes to the hydrology of the location. Construction of the channel will be undertaken by MRC.
	AO10.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only occurs where: (1) it does not involve mechanical clearing (2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i> , Department of State Development infrastructure and Planning 2014, and with the <i>Soil Management Guidelines in the Queensland Acid Sulfate Soil Technical Manual</i> , Department of Science, Information Technology, Innovation and the Arts, 2014. OR		
	AO10.3 The application is a development application where a local government is the assessment manager.		

Table 8.1.5: Extractive industry

Performance outcomes	Acceptable outcomes	Response	Comment
Limits to clearing for an extractive industry			
PO1 Clearing is limited to the extent that is necessary for:	No acceptable outcome is prescribed.	✓	Construction of the channel will require the extraction of 130,000 tonnes of material. Once constructed, MRC will

Performance outcomes	Acceptable outcomes	Response	Comment
(1) dredging material from the bed of any waters (2) extracting, from a pit or quarry, rock, sand, clay, gravel, loam or other material (3) screening, washing, grinding, milling, sizing or separating material extracted from a pit or quarry (4) carrying out work that is the natural and ordinary consequence of carrying out work mentioned in subparagraphs (1), (2) and (3) above.			surrender the Extractive EA as there will be no ongoing requirement for excavation activities. Only minimal ongoing maintenance will be required, primarily mowing and irrigation.
Clearing is staged			
PO2 Clearing: (1) is staged in line with operational needs that restrict clearing to the current operational area (2) is limited to the area from which material will be extracted, and any reasonably associated infrastructure, within the term of the development approval (3) cannot occur until all required permits are obtained.	No acceptable outcome is prescribed.	✓	Clearing will not occur until all relevant permits and licenses are obtained.

Performance outcomes	Acceptable outcomes	Response	Comment
Wetlands			
PO3 Maintain the current extent of vegetation associated with any natural wetland to protect: (1) water quality by filtering sediments, nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat.	AO3.1 Clearing does not occur in, or within 100 metres of, any natural wetland. OR	✓	Clearing will not occur within 100m of a natural wetland.
	AO3.2 Clearing only occurs within 100 metres of any natural wetland where: (1) the clearing does not occur within 50 metres of the of the natural wetland, or (2) the widths stipulated by Table 1 are not exceeded. OR		
	AO3.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of vegetation associated with a natural wetland. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
Watercourses and drainage features			
PO4 Maintain the current extent of vegetation associated with any watercourse or drainage feature to protect:	AO4.1 Clearing does not occur: (1) in any watercourse or drainage feature (2) within the relevant distance stipulated in Table 2 of the defining bank of any watercourse or drainage		

Performance outcomes	Acceptable outcomes	Response	Comment
(1) bank stability by protecting against bank erosion	feature. OR		
(2) water quality by filtering sediments, nutrients and other pollutants	AO4.2 Clearing only occurs within any watercourse or drainage feature, or within the relevant distance stipulated by Table 2 of the defining bank of any watercourse or drainage feature where: (1) the clearing does not occur within 5 metres of the defining bank, or (2) the widths stipulated by Table 1 is not exceeded. OR AO4.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impacts from clearing of vegetation associated with any watercourse or drainage feature. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
(3) aquatic habitat			Should DNRM require an environmental offset, MRC would respectfully request that this request form part of conditions of development approval.
(4) terrestrial habitat.			
Connectivity			
PO5 In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:	AO5.1 Clearing occurs in accordance with Table 3.		

Performance outcomes	Acceptable outcomes	Response	Comment
(1) is of sufficient size and configured in a way that maintains ecosystem functioning (2) remains in the landscape despite threatening processes.			
Salinity			
PO6 Clearing does not contribute to land degradation through: (1) waterlogging, or (2) the salinisation of groundwater, surface water or soil.	AO6.1 Clearing does not occur in or within 200 metres of a discharge area or recharge area. OR	✓	Clearing does not occur within 200 metres of a discharge area or recharge area.
	AO6.2 Clearing is less than: (1) 2 hectares, or (2) 10 metres wide.		
Conserving endangered and of concern regional ecosystems			
PO7 Maintain the current extent of endangered regional ecosystems and of concern regional ecosystems.	AO7.1 Clearing does not occur in: (1) an endangered regional ecosystem, or (2) an of concern regional ecosystem. OR	✓	Clearing does not occur in an endangered regional ecosystem or an of concern regional ecosystem.
	AO7.2 Clearing in an endangered regional ecosystem or an of concern regional ecosystem does not exceed the width or area prescribed in Table 1. OR		
	AO7.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has		Should DNRM require an environmental offset, MRC would

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>been reasonably minimised, an environmental offset is provided for any significant residual impact from the clearing of endangered regional ecosystems and of concern regional ecosystems.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>	✓	respectfully request that this requirement form part of conditions of development approval.
Essential habitat			
PO8 Maintain the current extent of essential habitat.	AO8.1 Clearing does not occur in an area of essential habitat. OR	✓	Clearing does not occur in an area of essential habitat.
	AO8.2 Clearing in essential habitat does not exceed the width or area prescribed in Table 1. OR		
	AO8.3 Clearing only occurs where an area of essential habitat is isolated and small in size and at risk from threatening processes, for the prescribed species. OR		
	AO8.4 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from the clearing of essential habitat. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to	✓	Should DNRM require an environmental offset, MRC would respectfully request that this requirement form part of conditions of development approval.

Performance outcomes	Acceptable outcomes	Response	Comment
	Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
Acid sulfate soils			
<p>PO9 Clearing activities do not result in the disturbance of acid sulfate soils or changes to the hydrology of the location that will either:</p> <p>(1) aerate horizons containing iron sulfides, or</p> <p>(2) mobilise acid or metals.</p>	<p>AO9.1 Clearing does not occur in land zone 1, land zone 2 or land zone 3.</p> <p>OR</p>	✓	<p>Clearing will not result in the disturbance of acid sulfate or changes to the hydrology of the location.</p> <p>The construction of channel will be undertaken by MRC.</p>
	<p>AO9.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only occurs where:</p> <p>(1) it does not involve mechanical clearing</p> <p>(2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i>, Department of State Development, Infrastructure and Planning, 2014, and with the <i>Soil Management Guidelines in the Queensland Acid Sulfate Soil Technical Manual</i>, Department of Science, Information Technology, Innovation and the Arts, 2014.</p> <p>OR</p>		
	<p>AO9.3 The application is a development application where a local government is the assessment manager.</p>		

Table 8.1.6: High value agriculture clearing and irrigated high value agriculture clearing

Performance outcomes	Acceptable outcomes	Response	Comment
High value and irrigated high value agriculture clearing			

Performance outcomes	Acceptable outcomes	Response	Comment
<p>Clearing is only for high value agriculture clearing or irrigated high value agriculture clearing where:</p> <ol style="list-style-type: none"> (1) the land is suitable for agriculture having regard to topography, climate and soil attributes (2) there is no alternative site on the land for the clearing (3) a business plan, for activities related to the clearing, demonstrates the viability of the activities (4) where a regulation prescribes restrictions relevant to the clearing, these restrictions are complied with (5) if for irrigated high value agriculture clearing, demonstrate that the owner of the land is an eligible owner who has, or may have, access to enough water for establishing, cultivating and harvesting the crops to which the clearing relates. <p>(1) Editor's note: Section 22DAB(3) provides for a regulation to prescribe restrictions for certain matters related to high value agriculture clearing or irrigated high value agriculture clearing.</p>	No acceptable outcome is prescribed.	N/A	The clearing is in relation to a diversion channel associated with flood mitigation works.

Performance outcomes	Acceptable outcomes	Response	Comment
Wetlands			
PO2 Maintain the current extent of vegetation associated with any natural wetland to protect: (1) water quality by filtering sediments, nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat.	AO2.1 Clearing does not occur in, or within 100 metres of, any natural wetland. OR	✓	Clearing will not occur in, or within, 100m of any natural wetland.
	AO2.2 Clearing only occurs within 100 metres of any natural wetland where: (1) the clearing does not occur within 50 metres of the natural wetland, or (2) the widths stipulated by Table 1 are not exceeded. OR		
	AO2.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from the clearing of vegetation associated with a natural wetland. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
Watercourses and drainage features			
PO3 Maintain the current extent of vegetation associated with any watercourse or drainage feature to protect:	AO3.1 Clearing does not occur: (1) in any watercourse or drainage feature (2) within the relevant distance stipulated in Table 2 of the defining bank of any watercourse or drainage		

Performance outcomes	Acceptable outcomes	Response	Comment
(1) bank stability by protecting against bank erosion	feature. OR		
(2) water quality by filtering sediments, nutrients and other pollutants	AO3.2 Clearing only occurs within any watercourse or drainage feature, or within the relevant distance stipulated by Table 2 of the defining bank of any watercourse or drainage feature where:		
(3) aquatic habitat	(1) the clearing does not occur within 5 metres of the defining bank, or		
(4) terrestrial habitat.	(2) the widths stipulated by Table 1 is not exceeded. OR		
	AO3.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of vegetation associated with any watercourse or drainage feature. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .	✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.
Connectivity area			
PO4 In consideration of vegetation on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that:	AO4.1 Clearing occurs in accordance with Table 3.	✓	The proposed channel will require the clearing of a vegetation in a defined area of the channel. The construction and function of the channel will not impact on other vegetation on the lot or vegetation on adjoining lots.

Performance outcomes	Acceptable outcomes	Response	Comment
<p>(1) is of sufficient size and configured in a way that maintains ecosystem functioning</p> <p>(2) remains in the landscape despite threatening processes.</p>			
Soil erosion			
<p>PO5 Clearing:</p> <p>(1) does not result in soil erosion stemming from:</p> <p>(a) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding</p> <p>(b)</p> <p>(c) any associated loss of chemical, physical or biological fertility—including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients</p> <p>(2) maintains ecological processes, within or outside the lot(s) that are the subject of the application.</p>	<p>AO5.1 Clearing is undertaken in accordance with a sediment and erosion control plan which avoids and minimises land degradation.</p>		
Salinity			
<p>PO6 Clearing does not contribute to land degradation through:</p> <p>(1) waterlogging, or</p> <p>(2) the salinisation of groundwater,</p>	<p>AO6.1 Clearing of vegetation does not occur in, or within 200 metres of, a discharge area or recharge area.</p> <p>OR</p> <p>AO6.2 Clearing of vegetation is less than:</p>	✓	Clearing the vegetation will not occur in, or within, 200 metres of a discharge area or recharge area.

Performance outcomes	Acceptable outcomes	Response	Comment
surface water or soil.	(1) 2 hectares, or (2) 10 metres wide.		
Conserving endangered and of concern regional ecosystems			
PO7 Maintain the current extent of endangered regional ecosystems and of concern regional ecosystems, or provide a significant beneficial outcome where the clearing cannot be reasonably avoided, and impacts reasonably minimised.	AO7.1 Clearing does not occur in: (1) an endangered regional ecosystem, or (2) an of concern regional ecosystem. OR	✓	Clearing does not occur in an endangered regional ecosystem or an of concern regional ecosystem.
	AO7.2 Clearing in an endangered regional ecosystem, or an of concern regional ecosystem does not exceed the width or area prescribed in Table 1. OR		
	AO7.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from the clearing of endangered regional ecosystem or of concern regional ecosystems, or a significant beneficial outcome is provided for the clearing of an endangered regional ecosystem or of concern regional ecosystems. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .	✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.
Essential habitat			

Performance outcomes	Acceptable outcomes	Response	Comment
(2) PO8 Maintain the current extent of essential habitat.	AO8.1 Clearing of vegetation does not occur in an area of essential habitat. OR	✓	Clearing will not occur in an area of essential habitat.
	AO8.2 Clearing of vegetation in essential habitat does not exceed the width or area prescribed in Table 1. OR		
	AO8.3 Clearing only occurs where an area of essential habitat is isolated and small in size and at risk from threatening processes, for the prescribed species. OR		
	AO8.4 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact for the clearing of essential habitat. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .	✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.
Acid sulfate soils			
PO9 Clearing activities do not result in the disturbance of acid sulfate soils or changes to the hydrology of the location that will either: (1) aerate horizons containing iron sulfides, or	AO9.1 Clearing does not occur in land zone 1, land zone 2 or land zone 3. OR	✓	Clearing activities would not result in the disturbance of acid sulfate soils or changes to the hydrology of the location.
	AO9.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only occurs where: (1) it does not involve mechanical clearing		

Performance outcomes	Acceptable outcomes	Response	Comment
(2) mobilise acid or metals.	(2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i> , Department of State Development, Infrastructure and Planning, 2014, and with the <i>Soil Management Guidelines in the Queensland Acid Sulfate Soil Technical Manual</i> , Department of Science, Information Technology, Innovation and the Arts, 2014. (1) OR (2)		
	AO9.3 The application is a development application where a local government is the assessment manager.		

Table 8.1.7: Necessary environmental clearing

Performance outcomes	Acceptable outcomes	Response	Comment
Limits to clearing			
PO1 Clearing is reasonably avoided, or is limited to the extent that is necessary to: (1) restore the ecological and environmental condition of land, or (2) divert existing natural channels in a way that replicates the existing form of the natural channels, or (3) prepare for the likelihood of a natural disaster, or (4) remove contaminants from land.	No acceptable outcome is prescribed.		

Performance outcomes	Acceptable outcomes	Response	Comment
Wetlands (land restoration, natural disaster preparation)			
PO2 Maintain vegetation associated with any natural wetland to protect: (1) water quality by filtering sediments, nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat (3) or where this is not reasonably possible, rehabilitate.	AO2.1 Clearing does not occur: (1) in any natural wetland, or (2) within 100 metres of any natural wetland. OR	N/A	Clearing will not occur in, or within 100m of, a natural wetland.
	AO2.2 Clearing only occurs within 100 metres of any natural wetland where: (1) the clearing does not occur within 50 metres of the natural wetland, or (2) the widths stipulated by Table 1 are not exceeded. OR		
	AO2.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated in accordance with an environmental clearing management plan.	✓	Once constructed, the channel will be vegetated with native grasses to assist with channel function.
Wetlands (natural channel diversion and contaminants removal)			
PO3 Maintain vegetation associated with any natural wetland to protect: (1) water quality by filtering sediments, nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat	AO3.1 Clearing does not occur: (1) in any natural wetland, or (2) within 100 metres of any natural wetland. OR	N/A	Clearing will not occur in, or within 100m of, a natural wetland.
	AO3.2 Clearing only occurs within 100 metres of any natural wetland where:		

Performance outcomes	Acceptable outcomes	Response	Comment
(4) or where this is not reasonably possible, rehabilitate or maintain the current extent.	(1) the clearing does not occur within 50 metres of the natural wetland, or (2) the widths stipulated by Table 1 are not exceeded. OR		
	AO3.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated. OR		
	AO3.4 Where clearing is for natural channel diversion or contaminants removal, and it can be demonstrated that clearing cannot be reasonably avoided, and: (1) the extent of clearing has been reasonably minimised (2) the cleared area cannot be reasonably rehabilitated an environmental offset is provided for any significant residual impacts from clearing vegetation associated with a natural wetland. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
Watercourses and drainage features (land restoration and natural disaster preparation)			
PO4 Maintain vegetation associated with	AO4.1 Clearing does not occur:		

Performance outcomes	Acceptable outcomes	Response	Comment
any watercourse or drainage feature to protect: (1) bank stability by protecting against bank erosion (2) water quality by filtering sediments, nutrients and other pollutants (3) aquatic habitat (4) terrestrial habitat. (5) or where this is not reasonably possible, rehabilitate.	(1) within any watercourse or drainage feature, or (2) within the relevant distances stipulated in Table 2 from each defining bank of any watercourse or drainage feature. OR		
	AO4.2 Clearing only occurs within any watercourse or drainage feature, or within the relevant distance stipulated by Table 2 of the defining bank of any watercourse or drainage feature where: (1) the clearing does not occur within 5 metres of the defining bank of any watercourse or drainage feature, or (2) the widths stipulated by Table 1 are not exceeded. OR		
	AO4.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated.	✓	Once constructed, the channel will be vegetated with native grasses to assist with channel function.
Watercourses and drainage features (natural channel diversion and contaminants removal)			
PO5 Maintain vegetation associated with any watercourse or drainage feature to protect: (1) bank stability by protecting against bank erosion	AO5.1 Clearing does not occur: (1) within any watercourse or drainage feature, or (2) within the relevant distances stipulated in Table 2 from each defining bank of any watercourse or drainage feature.		

Performance outcomes	Acceptable outcomes	Response	Comment
(2) water quality by filtering sediments, nutrients and other pollutants	OR		
(3) aquatic habitat	AO5.2 Clearing only occurs within any watercourse or drainage feature, or within the relevant distance stipulated by Table 2 of the defining bank of any watercourse or drainage feature where:		
(4) terrestrial habitat	(1) the clearing does not occur within 5 metres of the defining bank of any watercourse or drainage feature, or		
(6) or where this is not reasonably possible, rehabilitate or maintain the current extent.	(2) the widths stipulated by Table 1 are not exceeded. OR		
	AO5.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated. OR		
	AO5.4 Where it can be demonstrated that clearing cannot be reasonably avoided, and: (1) the extent of clearing has been reasonably minimised (2) the cleared area cannot be reasonably rehabilitated an environmental offset is provided for any significant residual impact from clearing of vegetation associated with a watercourse or drainage feature. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.3 (Wetlands and watercourses) of the	✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.

Performance outcomes	Acceptable outcomes	Response	Comment
	<i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .		
Connectivity (land restoration and natural disaster preparation)			
PO6 In consideration of vegetation on the subject lot(s), and in the landscape adjacent to the subject lot(s), vegetation is retained that: (1) is of sufficient size and configured in a way that maintains ecosystem functioning (2) remains in the landscape despite threatening processes (7) or where this is not reasonably possible, rehabilitate.	AO6.1 Clearing occurs in accordance with Table 3. OR		
	AO6.2 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated.	✓	Once constructed, the channel will be vegetated with native grasses to assist with channel function and integrate the development into the natural environment.
Connectivity (natural channel diversion and contaminants removal)			
PO7 In consideration of vegetation mapped on the subject lot(s) and in the landscape adjacent to the subject lot(s), vegetation is retained that: (1) is of sufficient size and configured in a way that maintains ecosystem functioning (2) remains in the landscape despite threatening processes (8) or where this is not reasonably possible, rehabilitate, or maintain the current extent.	AO7.1 Clearing occurs in accordance with Table 3. OR		
	AO7.2 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated. OR		
	AO7.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and: (1) the extent of clearing has been reasonably minimised	✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>(2) the cleared area cannot be reasonably rehabilitated</p> <p>an environmental offset is provided for any significant residual impact from clearing vegetation that forms a connectivity area.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.2 (Connectivity areas) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>		
Soil erosion			
<p>PO8 Clearing does not result in or accelerate land degradation resulting from:</p> <p>(1) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding</p> <p>(2) any associated loss of chemical, physical or biological fertility—including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and nutrients</p> <p>(9) within and outside the lot(s) that are the subject of the application.</p>	<p>AO8.1 Clearing is undertaken in accordance with a sediment and erosion control plan which reasonably avoids and minimises land degradation.</p>	✓	Clearing will not result in or accelerate land degradation.
Salinity			
<p>PO9 Clearing does not contribute to, or</p>	<p>AO9.1 Clearing does not occur in, or within 200 metres of,</p>	✓	Clearing will not occur in, or within, 200 metres of a

Performance outcomes	Acceptable outcomes	Response	Comment
accelerate, land degradation through: (1) waterlogging, or (2) the salinisation of groundwater, surface water or soil.	a discharge area or recharge area. OR		discharge area or recharge area.
	AO9.2 Clearing is less than: (1) 2 hectares, or (2) 10 metres wide.		
Essential habitat (land restoration and natural disaster preparation)			
PO10 Clearing does not occur in essential habitat, or where this is not reasonably possible, rehabilitate where the clearing cannot be reasonably avoided and impacts reasonably minimised.	AO10.1 Clearing does not occur in essential habitat. OR	✓	Clearing would not occur in an essential habitat.
	AO10.2 Clearing in essential habitat does not exceed the widths or areas prescribed in Table 1. OR		
	AO10.3 Clearing only occurs where an area of essential habitat is isolated and small in size and at risk from threatening processes, for the prescribed species. OR		
	AO10.4 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated.		
Essential habitat (natural channel diversion and contaminants removal)			
(10) PO11 Clearing does not occur in essential habitat, or where this cannot reasonably be avoided, rehabilitate or maintain the current extent of essential habitat.	AO11.1 Clearing does not occur in essential habitat. OR	✓	Clearing would not occur in an essential habitat.
	AO11.2 Clearing in essential habitat does not exceed the widths or areas prescribed in Table 1. OR		

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>AO11.3 Clearing only occurs where an area of essential habitat is isolated and small in size and at risk from threatening processes, for the prescribed species. OR</p>		
	<p>AO11.4 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated. OR</p>		
	<p>AO11.5 Where it can be demonstrated that clearing cannot be reasonably avoided, and:</p> <p>(1) the extent of clearing has been reasonably minimised (2) the cleared area cannot be reasonably rehabilitated an environmental offset is provided for any significant residual impact from clearing of essential habitat.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>		
Clearing regional ecosystems (land restoration and natural disaster preparation)			
(11) PO12 Clearing does not occur in endangered regional ecosystems, of concern regional ecosystems or least concern regional ecosystems, or where this is not reasonably possible, rehabilitate where the clearing cannot be reasonably	<p>AO12.1 Clearing does not occur in:</p> <p>(1) an endangered regional ecosystem, or (2) an of concern regional ecosystem, or (3) a least concern regional ecosystem. OR</p>	✓	The channel would be vegetated with native grasses that would assist with channel function and help integrate the channel in the natural environment.

Performance outcomes	Acceptable outcomes	Response	Comment
avoided and impacts reasonably minimised.	AO12.2 Clearing: (1) maintains the natural floristic composition and range of sizes across the application area, or (2) does not exceed the widths or areas prescribed in Table 1. OR		
	AO12.3 Where it can be demonstrated that clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, the cleared area is rehabilitated.		
	Clearing regional ecosystems (natural channel diversion and contaminants removal)		
(12) PO13 Clearing does not occur in endangered regional ecosystems, of concern regional ecosystems or least concern regional ecosystems, or where this cannot be reasonably avoided, rehabilitate or maintain the current extent of endangered regional ecosystems and of concern regional ecosystems.	AO13.1 Clearing does not occur in: (1) an endangered regional ecosystem, or (2) an of concern regional ecosystem, or (3) a least concern regional ecosystem. OR		
	AO13.2 Clearing: (1) maintains the natural floristic composition and range of sizes across the application area, or (2) does not exceed the widths or areas prescribed in Table 1. OR		

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>AO13.3 Where it can be demonstrated that clearing cannot be reasonably avoided and the extent of clearing has been reasonably minimised, endangered regional ecosystems and of concern regional ecosystems are rehabilitated.</p> <p>OR</p> <p>AO13.4 Where clearing an endangered regional ecosystem or of concern regional ecosystem and it can be demonstrated that clearing cannot be reasonably avoided, minimised or rehabilitated, an environmental offset is provided for any significant residual impact from clearing an endangered regional ecosystem or of concern regional ecosystem.</p> <p>Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i>.</p>		
		✓	Should DNRM require an environmental offset, MRC would respectfully request that this form part of conditions of development approval.
Acid sulfate soils			
<p>PO14 Clearing does not result in, or accelerate, the disturbance of acid sulfate soils or changes to the hydrology of the location that will either:</p> <p>(1) aerate horizons containing iron sulfides, or</p> <p>(2) mobilise acid or metals.</p>	<p>AO14.1 Clearing vegetation does not occur in:</p> <p>(1) land zone 1, land zone 2 or land zone 3</p> <p>(2) areas below the 5 metre Australian Height Datum where acid sulfate soils are present.</p> <p>OR</p>	✓	Clearing will not result in, or accelerate, the disturbance of acid sulfate soils or changes to the hydrology of the location.
	<p>AO14.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only</p>		

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>occurs where:</p> <p>(1) it does not involve mechanical clearing</p> <p>(2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i>, Department of State Development, Infrastructure and Planning, 2014, and with the <i>Soil Management Guidelines</i> in the <i>Queensland Acid Sulfate Soil Technical Manual</i>, Department of Science, Information Technology, Innovation and the Arts, 2014.</p> <p>OR</p>		
	<p>AO14.3 The application is a development application where a local government is the assessment manager.</p>		

Table 8.1.8: Weed or pest management

Performance outcomes	Acceptable outcomes	Response	Comment
Limits to clearing for weed or pest management			
<p>PO1 Clearing is limited to the extent necessary to:</p> <p>(1) control non-native plants or declared pests, or</p> <p>(2) provide access for control of non-native plants or declared pests if no alternative route exists.</p>	<p>No acceptable outcome is prescribed</p>	<p>✓</p>	<p>Clearing is required to construct a diversion channel associated with flood mitigation works. The works involve clearing of vegetation at the eastern and western extent of the channel. Once the channel is constructed, MRC will continue ongoing maintenance of the channel including routine pest control.</p>
Wetlands			

Performance outcomes	Acceptable outcomes	Response	Comment
PO2 Maintain vegetation associated with a natural wetland to protect: (1) water quality by filtering sediments, nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat.	AO2.1 Mechanical clearing does not occur within 5 metres of a natural wetland. AND	N/A	The application is for the construction for a diversion channel associated with flood mitigation works for the town of Roma. It is not for the purpose of Mechanical weed control.
	AO2.2 Clearing only occurs: (1) within a 1.5 meter radius from the base of the stem of individual non-native or declared plants, or (2) to the extent necessary to provide access for the control of the non-native or declared plants. AND		
	AO2.3 Clearing for access tracks running parallel to a natural wetland is not to be located within 10 metres of the natural wetland.		
Watercourses and drainage features			
PO3 Maintain vegetation associated with any watercourse or drainage feature to protect: (1) bank stability by protecting against bank erosion (2) water quality by filtering sediments, nutrients and other pollutants (3) aquatic habitat (4) terrestrial habitat.	AO3.1 Mechanical clearing does not occur within 20 metres of the defining bank of a watercourse or drainage feature. AND		
	AO3.2 Clearing only occurs: (1) within a 1.5 metre radius from the base of the stem of individual non-native or declared plants, or (2) to the extent necessary to provide access for the control of the non-native or declared plant. AND		
	AO3.3 Clearing for access tracks running parallel to a		

Performance outcomes	Acceptable outcomes	Response	Comment
	watercourse or drainage feature are not be located within 10 metres of the defining bank of the watercourse or drainage feature.		
Soil erosion			
PO4 Clearing does not result in: (1) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding (2) any associated loss of chemical, physical or biological fertility—including, but not limited to water holding capacity, soil structure, organic matter, soil biology and nutrients within or outside the lot(s) that are the subject of the application.	AO4.1 Mechanical clearing retains 50 per cent of the ground cover (dead or alive) in each 50 by 50 metre (0.25 hectare) area. AND	✓	Once constructed, the channel will be revegetated with native grasses that will allow proper channel function and will help to prevent mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion or scalding.
	AO4.2 New access tracks, necessary to gain access to a weed infestation, do not: (1) exceed 5 metres in width (2) de-stabilise the banks of any watercourse or drainage feature as a result of crossing construction or use.	N/A	No new access tracks are proposed along the watercourse.
Conserving remnant vegetation that are regional ecosystems			
PO5 Clearing activities: (1) maintain the natural floristic composition and range of sizes of each species of the regional ecosystem evenly spaced across the application area (2) do not remove mature trees.	AO5.1 Mechanical clearing does not exceed the limitations defined in Table 4. AND	N/A	The application is for the construction for a diversion channel associated with flood mitigation works for the town of Roma. It is not for the purpose of Mechanical weed control.
	AO5.2 Soil absorbed broad spectrum herbicides are not: (1) applied via aerial application, or (2) ground-applied on a broad acre basis, or	N/A	The application is for the construction for a diversion channel associated with flood mitigation works for the town of Roma. It is not for the purpose of Mechanical weed control.

Performance outcomes	Acceptable outcomes	Response	Comment
	(3) used inconsistently with the product directions.		
Requirements for dense regional ecosystems			
(13) PO6 The removal of canopy vegetation does not occur in the regional ecosystems listed in Table 5.	AO6.1 Clearing and associated soil disturbance in regional ecosystems listed in Table 5 occurs only: <ul style="list-style-type: none"> (1) within a 1.5 metre radius from the base of the stem or individual non-native or declared plants, or (2) to the extent necessary to provide access for the control of the non-native or declared plant. 	N/A	
Acid sulfate soils			
PO7 Clearing activities do not result in disturbance of acid sulfate soils or changes to the hydrology of the location that will either: <ul style="list-style-type: none"> (1) aerate horizons containing iron sulfides, or (2) mobilise acid or metals. 	AO7.1 Clearing does not occur in land zone 1, land zone 2 or land zone 3. OR	N/A	
	AO7.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only occurs where: <ul style="list-style-type: none"> (1) it does not involve mechanical clearing (2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i>, Department of State Development, Infrastructure and Planning, 2014, and with the <i>Soil Management Guidelines</i> in the <i>Queensland Acid Sulfate Soil Technical Manual</i>, Department of Science, Information Technology, Innovation and the Arts, 2014. OR	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
	(a) AO7.3 The application is a development application where a local government is the assessment manager.	N/A	

Table 8.1.9: Thinning

Performance outcomes	Acceptable outcomes	Response	Comment
Clearing limited to specific regional ecosystems			
PO1 Clearing for the purpose of thinning does not occur in the regional ecosystems listed in Table 6, except where clearing is solely for removing native plants not naturally occurring within the regional ecosystem.	No acceptable outcome is prescribed.	N/A	The application is for the construction of a channel associated with flood mitigation works. It is not for the purpose of thinning.
Retained vegetation density			
PO2 Clearing must retain a density of vegetation consistent with the natural floristic composition of the regional ecosystem.	AO2.1 The vegetation density is consistent with a representative reference site of the same regional ecosystem. OR	✓	The construction of the channel will not result in a density reduction of vegetation that is inconsistent with similar ecosystems.
	AO2.2 The vegetation density is consistent with the natural floristic composition of the regional ecosystem as demonstrated by, bio condition benchmarks for regional ecosystem condition assessment, the <i>Regional Ecosystem Description Database</i> and supplementary data, or the Queensland Herbarium.		
Wetlands			
PO3 Maintain vegetation associated with any natural wetland to protect: (1) water quality by filtering sediments,	AO3.1 Mechanical clearing does not occur within 20 metres of a natural wetland.	N/A	Clearing will not occur within 20 metres of a natural wetland.

Performance outcomes	Acceptable outcomes	Response	Comment
nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat.			
Watercourses and drainage features			
PO4 Maintain vegetation associated with any watercourse or drainage feature to protect: (1) bank stability by protecting against bank erosion (2) water quality by filtering sediments, nutrients and other pollutants (3) aquatic habitat (4) terrestrial habitat.	AO4.1 Mechanical clearing does not occur within 20 metres from the defining bank of a watercourse or drainage feature.	✓	The application is for the construction of a diversion channel associated with flood mitigation works. Once constructed the channel will be vegetated with native grasses that will assist with bank stability and protect against bank erosion.
Soil erosion			
PO5 Clearing does not result in soil erosion stemming from: (1) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding (2) any associated loss of chemical, physical or biological fertility — including, but not limited to water holding capacity, soil structure, organic matter, soil biology, and	AO5.1 Mechanical clearing must: (1) retain 50per cent of the ground cover (dead or alive) in each 50 by 50 metre (0.25 hectare) area (2) not occur on slopes in excess of 10 per cent.	✓	The construction of a channel will not result in soil erosion. The channel will be replanted with native grasses that will assist in preventing soil erosion.

Performance outcomes	Acceptable outcomes	Response	Comment
nutrients within or outside the lot(s) that are the subject of the application.			
Conserving remnant vegetation that are regional ecosystems			
PO6 Clearing of vegetation: (1) maintains the natural floristic composition and range of sizes of each species of the regional ecosystem evenly spaced across the application area (2) does not remove habitat trees.	AO6.1 Thinning must retain mature trees and habitat trees. AND	N/A	The application is for a diversion channel not associated with thinning.
	AO6.2 Thinning must retain immature trees to: (1) return the immature tree density to a more typical level (2) retain representatives of all the species that occur in the regional ecosystem in about the proportion to what would normally exist (3) retain the range of tree sizes that would normally occur (4) space immature trees as evenly as possible across the thinned area. AND	N/A	The application is for a diversion channel not associated with thinning.
	AO6.3 Thinning is not undertaken: (1) by ground application of soil absorbed broad spectrum herbicides, or (2) aerial application of any herbicides.	N/A	
Acid sulfate soils			

Performance outcomes	Acceptable outcomes	Response	Comment
PO7 Clearing activities do not result in disturbance of acid sulfate soils or changes to the hydrology of the location that will either: (1) aerate horizons containing iron sulfides, or (2) mobilise acid or metals.	A07.1 Clearing does not occur in land zone 1, land zone 2 or land zone 3. OR		
	A07.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only occurs where: (1) it does not involve mechanical clearing (2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i> , Department of State Development, Infrastructure and Planning, 2014, and with the <i>Soil Management Guidelines in the Queensland Acid Sulfate Soil Technical Manual a</i> , Department of Science, Information Technology, Innovation and the Arts, 2014. OR		
	A07.3 The application is a development application where a local government is the assessment manager.		

Table 8.1.10: Encroachment

Performance outcomes	Acceptable outcomes	Response	Comment
Clearing limited to specific regional ecosystems			
PO1 Clearing for the purpose of encroachment only occurs in the regional ecosystems listed in Table 7.	No acceptable outcome is prescribed.	N/A	Clearing is not for the purpose of encroachment.
Mature trees			
PO2 Clearing for the purpose of	A02.1 Clearing of encroachment, based on ground	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
<p>encroachment:</p> <p>(1) results in the restoration of the regional ecosystem</p> <p>(2) does not remove habitat trees.</p>	<p>assessment:</p> <p>(1) retains all mature trees, habitat trees and groves</p> <p>(2) retains representatives of all immature, non-encroaching species</p> <p>(3) may remove non-native species and native species, that do not belong in that regional ecosystem, from the clearing area.</p> <p>OR</p>		
	<p>AO2.2 Clearing of encroachment is limited to:</p> <p>(1) those areas where encroachment was not visible on aerial photographs taken in the year 1950 to present</p> <p>(2) retain habitat trees and mature trees of all non-encroaching species.</p>	N/A	
Wetlands			
<p>PO3 Maintain vegetation associated with a wetland to protect:</p> <p>(1) water quality by filtering sediments, nutrients and other pollutants</p> <p>(2) aquatic habitat</p> <p>(3) terrestrial habitat.</p>	<p>AO3.1 Mechanical clearing does not occur within 20 metres of the defining bank of a natural wetland.</p> <p>AND</p>	N/A	
	<p>AO3.2 The application of soil absorbed broad spectrum herbicides does not occur within 50 metres of the defining bank of a natural wetland.</p>	N/A	
Watercourses and drainage features			
<p>PO4 Clearing associated with a</p>	<p>AO4.1 Mechanical clearing does not occur within 20</p>		

Performance outcomes	Acceptable outcomes	Response	Comment
<p>watercourse or drainage feature is protected in a manner that maintains:</p> <p>(1) bank stability by protecting against bank erosion</p> <p>(2) water quality by filtering sediments, nutrients and other pollutants</p> <p>(3) aquatic habitat</p> <p>(4) terrestrial habitat.</p>	<p>metres of the defining bank of a watercourse or drainage feature.</p> <p>AND</p>		
	<p>AO4.2 The application of soil absorbed broad spectrum herbicides does not occur within 50 metres of the defining bank of a watercourse or drainage feature.</p>	N/A	
Soil erosion			
<p>PO5 Clearing does not result in:</p> <p>(1) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding</p> <p>(2) any associated loss of chemical, physical or biological fertility — including, but not limited to water holding capacity, soil structure, organic matter, soil biology and nutrients</p> <p>within or outside the lot(s) that are the subject of the application.</p>	<p>AO5.1 Mechanical clearing:</p> <p>(1) is limited to slopes less than 5 per cent</p> <p>(2) retains 50 per cent of the ground cover (dead or alive) in each 50 by 50 metre (0.25 hectare) area.</p>	N/A	
Acid sulfate soils			
<p>PO6 Clearing activities do not result in disturbance of acid sulfate soils or</p>	<p>AO6.1 Clearing does not occur in land zone 1, land zone 2 or land zone 3.</p>	N/A	

Performance outcomes	Acceptable outcomes	Response	Comment
changes to the hydrology of the location that will either:	OR		
(1) aerate horizons containing iron sulfides, or	AO6.2 Clearing in land zone 1, land zone 2 or land zone 3 in areas below the 5 metre Australian Height Datum only occurs where:	N/A	
(2) mobilise acid or metals.	(1) it does not involve mechanical clearing (2) the acid sulfate soils are managed consistent with the <i>State Planning Policy</i> , Department of State Development, Infrastructure and Planning, 2014, and with the <i>Soil Management Guidelines</i> in the <i>Queensland Acid Sulfate Soil Technical Manual</i> , Department of Science, Information Technology, Innovation and the Arts, 2014.		
	OR		
	AO6.3 The application is a development application where a local government is the assessment manager.	N/A	

Table 8.1.11: Fodder

Performance outcomes	Acceptable outcomes	Response	Comment
Limits to fodder harvesting			
PO1 Clearing for fodder harvesting:	No acceptable outcome is prescribed.	N/A	The application is not for fodder harvesting.
(1) occurs only in the following areas:			
(a) Balonne Shire Council			
(b) Barcaldine Shire Council			
(c) Barcoo Shire Council			

Performance outcomes	Acceptable outcomes	Response	Comment
(d) Blackall Tambo Regional Council (e) Bulloo Shire Council (f) Diamantina Shire Council (g) Goondiwindi Regional Council (h) Longreach Regional Council (i) Maranoa Regional Council (j) Murweh Shire Council (k) Paroo Shire Council (l) Quilpie Shire Council (m) Western Downs Regional Council (n) Winton Shire Council (2) is limited to the extent necessary to provide fodder for stock.			
Conserving vegetation that contains endangered regional ecosystems and of concern regional ecosystems			
PO2 Clearing: (1) does not occur in vegetation that contains endangered regional ecosystems (2) is limited to vegetation that contains of concern regional ecosystems	No acceptable outcome is prescribed.		

Performance outcomes	Acceptable outcomes	Response	Comment
6.5.3, 11.5.13, 6.5.5 and 4.7.3, and by selective harvesting where it does not remove more than 3 in 10 fodder trees.			
Cleared vegetation			
PO3 Cleared vegetation is not moved from where it falls.	No acceptable outcome is prescribed.		
Conserving the fodder resource			
PO4 Fodder harvesting does not reduce the total extent of the fodder in the regional ecosystem listed in Tables 8 and 9 on a lot to below 50 per cent of its current extent within any 10 year period.	AO4.1 Fodder harvesting is limited to the regional ecosystems and harvesting methods listed in Tables 8 and 9, and: <ul style="list-style-type: none"> (1) is limited to areas that have not been harvested in the past 10 years (2) retained vegetation is not harvested within 10 years of the harvesting of an adjacent area which has been subject to either strip harvesting or block harvesting. 		
Wetlands			
PO5 Maintain vegetation associated with any natural wetland to protect: <ul style="list-style-type: none"> (1) water quality by filtering sediments; nutrients and other pollutants (2) aquatic habitat (3) terrestrial habitat. 	AO5.1 Mechanical clearing does not occur within 20 metres of any natural wetland. OR		
	AO5.2 Strip harvesting or block harvesting does not occur within 100 metres of any natural wetland.		
Watercourses and drainage features			

Performance outcomes	Acceptable outcomes	Response	Comment
PO6 Maintain vegetation associated with any watercourse or drainage feature to protect: (1) bank stability by protecting against bank erosion (2) water quality by filtering sediments, nutrients and other pollutants (3) aquatic habitat (4) terrestrial habitat.	AO6.1 Mechanical clearing does not occur within 20 metres from the defining bank of any watercourse or drainage feature. OR		
	AO6.2 Strip harvesting or block harvesting does not occur within 100 metres of the defining bank of any watercourse or drainage feature.		
Soil erosion			
PO7 Clearing does not result in: (1) mass movement, gully erosion, rill erosion, sheet erosion, tunnel erosion, stream bank erosion, wind erosion, or scalding (2) any associated loss of chemical, physical or biological fertility — including, but not limited to water holding capacity, soil structure, organic matter, soil biology and nutrients within or outside the lot(s) that are the subject of the application.	AO7.1 Strip harvesting or block harvesting: (1) does not occur on a slope that exceeds 5 per cent (2) is aligned across the slope. OR		
	AO7.2 Harvesting occurs using selective harvesting or breaker harvesting methods.		
Salinity			
PO8 Clearing does not contribute to land	AO8.1 Clearing does not occur in or within 200 metres of		

Performance outcomes	Acceptable outcomes	Response	Comment
degradation through: (1) waterlogging, or (2) the salinisation of groundwater, surface water or soil.	a discharge area or recharge area, or salinity warning area. OR		
	AO8.2 Clearing is less than: (1) 2 hectares, or (2) 10 metres wide.		
Conserving vegetation			
PO9 Fodder harvesting activities: (1) retain at least: (a) 50 per cent of the predominant canopy cover of the vegetation over each 300 by 300 metre (9 hectare) area when selective harvesting or narrow strip harvesting (b) 55 per cent of the predominant canopy cover of the vegetation over each 300 by 300 metre (9 hectare) area when block harvesting or wide strip harvesting (2) maintain the range of species of the regional ecosystem at the locality.	AO9.1 Selective harvesting does not: (1) harvest more than 5 in 10 individual fodder trees in any given area (2) remove non-fodder species beyond that needed to provide access for harvesting, or (3) involve mechanical clearing within 50 metres of a scarp or an area of instability, in the following regional ecosystems 6.7.1, 6.7.6, 6.7.14, 6.7.15, 6.7.16, 11.7.1, 11.7.2 and 11.7.5. OR		
	AO9.2 Strip harvesting or block harvesting only occurs in regional ecosystems listed in Table 8.		
	AND AO9.3 Block harvesting: (1) is limited to the harvesting area and width of retained		

Performance outcomes	Acceptable outcomes	Response	Comment
	vegetation listed in Table 10 (2) retains non-fodder species with height of 4 metres or more within the harvested area (3) does not occur in fodder regional ecosystems that are less than 10 hectares in area or 500 metres in width (4) tracks between blocks are limited to a width of 10 metres. OR		
	AO9.4 Wide strip harvesting: (1) occurs where the harvested strip is 70-135 metres in width (2) retains a minimum of 165 metres wide strip of retained vegetation on either side of the cleared strip (3) only occurs for a 800 metre length with the retention of a 200 metre wide patch of vegetation at the end of each length (4) does not occur in fodder regional ecosystems that are less than 10 hectares in area or 500 metres in width. OR		
	AO9.5 Narrow strip harvesting: (1) occurs where the harvested strip is 20 to 50 metres in width (2) retains vegetation on either side of the strip a width at		

Performance outcomes	Acceptable outcomes	Response	Comment
	<p>least equal to the width of the harvested strip</p> <p>(3) does not occur in fodder regional ecosystems listed in Tables 8 and 9 that are less than 10 hectares in area or 500 metres in width.</p>		
Essential habitat			
PO10 Maintain the current extent of essential habitat.	AO10.1 Fodder harvesting does not occur in essential habitat. OR	N/A	
	AO10.2 Clearing in essential habitat does not exceed the width or area prescribed in Table 1. OR	N/A	
	AO10.3 Where it can be demonstrated that the clearing cannot be reasonably avoided, and the extent of clearing has been reasonably minimised, an environmental offset is provided for any significant residual impact from clearing of essential habitat. Editor's note: Applications for development should identify whether there is likely to be a significant residual impact and a need for an environmental offset having regard to Section 3.1 (Regulated vegetation) of the <i>Significant Residual Impact Guideline</i> and the relevant <i>Queensland Environmental Offsets Policy</i> .	N/A	
Fodder species			
PO11 Fodder harvesting consists predominantly of fodder species.	AO11.1 Fodder harvesting consists predominantly of fodder species and only occurs in the regional ecosystems listed in Tables 8 or 9.	N/A	

ODA-0416-029601

File: 2016/19469
Enquiries: Department of Development, Facilities & Environmental Services
Phone: 1300 007 662
Post: PO Box 620, Roma Qld 4455
Email: planning@maranoa.qld.gov.au



29 June 2016



Department of Infrastructure, Local Government and Planning
128 Margaret Street
Toowoomba, QLD 4350

Attention: Andrew Foley

Dear Andrew,

**RE: Information Request Response - Development Permit for an Operational Works for the construction of a high flow diversion channel associated with stage 2 flood mitigation works for the town of Roma and concurrence Environmental Authority for Extractive Activities - ERA 16 2 (b)
Described as Lot 21 on R8614; Lot 47 on R8614; Lot 96 on M5398; Lot 343 on R8614; and Lot 342 on WV219**

I refer to your correspondence dated 29 April 2016 requesting additional information to complete the assessment process for the above noted application.

Attached with this letter is all of the information requested.

We trust that the Department of Infrastructure, Local Government and Planning is now in a position to continue processing the application.

Should you have any questions please contact the Department of Development, Facilities and Environmental services on telephone 1300 007 662.

Yours sincerely


Danielle Pearn
Manager Planning & Building Development

Attachment 1 – Information Request Response

Attachment 1 – Information Request Response

Information Requested (IR)

IR Item 1

In accordance with the State Development Assessment Provisions (SDAP) further information is required to ensure that the activity does not have an adverse environmental impact beyond the site.

Identify all potential impacts and provide mitigation measures to address risk for the following environmental values;

1. Acoustic impacts for all sensitive receptors;
2. Air quality impacts for all sensitive receptors and the management hierarchy for air emissions;
3. Water impacts existing on the site and surrounding vicinity;
4. Rehabilitation measures to be used once the relevant activity ceases

IR Response

This information request response identifies the potential risks and proposed mitigation measures for each of the environmental values identified in IR Item 1.

The following overarching points are offered for general consideration;

- A full time Council officer has been employed to act as a community liaison while the activity is taking place.
- Council has undertaken extensive community consultation and continues to liaise with affected landholders as part of the Roma flood mitigation project.
- The proposed activity is temporary (approximately 6 months).
- Any conditions of development approval issued by the Department of Infrastructure Local Government and Planning will be stringently adhered to by Council.
- The proposed activity relates to flood mitigation works for the town of Roma which are considered a critical part of community infrastructure and community resilience.
- The proposed activity will be funded by the State Government of Queensland.

1. Acoustic impacts for all sensitive receptors

The proposed channel will avoid all forms of built development, running for the most part through vacant undeveloped rural land. The closest sensitive receptor is a dwelling located approximately 270m south-west of the channel. Other nearby sensitive receptors are identified in Figure 1 below.

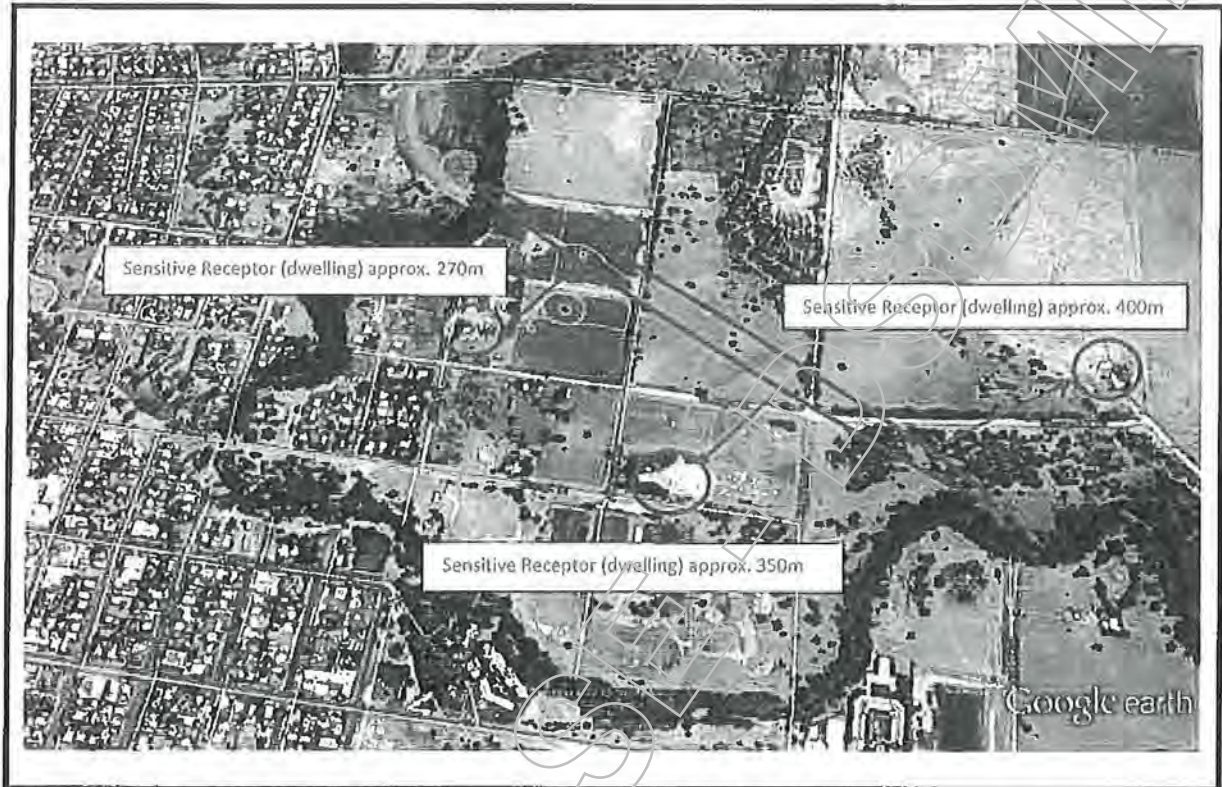


Figure 1 – Location of nearby sensitive receptors (Source - Google Earth)

Built development in the generally vicinity includes recreational uses to the north and south; industrial development to the east; and low density residential development to the west.

Potential noise impacts

Noise from the proposed activity can be expected from the following sources;

- Dozers and excavators removing and shifting soil and rock;
- Front end loaders placing the soil and rock into vehicles for removal from site;
- Heavy vehicles entering and leaving the site;
- Water truck suppressing dust; and
- Staff vehicles accessing the site;

Proposed noise nuisance mitigation measures

To mitigate noise impacts expected from the proposed activity on nearby and surrounding land uses Council will;

- Prepare a Site Environmental Management Plan (EMP);

- Restrict operating hours to 6am - 6pm Monday to Saturday and not conduct works on Public Holidays;
- Use only the latest model vehicles and machinery fitted with noise attenuation devices;
- Service and maintain all equipment and machinery on a regular basis;
- Position machinery to have the least amount of disturbance on nearby receptors;
- Ensure that Idle plant and equipment is shut down when not in use;
- Limit the use compression brakes around sensitive receptors;
- Ensure all excavation, stockpiling and associated activities are contained within a designated work area immediately adjacent to the proposed channel alignment and maintain a minimum separation distance of 100 metres to all sensitive receptors identified in Figure 1 above, throughout the duration of the development works; and
- Locate site access and access tracks to minimise disturbance on nearby and surrounding land uses.

2. Air quality impacts for all sensitive receptors and the management hierarchy for air emission

The proposed channel is located in a low-density, low-intensity, semi-rural setting where air quality is considered high. The prevailing wind direction at the development site is south-west.

Potential air quality impacts

Possible impacts to air quality from the activity can be expected from the following sources;

- Dust generated from machinery and vehicles being used in the activity; and
- Diesel fumes from the machinery and vehicles used in the activity.

Proposed air nuisance mitigation measures

To mitigate against possible air impacts generated from the activity Council will;

- Prepare a Site Environmental Management Plan (EMP);
- Regularly monitor dust being generated from the activity (by site supervisor and employees);
- Have a full time on-site water truck to suppress dust;
- Use only well maintained & compliant vehicles and machinery;
- Restrict the idling of vehicles and machinery;
- Implement speed restrictions on vehicles accessing the site; and
- Locate access points and access tracks so as to have minimal impact on nearby and surrounding development.

3. Water impacts existing on the site and surrounding vicinity

The purpose of the channel is to redirect flows away from town of Roma during flood events. It will work in conjunction with the Stage 1 earthen levee bank, capturing flows that build up behind the levee and redirecting them away from the built up areas of Roma. The channel will also reduce water levels at critical points along Bungil Creek when Bungil Creek reaches capacity during major flood events.

Potential water impacts

Possible impacts to water resulting from the activity include;

- Sediment from the erosion of unprotected soil during construction of the channel; and
- Petroleum spill from machinery associated with the construction of the channel.

Proposed water impact mitigation measures

To mitigate against possible impacts to water Council advises that;

- A Site Environmental Management Plan (EMP) will be prepared;
- There will be no direct or indirect release of contaminants to ground water from the activity and no acid forming (ASS) or potential acid forming (PASS) soil will be disturbed during the activity;
- All vehicles will be maintained and regularly serviced to minimise the risk of a petroleum and/or chemical spill. A material safety data sheet (MSDS) will be located at the site office as well as spill kits on refuelling vehicles,
- Conduct all servicing of vehicles and equipment at an approved motor vehicle workshop facility and designated service areas on site;
- The profile of the channel will be designed and constructed to ensure water does not pond or stagnate; and
- Sediment controls will be in place at discharge points.

4. Rehabilitation measures to be used once the relevant activity ceases

Council is in the process of preparing a rehabilitation plan for the eastern diversion channel, including a comprehensive list of grass species to be used in re-vegetating the diversion channel once it is constructed. The rehabilitation plan will form part of the detailed design phase and Council would respectfully request that the requirement for a detailed rehabilitation plan form part of the conditions of development approval.

Rehabilitation measures

The following is offered as a general information regarding site rehabilitation;

- All machinery and equipment associated with the activity will be removed from the site;
- The diversion channel will be vegetated with plant species in accordance with a comprehensive revegetation plan provided by a suitably qualified supplier;

- Conditions imposed by the Department of Infrastructure, Local Government and Planning with regards to offset plantings and other rehabilitation measures will be implemented by Council and contractors; and
- Council will continually monitor and maintain the channel as part of its ongoing works program.

IR Item 2

Provide an erosion and sediment control plan, compiled by a suitably qualified person and in accordance with the following document:

- Best Practice Erosion and Sediment Control, IECA 2008 International Erosion Control Association (Australia), Picton NSW

Note: Consideration should also be given to the effect the diversion channel will have on hydraulic flow and potential scour within the bed and banks of Bungil Creek.

Attached is a sediment and erosion control plan that has been prepared by GHD Pty Ltd dated June 2016. The Sediment and Erosion Plan has been prepared in accordance with Best Practice Erosion and Sediment Control IECA 2008 International Erosion Control Association (Australia), Picton NSW.

RTI RELEASE



RTI RELEASE - DSDMIP

Maranoa Regional Council

Flood Mitigation Project - Stage 2a Eastern Diversion
Drain

Erosion and Sediment Control Plan

June 2016

Table of contents

1.	Introduction.....	1
1.1	Project Background.....	1
1.2	Purpose of this report.....	3
1.3	Scope and Limitations.....	3
1.4	Assumptions.....	4
1.5	Relevant Guidelines.....	4
1.6	Legislative Requirements.....	4
2.	Site Analysis.....	6
2.1	Rainfall and Evaporation.....	6
2.2	Soil Loss Estimation.....	6
2.3	ESC Program and Timeframe for Works.....	7
3.	Erosion and Sediment Management.....	8
3.1	Erosion and Sediment Control Guidelines for Contractor.....	8
3.2	Erosion Management.....	8
3.3	Sediment Management.....	11
4.	Monitoring and Maintenance.....	13
4.1	Monitoring requirements.....	13
4.2	Maintenance requirements.....	13

Table index

Table 1 Rainfall Data*	6
Table 2 Evaporation Data*	6
Table 3 Soil Loss Calculations for Diversion Drain	7
Table 4 Limitations to Access.....	9

Figure index

Figure 1 Stage 2 Eastern Diversion Drain Alignment.....	2
Figure 2 Stage 2 levee alignment.....	2

Appendices

Appendix A – Erosion and Sediment Control Plan Drawings

1. Introduction

Maranoa Regional Council (MRC) engaged GHD to undertake the detailed design of a levee extension and diversion drain for Stage 2a of the Roma Flood Mitigation Project. This phase of the Roma Flood Mitigation Project comes after GHD were previously engaged by Council to deliver a series of design, consultation and optioneering outcomes as part of the Regional Flood Study.

This report presents an Erosion and Sediment Control Plan (ESC) for the construction of the eastern diversion drain element of the project as required by the conditional approval of works by the State regulator. This report has been undertaken with reference to the International Erosion Control Association Guidelines (IECA, 2008).

1.1 Project Background

In 2012, GHD Pty Ltd was commissioned by Maranoa Regional Council (MRC) to investigate flood mitigation options to address regional flood risk within the township of Roma. Concept design options to mitigate flooding from the Bungil Creek catchment for 'Stage 1' were subsequently developed as part of these investigations. Stage 1 was followed by Stage 2.

The purpose of the Stage 2 Flood Mitigation Project is to further reduce the risk of above floor flooding to properties within the township of Roma from a flood event equivalent to the 2012 DFE. This is an extension of the overall regional flood mitigation project, from which the following arrangement was selected based on cost-benefit and effectiveness of the solution.

The selected arrangement from the Stage 2 Roma Flood Mitigation Study, Hydrology and Hydraulics for Stage 2 Regional Mitigation Options (GHD, 2014 Rev 1) was the eastern diversion drain and western levee. The eastern diversion drain provides a diversion of the Bungil Creek to the eastern side of the township and the western levee is an extension of the Stage 1 Levee at the southern end, adjacent to Bungil Creek.

The eastern diversion drain alignment is shown in Figure 1 and the western levee alignment is shown in Figure 2 below.



Figure 1 Stage 2 Eastern Diversion Drain Alignment



Figure 2 Stage 2 levee alignment

1.2 Purpose of this report

The purpose of this Roma Stage 2 Flood Mitigation Project Design Report is to develop an Erosion and Sediment Control Plan (ESCP) for the construction phase of the Stage 2 eastern diversion drain element only. The preparation of an ESCP was required by Department of Infrastructure, Local Government and Planning in their Information Request dated 29 April 2016. This report and attached drawings address the requirements of item ERA 16 2 (B) 2.

The determination of the required erosion and sediment control measures outlined in the ESCP is based on assumed conservative values (soil and rainfall data) as sourced from IECA guidelines. The Contractor's preparation of the site/task specific erosion and sediment works instructions should be informed by additional soil data required from appropriate localised site verification and additional geotechnical investigation.

As part of the Environment Management Plan (EMP) for the works, the Contractor should prepare detailed, task specific erosion and sediment control measures to compliment this Erosion and Sediment Control Plan (ESCP). Site conditions may require:

- Construction of any or all of the measures described in this report to differ from their on-site application described in this document;
- Design and implementation of additional long or short term controls and designs, consistent with the concepts contained within this ESCP; and
- Geotechnical investigations to support the implementation of the ESCP.

1.3 Scope and Limitations

This report has been prepared by GHD for Maranoa Regional Council and may only be used and relied on by Maranoa Regional Council for the purpose agreed between GHD and the Maranoa Regional Council as set out Section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Maranoa Regional Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer to Section 1.4). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Maranoa Regional Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.4 Assumptions

The following assumptions have been made in preparation of this report:

- The survey data provided by Bennett & Bennett Surveyors and MRC is sufficiently accurate for the purposes of this report.
- The survey datum used is the Australian Height Datum (AHD). All geospatial references contained within this report are to Map Grid Australia GDA 94.

1.5 Relevant Guidelines

This ESCP has been prepared in reference to the following guidelines:

- Best Practice Erosion and Sediment Control. International Erosion Control Association (Australasia) (IECA 2008)

1.6 Legislative Requirements

A person or persons conducting land-disturbing development must conduct such development in accordance with the requirements of relevant environmental legislation (e.g. *Environmental Protection Act 1994*, and the associated *Environmental Protection (Water) Policy 2009*); and the *Sustainable Planning Act 2009*. Relevant portions of these Acts are listed below.

1.6.1 Environmental Protection Act 1994

All persons have a legal duty under the *Environmental Protection Act 1994* (s319) to take all reasonable and practicable measures to minimise or prevent environmental harm. Such harm can be caused if sediment from building sites enters (washes, blows, falls or otherwise) into stormwater drains, roadside gutters or waterways. Stormwater run-off must be managed so that it is not released into waters, a roadside gutter, or stormwater drain at more than 50 mg/l TSS (Total Suspended Solids). Under s443 of the *Environmental Protection Act 1994* a person must not cause or allow a contaminant to be placed in a position where it could reasonably be expected to cause serious or material environmental harm or environmental nuisance (e.g. placing a stockpile adjacent a waterway).

In addition, people who are concerned with management in a corporation have an additional duty under the *Environmental Protection Act 1994* to ensure that their corporation complies with the Act. This means supervisors need to take reasonable and practicable steps to ensure that the people under their control do not breach environmental laws.

People who become aware of environmental harm in association with their work (e.g. significant loss of sediment from their site-works into a watercourse) have a legal duty under the *Environmental Protection Act 1994* to notify the Department of Environment and Resource Management (DERM).

1.6.2 Environmental Protection (Water) Policy 2009

This policy sits under the *Environmental Protection Act 1994*. The *Environmental Protection (Water) Policy 2009* provides environmental values and water quality objectives for Queensland waters. These are utilised when determining environmental harm and to inform other statutory and non-statutory decisions. The water quality objectives assist in identifying whether the environmental values are protected. These values and objectives should be utilised when determining risk of environmental harm from water releases or run off and appropriate erosion and sediment controls implemented.

1.6.3 The Sustainable Planning Act 2009

The *Sustainable Planning Act 2009* is the mechanism for assessing all developments within Queensland. This act establishes the process for sustainable planning and development assessment in an ecologically sustainable way.

2. Site Analysis

The purpose of the site analysis is to identify the constraints that need to be considered during planning and design.

2.1 Rainfall and Evaporation

The following weather pattern data was obtained from the Bureau of Meteorology (BOM) to assist with the desktop analysis. The closest (open) weather station collecting monthly rainfall and evaporation data is at Roma Airport, Qld. Rainfall data has been recorded from 1985 to 2016. Evaporation data has been recorded from 1992 to 2008. The two sets of data has been provided in Table 1 and Table 2 below.

Table 1 Rainfall Data*

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Mean Rainfall (mm)	71.6	87.5	53.2	34.6	34.4	29.6	22.4	23.9	24	50.9	61.5	82.3	579.8
Mean number of rain days \geq 10mm	2	2.5	1.3	0.8	1.1	1	0.7	0.7	0.7	1.5	2	2.5	16.8
Mean number of rain days \geq 25mm	1.1	1.1	0.7	0.4	0.4	0.3	0.2	0.3	0.2	0.4	0.6	1	6.7
Erosion Risk*	M	M	M	L	L	VL	VL	VL	VL	M	M	M	

*BOM Rainfall data from Roma Airport, Station Number 043091

*Erosion Risk High = H, Moderate = M, Low = L, Very Low = VL

The number of rain days can be used as an indicator of how often runoff, and therefore potential erosion, may occur. The Bureau of Meteorology (BoM) provides monthly rainfall data of depths that occur greater or equal to 10 mm and 25 mm days per month. Storms less than 10 mm are considered to have less potential to cause erosion as much of the water will infiltrate into the soil and run-off is typically minimal.

Table 2 Evaporation Data*

Rainfall	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean daily evaporation (mm)	10.3	8.6	7.8	6.2	4.4	3.2	3.5	4.6	7.0	8.6	9.2	9.7	6.9

*BOM Evaporation data from Roma Airport, Station Number 043091

2.2 Soil Loss Estimation

Soils present in the diversion drain vicinity area dispersive in nature and can be classified as clayey sands. Refer to the *Stage 2 Geotechnical Factual Report* (GHD, 2016) for more details.

The Revised Universal Soil Loss Equation RUSLE equation has been applied to estimate the month soil loss from sheet and rill erosion from the site, if no controls were put into place.

Soil loss is computed through the following equation:

$$A = R \times K \times LS \times P \times C$$

Where:

A = annual soil loss due to erosion (t/ha/yr)

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length / gradient factor

P = erosion control practice factor

C = ground cover and management factor

The soil loss calculations for the diversion drain have been presented in Table 3.

Table 3 Soil Loss Calculations for Diversion Drain

Parameter	Diversion Drain	Comments
R	1890	Computed from IFD chart for 2 yr 6 hr storm event
K	0.044	Soil erodibility factor for Clayey Sands
LS	0.24	Computed from topographical data
P	1.3	Assumed limited erosion controls (worst case)
C	1	Assumed no ground cover (worst case)
A (t/ha/yr)	26	Soil loss in tons per hectare on an annual basis

Based on the above, without implementation of upstream erosion and sediment control procedures, the estimated potential soil loss over a year for the diversion drain is 26 tonnes per hectare per year respectively.

This translates into 20 m³/ha of sediment volume for a 12-month period from the diversion drain catchment. Therefore, the site will be considered high risk.

2.3 ESC Program and Timeframe for Works

Construction is dependent upon the timing that environmental permitting is approved and the work sequencing that should need to occur to ensure appropriate ESC mitigation measures are installed.

Construction is expected to take up to 12 weeks or 3 months.

For each element within the work stages, detailed ESC work instructions should be developed by the Contractor to outline the specific requirements.

3. Erosion and Sediment Management

3.1 Erosion and Sediment Control Guidelines for Contractor

3.1.1 General

Sediment and erosion controls should be established by the contractor to comply with the requirements of the *Protection of the Environment Operations Act* and *Best Practice Erosion and Sediment Control*, International Erosion Control Association (IECA, 2008).

The ESC measures on site should be installed generally in the following progression:

- Installation of sediment controls (down slope) and exclusion fencing to nominate areas of work and establishing "No-Go" zones;
- Installation of stabilised site access, site compound and facilities;
- Undertake clearing and grubbing work;
- Strip and place / stockpile topsoil;
- Temporary access to location of sedimentation trap;
- Construction of sedimentation trap;
- Construction of sediment-laden water diversion drains to direct runoff to the sedimentation trap;
- Installation of diversion drains upslope and sediment fences downstream of stockpile locations; and
- Construction of the remainder of works.

3.1.2 Erosion and Sediment Control Training for Site Personnel

All personnel should attend an induction program.

The project should require a number of training methods including:

- All personnel should attend a project site specific induction prior to commencing any work on the site, where general erosion and sediment control and water quality matters should be highlighted, together with responsibilities under relevant legislation;
- Toolbox meetings should be conducted regularly, at least weekly, to address numerous issues related to operations, safety, the environment etc. Issues relevant to the stage of construction are to be highlighted; and
- Formal training covering awareness of soil and water related issues and additional advanced training should be delivered to relevant personnel.

Measures and controls required to mitigate pollution of receiving waters and unacceptable levels of soil loss during construction are included below.

3.2 Erosion Management

3.2.1 Explanatory Notes and Installation Sequences

In order to reduce on-site erosion and off-site sedimentation, construction sequencing should be undertaken that balances the timing of land disturbance activities and the installation of mitigation measures.

3.2.2 Minimise Disturbance

Where practicable, the soil erosion hazard on the site should be kept as low as possible and as recommended in Table 4. At the commencement of onsite activities, the installation of barrier fencing and sediment fencing should be undertaken to clearly define the limits of works and any "No-Go" zones. Where possible, existing vegetation strips should be maintained to minimise soil disturbance. The number and size of construction compounds should be minimised as far as practicable. All sediment and erosion controls should be installed within the project boundary (Greenfields Area).

Table 4 Limitations to Access

Land use	Limitation	Comments
Constructions areas	Disturbance to generally be no further than five (preferably two) metres from the edge of any essential construction activity	All site workers should clearly recognise these zones that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (down slope), or similar methods.
Access areas	Generally limited to a maximum width of 10 m	The site manager/foreman should determine and mark the location of these zones onsite. They may vary in position to best conserve the existing vegetation and protect downstream areas while being considerate of the needs of efficient works' activities. All site workers should clearly recognise their boundaries which, where appropriate, are marked with barrier mesh, sediment fencing, or similar materials.
Remaining lands	Entry prohibited except for essential thinning of plant growth	All site workers clearly recognise this land by marking boundary with barrier fence or similar.

3.2.3 "No Go" Zones

Any areas outside of the clearing limits should be designated as "No Go" zones to minimise or prevent access by personnel or vehicles. Temporary fencing or barricading such as Para webbing or perimeter tape is to be utilised on the cleared perimeter with accompanying signage. Site inductions and toolbox meetings should include the importance of observing "No Go" zones, particularly in areas near to any identified sensitive area.

3.2.4 Vegetation Clearing

Vegetation can only be cleared within approved areas. The limits of the development are to be clearly defined with perimeter tape, security line, Para webbing or similar.

Vegetation outside of the development footprint is not to be removed or damaged. The protection of existing vegetation should be incorporated into site inductions for all project personnel and contractors. This information should also be reiterated at toolbox talks or briefings.

3.2.5 Erosion Control Measures

Earthworks are expected to disturb dispersive and fine soils. The vegetation removal and earthworks are expected to produce appreciable quantities of fine materials that could become entrained in runoff.

Clearly visible barrier fencing shall be installed to assist traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site through the stabilised access points. Erosion

control on the embankment crests, downstream batters and any other exposed areas will be provided by gypsum stabilisation of a 200 mm thick layer of the on-site (dispersive) clays, and by covering with 75 mm of topsoil seeded with grass mix.

Short term erosion control on any exposed areas should be provided by regular application of soil binding polymer product such as *Vital Bon Matt Stonewall* as per manufacturer's recommendations.

3.2.6 Stabilisation

The stabilisation requirements for the project are as follows:

- Disturbed soil surfaces are to be stabilised with soil glue products (*Vital Stonewall* or equivalent) during the works and within 1 day of completion of works within any area of the site;
- All temporary earth banks, flow diversion systems, and embankments where runoff should flow uncontrolled off site are to be stabilised with rock/gravel over geo-textile, or vegetation;
- A success criterion for ground cover is a minimum of 75% cover

3.2.7 Stockpile Management

All stockpiles are to:

- Be separated into soil and use types;
- Be located further than 40 metres from waterways;
- Be located at least one metre from site boundary fencing;
- Not be located against the base of significant trees;
- Be watered and / or protected through effective erosion control emulsions (*Vital Bon-Matt Stonewall* or equivalent), as required, to minimise dust emissions; and
- Have sediment fences and coir logs located down slope to minimise the risk of sediment laden runoff.

3.3 Sediment Management

3.3.1 Dust suppression

Dust suppression and erosion protection on access tracks can be provided by regular application of *Vital Bon Matt HR* or approved equivalent.

3.3.2 Sediment Fence

The sediment fence recommended for this project is *TerraStop TS 1780* or approved equivalent.

3.3.3 Rock Pads

The rock pads at the site entry and exit locations should have the following dimensions

- Rock d50= 100 mm (minimum) over geotextile (*Terratex E1 PP* or approved equivalent); and
- Thickness of rock protection layer = 200 mm (minimum).

3.3.4 Earth Bunds

Earth Bunds can be formed by using excavated material. While forming Earth bunds, care should be taken to separate topsoil from subsoil. Also, as indicated on the Erosion and Sediment Control Drawings, earth bunds shall be utilised to capture dirty water within the drainage channel during construction. The earth bund should be 1 m high with 1:2 side slopes.

The upstream base of the earth bunds should be protected with non-woven geotextile (*TerraStop Non Woven Q Range* or approved equivalent). Erosion control on Earth Bunds should be provided by regular application of soil binding polymer product such as *Vital Bon Matt Stonewall* as per manufacturer's recommendations.

3.3.5 Dirty Water Channels

Dirty water channel dimensions have been conservatively designed to convey up to 1 m³/s flow and their dimensions (minimum) are as follows:

- Base Width: 0.50 m
- Side Slopes: 1 to 2
- Channel Slope: 0.5 %
- Flow depth: 0.58 m
- Discharge: 1.00 m³/s
- Channel Lining: Coconut / jute fibre mats or Geotextile
- Maximum Acceptable Velocity: 1.7 m/s

3.3.6 Coir Logs

Coir Logs to be used as indicated on Erosion and Sediment Control Drawings (*EcoLog*, 300 mm diameter or approved equivalent). Installation of the coir logs to be as per manufacturer's recommendations.

3.3.7 Sediment Traps and Flocculation

It is noted that during the earthworks for different stages, sediment laden water shall be trapped at the designated points.

Excavated sediment traps have been shown at several locations in the ESC drawings and have been conservatively designed to treat a flow of 1 m³/s during construction. The minimum dimensions of excavated sediment traps are as follows (IECA, 2008):

- Surface area: 750 m²
- Length to Width Ratio: 3:1
- Side slopes: 1V:3H
- Depth: 1 m
- Inflow bank to be protected with Geotextile lining
- Sediment to be removed when it exceeds 30 % of trap volume

Due to presence of dispersive soils, the water contained within the sediment traps will, most likely, not achieve the desired water quality (especially Total Suspended Solids, 50 mg/l). Therefore, appropriate flocculation is obligatory.

Apply Gypsum (CaSO₄) at the rate of 32 kg per 100 m³. In case of increased likelihood of high intensity storms, increase dosage to 70 kg per 100 m³. Gypsum is the least ecologically threatening flocculent as it causes little pH change, however, slight changes in salinity can be experienced. Gypsum needs to be spread evenly across the water surface.

In addition, Filter bags (1380 Filter Bags or approved equivalent) filled with Gypsum should be applied every 20 m in the dirty water channels to aid with Flocculation. It must be noted that Gypsum can cause scum deposits in equipment.

Other flocculation options will require written approval from Department of Environment and Heritage Protection (DEHP). These include:

- Polyacrylamides (PAMS like DamClear Floc Blocks or other product approved by CPESC)
- Aluminium based flocculants

3.3.8 Silt Curtains

Floating silt curtains shall be installed in Bungil Creek (when in flow) near the inlet and outlet of the diversion drain during the construction phase. Silt curtains act to isolate the sediment-laden waters from passing stream flows. This allows sedimentation of the disturbed water body with the area enclosed by the silt curtain. The most effective placement method for silt curtain is in a semicircle or U shape arrangement around the disturbance area.

The following companies supply and install silt curtains in Australia:

- *AussieErosion* Floating silt curtains
- *Polaris Marine Pty Ltd*
- *Adiomas Services Pty Ltd*

The installation and maintenance of the silt curtains should be as per manufacturer / supplier requirements.

4. Monitoring and Maintenance

4.1 Monitoring requirements

Appropriate procedures and qualified personnel should be engaged to plan and conduct site inspections and water quality monitoring throughout the construction

- All ESC measures should be inspected in accordance with the IECA 2008 guidelines.
- All site monitoring data including rainfall records, dates of water quality testing, testing results and records of controlled water releases for the site, should be documented onsite. The documentation should be maintained up to date for the duration of the approved works and be available on-site for inspection by the Assessing Authority on request.
- All environmental incidents should be documented, and should remain accessible to the relevant regulatory authorities on request. When an Environmental Incident (i.e. breach of limits) or exceedance of trigger value occurs, it is the responsibility of the Environmental Manager to investigate and initiate remedial actions commensurate with the severity of the incident.
- A system should be implemented and maintained that monitors and records site compliance and non-compliance with the ESCP requirements.

4.2 Maintenance requirements

All materials removed from ESC devices during maintenance, whether solid or liquid, should be disposed of in a manner that does not cause ongoing soil erosion or environmental harm. Solid materials removed from ESC devices are to be stockpiled onsite in accordance with stockpile guidelines.

Written records of erosion and sediment control monitoring and maintenance activities conducted during the construction and maintenance periods should be maintained on site. Original copies of such records shall be provided on request to the Assessing Authority

Maintenance of erosion and sediment control measures must occur in accordance with IECA 2008 guidelines.

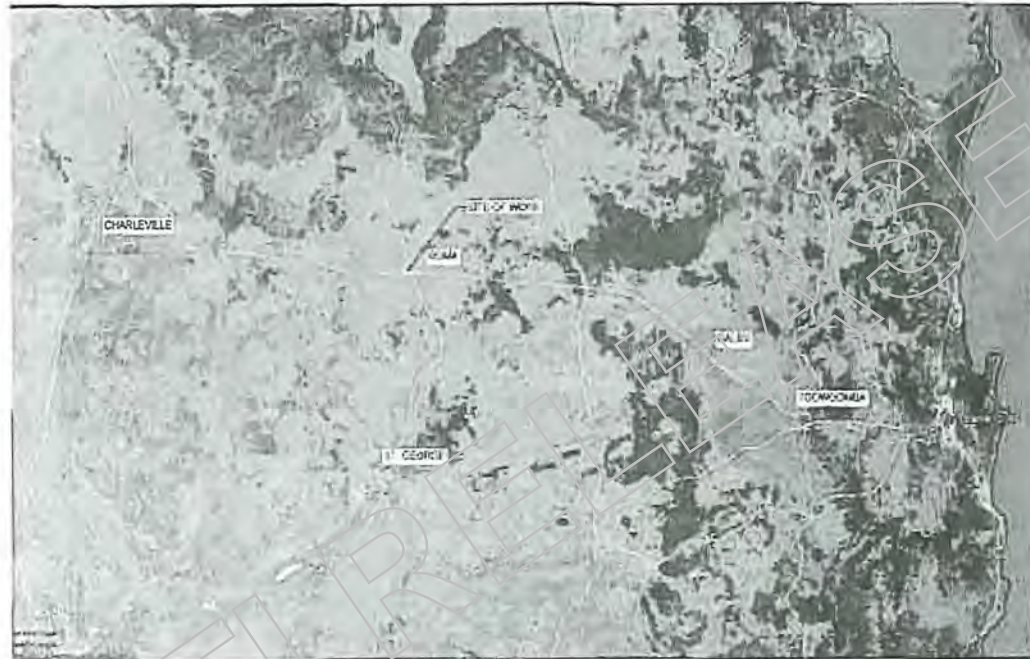
RTI RELEASE - DSDMIP

Appendices

Appendix A – Erosion and Sediment Control Plan Drawings

RTI RELEASE - DSDMIP

MARANOA REGIONAL COUNCIL ROMA LEVEE STAGE 2 PROJECT 41-29431



MADE BY: GOOGLE EARTH PRO (11/11/10) IN MARCH 2011
LOCALITY PLAN
NTS

DRAWING LIST

DRAWING No.	DRAWING TITLE
2016-378C-G201	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
2016-378C-G202	EROSION AND SEDIMENT CONTROL NOTES
CIVIL	
2016-378C-C201	EROSION AND SEDIMENT CONTROL PLAN
2016-378C-C202	NOTES AND DETAILS, SHEET 1 OF 4
2016-378C-C203	NOTES AND DETAILS, SHEET 2 OF 4
2016-378C-C204	NOTES AND DETAILS, SHEET 3 OF 4
2016-378C-C205	NOTES AND DETAILS, SHEET 4 OF 4

				1 CARTWRIGHT STREET P.O. BOX 42 MITCHELL QLD 4465 Phone: 1300 607 662 Fax: (07) 4624 6090 Email: council@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au		SUBJECT MARANOA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES		PROJECT ROMA LEVEE STAGE 2 PROJECT		PROJECT NO. 	
TITLE COVER SHEET DRAWING LIST AND LOCALITY PLAN		STATUS PRELIMINARY		DESIGNED A.K. N.C. J.P. 14/06		CHECKED 15/01		APPROVED 378C		DATE 2016-378C-G201	
SCALE @ A1 NTS		SCALE @ A A									

EROSION AND SEDIMENT CONTROL NOTES:

LIMITATIONS

THIS ESCP HAS BEEN PREPARED BY GHD FOR MARANOVA REGIONAL COUNCIL AND MAY ONLY BE USED AND RELIED ON BY MARANOVA REGIONAL COUNCIL. FOR THE PURPOSE AGREED BETWEEN GHD AND THE MARANOVA REGIONAL COUNCIL, GHD OTHERWISE DISCLAIMS RESPONSIBILITY TO ANY PERSON OTHER THAN MARANOVA REGIONAL COUNCIL ARISING IN CONNECTION WITH THIS ESCP. GHD ALSO EXCLUDES IMPLIED WARRANTIES AND CONDITIONS, TO THE EXTENT LEGALLY PERMISSIBLE.

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GHD HAS NOT BEEN INVOLVED IN THE PREPARATION OF THE BID DOCUMENTS FOR THIS PROJECT AND HAS HAD NO CONTRIBUTION TO, OR REVIEW OF THE BID DOCUMENTS OTHER THAN IN THIS REPORT. GHD SHALL NOT BE LIABLE TO ANY PERSON FOR ANY ERROR IN, OMISSION FROM, OR FALSE OR MISLEADING STATEMENT IN, ANY OTHER PART OF THE BID DOCUMENTS.

GENERAL NOTES

- READ THESE DRAWINGS IN CONJUNCTION WITH ENGINEERING DRAWINGS, SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED. REFER TO ROMA EASTERN DIVERSION DRAIN DESIGN DRAWINGS 2016-378C-G001 TO 2016-378C-G003 AND 2016-378C-C001 TO 2016-378C-C002.
- NOMINATION OF PROPRIETARY DEVICES DOES NOT INDICATE EXCLUSIVE REFERENCE BUT INDICATES THAT SIMILAR ALTERNATIVES HAVING THE REQUIRED PROPERTIES MAY BE OFFERED FOR APPROVAL BY A SUITABLY QUALIFIED PROFESSIONAL (PREFERABLY WITH CPESC AND/OR RPEQ ACCREDITATION).
- REFER ANY DISCREPANCY TO THE DESIGNER BEFORE PROCEEDING WITH THE WORK.
- DO NOT OBTAIN DIMENSIONS BY SCALING FROM THE DRAWINGS.
- VERIFY SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED.
- ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE SAA CODES, SPECIFICATIONS AND BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITY.
- THE CONTRACTOR SHALL MAINTAIN ACCURATE RECORDS OF LEVELS AND LOCATIONS OF SERVICES TO FULLY COMPLY WITH LOCAL AUTHORITY "AS CONSTRUCTED" INFORMATION REQUIREMENTS.
- IT IS EXPECTED THAT PRIOR TO ANY CONSTRUCTION ACTIVITY AT THE PARK A DETAILED WORK SPECIFIC ESCP WILL BE DEVELOPED BY THE CONTRACTOR AS PART OF THE CONSTRUCTION ENVIRONMENT MANAGEMENT PLAN (CEMP). THE CONTRACTOR WILL REVISE THIS ESCP TO PROVIDE GREATER DETAIL BASED ON CONSTRUCTION METHODOLOGY AND TIMING OF WORKS BY THE CONTRACTOR.
- THE CONTRACTOR SHALL KEEP RECORD OF RAINFALL FORECAST FOR THE UPCOMING WEEK AS A MINIMUM. IT IS NOTED THAT RAINFALL GREATER THAN 10 MM HAS A HIGHER EROSION POTENTIAL. THEREFORE, APPROPRIATE EROSION AND SEDIMENT CONTROL MEASURES MUST BE IN PLACE, ESPECIALLY, IF THERE IS GREATER THAN 50% CHANCE OF RAINFALL GREATER THAN 10 MM.
- THE CONTRACTOR SHALL ENSURE IMPLEMENTATION OF EROSION AND SEDIMENT CONTROL MEASURES.
- TYPICAL DETAILS OF EROSION AND SEDIMENT CONTROL MEASURES HAVE BEEN OBTAINED FROM THE IECA 2006.

SURVEY

SITE SURVEY HAS BEEN PROVIDED BY MARANOVA REGIONAL COUNCIL. SOILS AND EROSION CONTROL.

EARTHWORKS ARE EXPECTED TO DISTURB DISPERSIVE AND FINE SOILS. THE VEGETATION REMOVAL AND EARTHWORKS ARE EXPECTED TO PRODUCE APPRECIABLE QUANTITIES OF FINE MATERIALS THAT COULD BECOME ENTRAINED IN RUNOFF.

EROSION CONTROL ON THE EMBANKMENT CRESTS, DOWNSTREAM BATTERS AND ANY OTHER EXPOSED AREAS SHOULD BE PROVIDED BY GYPSUM STABILISATION (MINIMUM OF 3% BY MASS) OF A 200 MM (MINIMUM) THICK LAYER OF THE ON-SITE (DISPERSIVE) CLAYS, AND BY COVERING WITH 75 mm (MINIMUM) OF TOPSOIL SEEDED WITH GRASS MIX.

EROSION CONTROL ON ANY EXPOSED AREAS SHOULD BE PROVIDED BY REGULAR APPLICATION OF SOIL BINDING POLYMER PRODUCT SUCH AS VITAL BOND MATT STONEWALL AS PER MANUFACTURER'S RECOMMENDATIONS.

DISTURBANCE MINIMISATION

WHERE PRACTICABLE, THE SOIL EROSION HAZARD ON THE SITE SHOULD BE KEPT AS LOW AS POSSIBLE. AT THE COMMENCEMENT OF ON-SITE ACTIVITIES, THE INSTALLATION OF BARRIER FENCING AND SEDIMENT FENCING SHOULD BE UNDERTAKEN TO CLEARLY DEFINE THE LIMITS OF WORKS AND ANY "NO GO" ZONES. WHERE POSSIBLE, EXISTING VEGETATION STRIPS SHOULD BE MAINTAINED TO MINIMISE SOIL DISTURBANCE. THE NUMBER AND SIZE OF CONSTRUCTION COMPOUNDS SHOULD BE MINIMISED AS FAR AS PRACTICABLE. ALL SEDIMENT AND EROSION CONTROLS SHOULD BE INSTALLED WITHIN THE PROJECT BOUNDARY (GREENFIELDS AREA).

NO GO ZONE

ANY AREAS OUTSIDE OF THE CLEARING LIMITS SHOULD BE DESIGNATED AS "NO GO" ZONES TO MINIMISE OR PREVENT ACCESS BY PERSONNEL OR VEHICLES. TEMPORARY FENCING OR BARRICADES SUCH AS PARA WEBBING OR PERIMETER TAPE IS TO BE UTILISED ON THE CLEARED PERIMETER WITH ACCOMPANYING SIGNAGE. SITE INDUCTIONS AND TOOLBOX MEETINGS SHOULD INCLUDE THE IMPORTANCE OF OBSERVING "NO GO" ZONES, PARTICULARLY IN AREAS NEAR TO ANY IDENTIFIED SENSITIVE AREA.

STABILISATION

- THE STABILISATION REQUIREMENTS FOR THE PROJECT ARE AS FOLLOWS:
- DISTURBED SOIL SURFACES ARE TO BE STABILISED WITH SOIL (BLUE PRODUCTS (VITAL STONEWALL OR EQUIVALENT) DURING THE WORKS AND WITHIN 1 DAY OF COMPLETION OF WORKS WITHIN ANY AREA OF THE SITE.
 - ALL TEMPORARY EARTH BANKS, FLOW DIVERSION SYSTEMS, AND EMBANKMENTS WHERE RUNOFF SHOULD FLOW UNCONTROLLED OFF SITE ARE TO BE STABILISED WITH ROCK/GRAVEL, OVER GEO-TEXTILE, OR VEGETATION.
 - A SUCCESS CRITERION FOR GROUND COVER IS A MINIMUM OF 75% COVER.

STOCKPILE MANAGEMENT

- ALL STOCKPILES ARE TO:
- BE SEPARATED FROM SOIL AND USE TYPES,
 - BE LOCATED FURTHER THAN 40 METRES FROM WATERWAYS,
 - BE LOCATED AT LEAST ONE METRE FROM SITE BOUNDARY FENCING,
 - NOT BE LOCATED AGAINST THE BASE OF SIGNIFICANT TREES,
 - BE WATERED AND/OR PROTECTED THROUGH EFFECTIVE EROSION CONTROL MEASURES (VITAL BOND MATT STONEWALL OR EQUIVALENT), AS REQUIRED, TO MINIMISE DUST EMISSIONS,
 - HAVE SEDIMENT FENCES AND COIR LOGS LOCATED DOWN SLOPE TO MINIMISE THE RISK OF SEDIMENT LADEN RUNOFF.

DUST SUPPRESSION

DUST SUPPRESSION AND EROSION PROTECTION ON ACCESS TRACKS CAN BE PROVIDED BY REGULAR APPLICATION OF VITAL BOND MATT HR OR APPROVED EQUIVALENT.

SEDIMENT FENCE

THE SEDIMENT FENCE RECOMMENDED FOR THIS PROJECT IS TERRASTOP TS 1780 OR APPROVED EQUIVALENT.

ROCK PADS

THE ROCK PADS AT THE SITE ENTRY AND EXIT LOCATIONS SHOULD HAVE THE FOLLOWING DIMENSIONS:

- ROCK 050+ 100 mm (MINIMUM) OVER GEOTEXTILE (TERRATEX E: PP OR APPROVED EQUIVALENT)
- THICKNESS OF ROCK PROTECTION LAYER = 200 mm (MINIMUM)

EARTH BUNDS

EARTH BUNDS CAN BE FORMED BY USING EXCAVATED MATERIAL. WHILE FORMING EARTH BUNDS, CARE SHOULD BE TAKEN TO SEPARATE TOPSOIL FROM SUBSOIL. ALSO, AS INDICATED ON THE EROSION AND SEDIMENT CONTROL DRAWINGS, EARTH BUNDS SHALL BE UTILISED TO CAPTURE DIRTY WATER WITHIN THE DRAINAGE CHANNEL DURING CONSTRUCTION. THE EARTH BUND SHOULD BE 1 m HIGH WITH 1:2 SIDE SLOPES.

THE UPSTREAM BASE OF THE EARTH BUNDS SHOULD BE PROTECTED WITH NON-WOVEN GEOTEXTILE (TERRASTOP NON-WOVEN D RANGE OR APPROVED EQUIVALENT). EROSION CONTROL ON EARTH BUNDS SHOULD BE PROVIDED BY REGULAR APPLICATION OF SOIL BINDING POLYMER PRODUCT SUCH AS VITAL BOND MATT STONEWALL AS PER MANUFACTURER'S RECOMMENDATIONS.

DIRTY WATER CHANNELS

DIRTY WATER CHANNEL DIMENSIONS HAVE BEEN CONSERVATIVELY DESIGNED TO CONVEY UP TO 1 MDS FLOW AND THEIR DIMENSIONS (MINIMUM) ARE AS FOLLOWS:

- BASE WIDTH 0.50 m
- SIDE SLOPES 1 TO 2
- CHANNEL SLOPE 0.5 %
- FLOW DEPTH 0.50 m
- DISCHARGE 1.00 m³/h
- CHANNEL LINING COCONUT FIBRE MATS OR GEOTEXTILE
- MAXIMUM ACCEPTABLE VELOCITY 1.7 m/s

COR LOGS

COR LOGS TO BE USED AS INDICATED ON EROSION AND SEDIMENT CONTROL DRAWINGS (E.C.O.L.O.G. 300 MM DIAMETER OR APPROVED EQUIVALENT). INSTALLATION OF THE COR LOGS TO BE AS PER MANUFACTURER'S RECOMMENDATIONS.

SEDIMENT TRAPS AND FLOCCULATION

IT IS NOTED THAT DURING THE EARTHWORKS FOR DIFFERENT STAGES, SEDIMENT LADEN WATER SHALL BE TRAPPED AT THE DESIGNATED POINTS.

EXCAVATED SEDIMENT TRAPS HAVE BEEN SHOWN AT SEVERAL LOCATIONS IN THE ESC DRAWINGS AND HAVE BEEN CONSERVATIVELY DESIGNED TO TREAT A FLOW OF 1 MDS DURING CONSTRUCTION. THE MINIMUM DIMENSIONS OF EXCAVATED SEDIMENT TRAPS ARE AS FOLLOWS:

- SURFACE AREA 750 m²
- LENGTH TO WIDTH RATIO, 3:1
- SIDE SLOPES 1V:3H
- DEPTH 1 m
- INFLOW BANK TO BE PROTECTED WITH GEOTEXTILE LINING
- SEDIMENT TO BE REMOVED WHEN IT EXCEEDS 30 % OF TRAP VOLUME

DUE TO PRESENCE OF DISPERSIVE SOILS, THE WATER CONTAINED WITHIN THE SEDIMENT TRAPS WILL, MOST LIKELY, NOT ACHIEVE THE DESIRED WATER QUALITY (ESPECIALLY TOTAL SUSPENDED SOLIDS, 50 MG/L). THEREFORE APPROPRIATE FLOCCULATION IS OBLIGATORY.

APPLY GYPSUM (CASO4) AT THE RATE OF 32 KG PER 100 m². IN CASE OF INCREASED LIKELIHOOD OF HIGH INTENSITY STORMS, INCREASE DOSEAGE TO 70 KG PER 100 m². GYPSUM IS THE LEAST ECOLOGICALLY THREATENING FLOCCULANT AS IT CAUSES LITTLE PH CHANGE, HOWEVER, SLIGHT CHANGES IN SALINITY CAN BE EXPERIENCED. GYPSUM NEEDS TO BE SPREAD EVENLY ACROSS THE WATER SURFACE.

IN ADDITION, FILTER BAGS (300 FILTER BAGS OR APPROVED EQUIVALENT) FILLED WITH GYPSUM SHOULD BE APPLIED EVERY 20 M IN THE DIRTY WATER CHANNELS TO AID WITH FLOCCULATION. IT MUST BE NOTED THAT GYPSUM CAN CAUSE SCUM DEPOSITS IN EQUIPMENT.

OTHER FLOCCULATION OPTIONS WILL REQUIRE WRITTEN APPROVAL FROM DEPARTMENT OF ENVIRONMENT AND HERITAGE PROTECTION (DEHP). THESE INCLUDE:

- POLYACRYLAMIDES (PAMS LIKE DANCLAR FLOC BLOCKS OR OTHER PRODUCT APPROVED BY CPESC)
- ALUMINIUM BASED FLOCCULANTS

SILT CURTAINS

FLOATING SILT CURTAINS WILL NEED TO BE INSTALLED BY BUNGAL CREEK NEAR THE INLET AND OUTLET OF THE DIVERSION DRAIN DURING THE CONSTRUCTION PHASE. SILT CURTAINS ACT TO ISOLATE THE FLOWING LADEN WATER FROM PASSING STREAM FLOWS. THIS ALLOWS SEDIMENTATION OF THE DISTURBED WATER BODY WITHIN THE AREA ENCLOSED BY THE SILT CURTAIN. THE MOST EFFECTIVE PLACEMENT METHOD FOR SILT CURTAIN IS IN A SEMICIRCLE OR U SHAPE ARRANGEMENT AROUND THE DISTURBANCE AREA.

THE FOLLOWING COMPANIES SUPPLY AND INSTALL SILT CURTAINS IN AUSTRALIA:

- AUSSEREROSION FLOATING SILT CURTAINS
- POLARIS MARINE HTY LTD
- DIEMAS SERVICES PTY LTD

THE INSTALLATION AND MAINTENANCE OF THE SILT CURTAINS SHOULD BE AS PER MANUFACTURER SUPPLIER REQUIREMENTS.

MONITORING REQUIREMENTS

APPROPRIATE PROCEDURES AND QUALIFIED PERSONNEL SHOULD BE ENGAGED TO PLAN AND CONDUCT SITE INSPECTIONS AND WATER QUALITY MONITORING THROUGHOUT THE CONSTRUCTION.

- ALL ESC MEASURES SHOULD BE INSPECTED IN ACCORDANCE WITH THE IECA 2006 GUIDELINES.
- ALL SITE MONITORING DATA INCLUDING RAINFALL RECORDS, DATES OF WATER QUALITY TESTING, TESTING RESULTS AND RECORDS OF CONTROLLED WATER RELEASES FOR THE SITE, SHOULD BE DOCUMENTED ON-SITE. THE DOCUMENTATION SHOULD BE MAINTAINED UP TO DATE FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON-SITE FOR INSPECTION BY THE ASSESSING AUTHORITY ON REQUEST.
- ALL ENVIRONMENTAL INCIDENTS SHOULD BE DOCUMENTED, AND SHOULD REMAIN ACCESSIBLE TO THE RELEVANT REGULATORY AUTHORITIES ON REQUEST. WHEN AN ENVIRONMENTAL INCIDENT (I.E. BREACH OF LIMITS) OR EXCEEDANCE OF TRIGGER VALUE OCCURS, IT IS THE RESPONSIBILITY OF THE ENVIRONMENTAL MANAGER TO INVESTIGATE AND INITIATE REMEDIAL ACTIONS COMMENSURATE WITH THE SEVERITY OF THE INCIDENT.
- A SYSTEM SHOULD BE IMPLEMENTED AND MAINTAINED THAT MONITORS AND RECORDS SITE COMPLIANCE AND NON-COMPLIANCE WITH THE ESCP REQUIREMENTS.

MAINTENANCE REQUIREMENTS

ALL MATERIALS REMOVED FROM ESC DEVICES DURING MAINTENANCE WHETHER SOLID OR LIQUID, SHOULD BE DISPOSED OF IN A MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM. SOLID MATERIALS REMOVED FROM ESC DEVICES ARE TO BE STOCKPILED ON-SITE IN ACCORDANCE WITH STOCKPILE GUIDELINES.

WRITTEN RECORDS OF EROSION AND SEDIMENT CONTROL MONITORING AND MAINTENANCE ACTIVITIES CONDUCTED DURING THE CONSTRUCTION AND MAINTENANCE PERIODS SHOULD BE MAINTAINED ON-SITE. ORIGINAL COPIES OF SUCH RECORDS SHALL BE PROVIDED ON REQUEST TO THE ASSESSING AUTHORITY. MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES MUST OCCUR IN ACCORDANCE WITH IECA 2006 GUIDELINES.

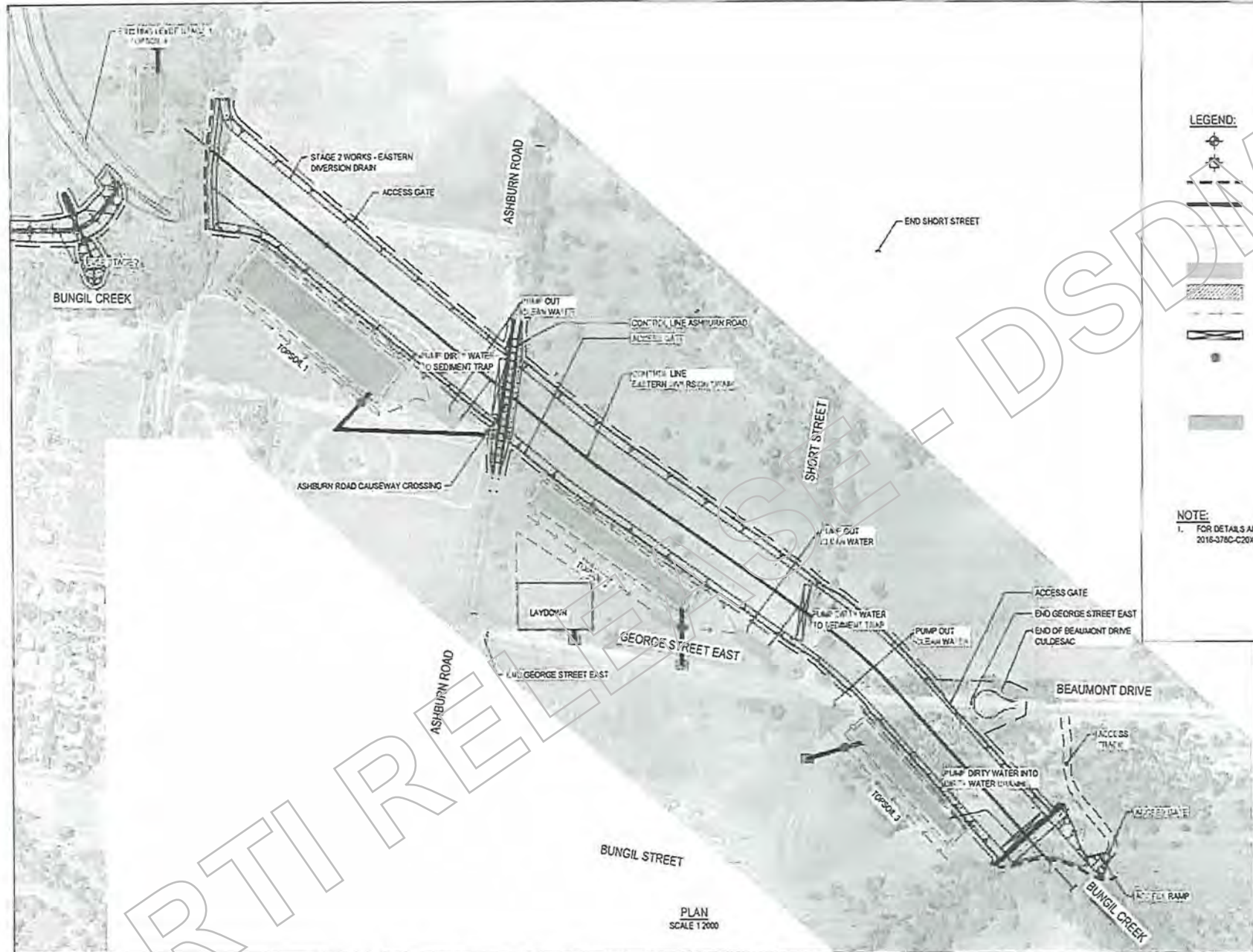


				1 CARTWRIGHT STREET P.O BOX 42, MITCHELL QLD 4405 Phone 1300 037 682 Fax (07) 4524 6690 Email council@maranoa.qld.gov.au Web www.maranoa.qld.gov.au	SUBJ MARANOVA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES	PROJECT ROMA LEVEE STAGE 2 PROJECT	PROJECT NO 2016-378C-G202		
DATE 24/06	DRAWN N.C.	CHECKED J.P.	DATE 24/06	DRAWING NO 2016-378C-G202	TITLE PRELIMINARY	SHEET NO 15/201	TOTAL SHEETS 378C	SCALE NTS	REV A

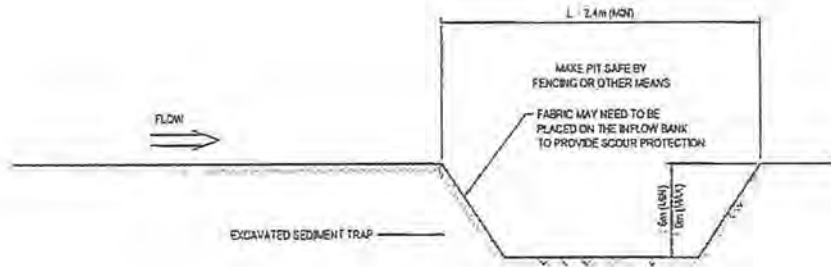


- LEGEND:**
- BOREHOLE LOCATION (GHD 2015)
 - TEST PIT LOCATION (GHD 2015)
 - SILT CURB
 - ACCESS TRACK/GRAVEL
 - SEDIMENT FENCE
 - COIR LOG/FIBRE ROLL
 - SEDIMENT TRAP
 - VIBRATION GRID AND ROCK PAD/RAMP
 - DIRTY WATER CHANNEL
 - TEMPORARY EARTH BUND
 - ROCK CAUSEWAY
 - TOPSOIL 1 - 200m x 40m
 - TOPSOIL 2 - 200m x 25m
 - TOPSOIL 3 - 150m x 15m
 - TOPSOIL 4 - 60m x 20m
 - LAYDOWN 80m x 50m

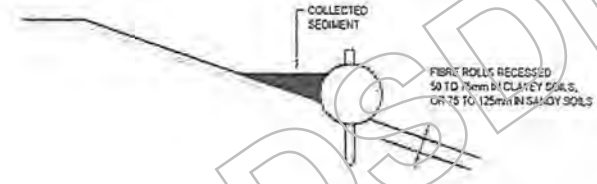
NOTE:
 1. FOR DETAILS AND NOTES, REFER TO DRAWING Nos. 2016-378C-C202 TO 2016-378C-C20X.



				CLIENT MARANOA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES		PROJECT ROMA LEVEE STAGE 2 PROJECT		PREPARED BY GHD	
1 CARTWRIGHT STREET P O BOX 42, MITCHELL QLD 4465 Phone: 1300 037 862 Fax: (07) 4524 6600 Email: council@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au		PROJECT NO. 2016-378C-C201		DATE 12/06		REVISION NO. 378C		SCALE AS SHOWN 1:2000	
EROSION AND SEDIMENT CONTROL PLAN				STATUS PRELIMINARY		SHEET NO. 15/201		REV A	



EXCAVATED SEDIMENT TRAP
SCALE N:1



TYPICAL FIBRE ROLL DETAIL (IECA, 2008)
SCALE N:1

CONSTRUCTION

1. REFER TO APPROVED PLANS FOR LOCATION AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
2. CLEAR THE FOUNDATION AREA OF THE OUTLET STRUCTURE (IF ANY), AND INSTALL AS PER SEPARATE INSTRUCTIONS.
3. EXCAVATE THE SETTLING POND IN ACCORDANCE WITH THE APPROVED PLANS, UNLESS OTHERWISE SPECIFIED. THE EXCAVATED PIT SHOULD HAVE A SIDE SLOPE OF 2:1 (H:V) OR FLATTER.
4. APPROPRIATELY STABILISE ANY BANK SUBJECT TO DIRECT INFLOW.
5. ESTABLISH ALL NECESSARY UP-SLOPE DRAINAGE CONTROL MEASURES TO ENSURE THAT SEDIMENT-LADEN RUNOFF IS APPROPRIATELY DIRECTED INTO THE SEDIMENT TRAP.
6. TAKE ALL NECESSARY MEASURES TO MINIMISE THE SAFETY RISK CAUSED BY THE STRUCTURE.

MAINTENANCE

1. CHECK EXCAVATED SEDIMENT TRAPS AFTER EACH RUNOFF EVENT AND MAKE REPAIRS IMMEDIATELY
2. INSPECT THE BANKS FOR SLUMPING OR EXCESSIVE SCOUR.
3. IF FLOW THROUGH THE STRUCTURE IS REDUCED TO AN UNACCEPTABLE LEVEL DUE TO BLOCKAGE OF THE OUTLET STRUCTURE (IF ANY), THEN MAKE ALL NECESSARY REPAIRS AND MAINTENANCE TO RESTORE THE DESIRED FLOW CONDITIONS.
4. CHECK THE STRUCTURE AND SURROUNDING CHANNEL BANKS FOR DAMAGE FROM OVERTOPPING FLOWS AND MAKE REPAIRS AS NECESSARY.
5. REMOVE SEDIMENT AND RESTORE ORIGINAL SEDIMENT STORAGE VOLUME WHEN COLLECTED SEDIMENT EXCEEDS 30% OF THE PIT VOLUME.
6. DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

FIBRE ROLL INSTALLATION

1. REFER TO APPROVED PLANS FOR LOCATION AND INSTALLATION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
2. WHEN PLACED ACROSS NON-VEGETATED OR NEWLY SEEDDED SLOPES, THE ROLLS MUST BE PLACED ALONG THE CONTOUR.
3. IF PLACED ON OPEN OR LOOSE SOIL, ENSURE THE FIBRE ROLLS ARE TRENCHED 75 TO 125mm IN SANDY SOILS AND 50 TO 75mm IN CLAYEY SOILS.
4. ENSURE THE OUTERMOST ENDS OF THE FIBRE ROLL ARE TUNED UP THE SLOPE TO ALLOW WATER TO ADEQUATELY POND UP-SLOPE OF THE ROLL, AND TO AVOID FLOW BYPASSING.
5. WHEN PLACED ACROSS THE INVERT OF MINOR DRAINS, ENSURE THE SOCKS ARE PLACED SUCH THAT:
 - 5.1. THE CREST OF THE DOWNSTREAM ROLL IS LEVEL WITH THE CHANNEL INVERT AT THE IMMEDIATE UPSTREAM SOCK (IF ANY).
 - 5.2. EACH ROLL EXTENDS UP THE CHANNEL BANKS SUCH THAT THE CREST OF THE FIBRE ROLL AT ITS LOWEST POINT IS LOWER THAN THE GROUND LEVEL AT EITHER END OF THE ROLL.
6. ENSURE THE ANCHORING STAKES ARE DRIVEN INTO THE END OF EACH ROLL AND ALONG THE LENGTH OF EACH ROLL AT A SPACING NOT EXCEEDING 1.2m OR SIX TIMES THE ROLL DIAMETER, WHICHEVER IS LESSER. A MAXIMUM STAKE SPACING OF 0.3m APPLIES WHEN USED TO FORM CHECK DAMS.
7. ADJOINING ROLL MUST BE OVERLAPPED AT LEAST 45 DEGREES AND ABUTTED.

FIBRE ROLL MAINTENANCE

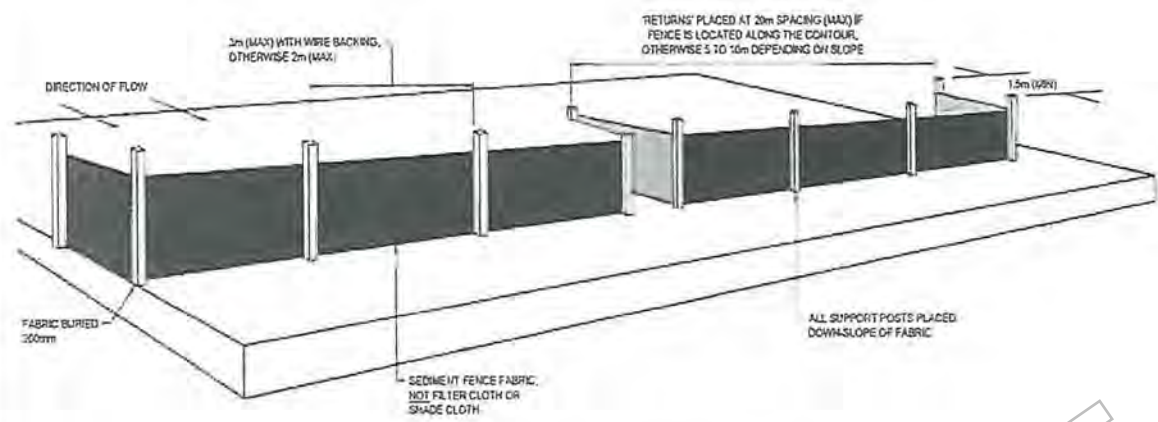
1. INSPECT ALL FIBRE ROLLS PRIOR TO FORECAST RAIN, DAILY DURING EXTENDED PERIODS OF RAINFALL, AFTER SIGNIFICANT RUNOFF DURING STORMS OR OTHERWISE AT WEEKLY INTERVALS.
2. REPAIR OR REPLACED DAMAGED FIBRE ROLLS.
3. REMOVE COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

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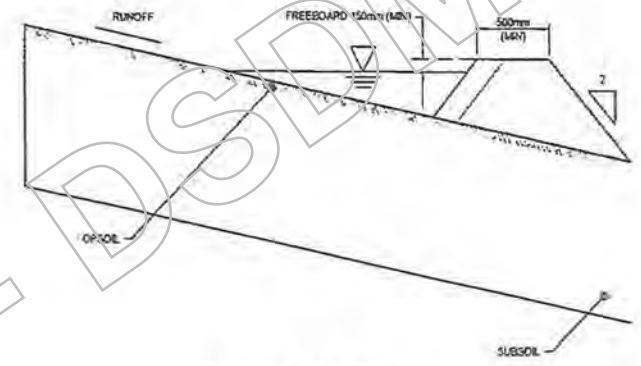
		1 CARTYRIKAT STREET P.O. BOX 42, MITCHELL QLD 4465 Phone: 1300 007 682 Fax: (07) 4824 6690 Email: council@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au	CLIENT MARANOA REGIONAL COUNCIL DEPARTMENT OF INFRASTRUCTURE SERVICES TITLE NOTES AND DETAILS SHEET 1 OF 4	PROJECT ROMA LEVEE STAGE 2 PROJECT DRAWING NUMBER 2016-378C-C202 SCALE & DATE NTS	PROJECT NUMBER 2016-378C-C202 DATE 12/4/06 DRAWN BY J.P. CHECKED BY A.K.
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BASE WIDTH (MIN)	7500mm
SIDE SLOPE (MAX)	2:1 (H:V)
HYDRAULIC FREEBOARD	150mm (300mm)



TYPICAL SEDIMENT FENCE DETAIL (IECA 2008)
SCALE N1:5



EARTH BANKS (IECA, 2008)
SCALE N1:5

SEDIMENT FENCE INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND REQUIRED TYPE OF FABRIC (IF SPECIFIED), IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, FABRIC TYPE, OR METHOD OF INSTALLATION CONTACT ENGINEER OR RESPONSIBLE ON-SITE OFFICE FOR ASSISTANCE.
- TO THE MAXIMUM DEGREE PRACTICAL, AND WHERE THE PLANS ALLOW, ENSURE THE FENCE IS LOCATED:
 - TOTALLY WITHIN THE PROPERTY BOUNDARIES,
 - ALONG A LINE OF CONSTANT ELEVATION WHEREVER PRACTICAL,
 - AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL DAMAGING THE FENCE.
- INSTALL RETURNS WITHIN THE FENCE AT MAXIMUM 20m INTERVALS IF THE FENCE IS INSTALLED ALONG THE CONTOUR, OR 5 TO 10m MAXIMUM SPACING (DEPENDING ON SLOPE) IF THE FENCE IS INSTALLED AT AN ANGLE TO THE CONTOUR, THE RETURNS SHALL CONSIST OF EITHER:
 - V-SHAPED SECTION EXTENDING AT LEAST 1.5m UP THE SLOPE, OR
 - SANDBAG OR ROCK/AGGREGATE CHECK DAM A MINIMUM 1/3 AND MAXIMUM 1/2 FENCE HEIGHT, AND EXTENDING AT LEAST 1.5m UP THE SLOPE.
- ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m, OR AS NECESSARY, TO MINIMISE WATER BYPASSING AROUND THE FENCE.
- ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE, AND THE UNDESIRABLE DISCHARGE OF WATER AROUND THE ENDS OF THE FENCE.
- IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF THE EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE, DO NOT ATTACH THE FABRIC TO THE TREES.
- ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 3m IF SUPPORTED BY A TOP SUPPORT WIRE OR WIRE MESH BACKING, OTHERWISE NO GREATER THAN 2m.
- IF SPECIFIED, SECURELY ATTACH THE SUPPORT WIRE OR MESH TO THE UP-SLOPE SIDE OF THE STAKES WITH THE MESH EXTENDING AT LEAST 200mm INTO THE EXCAVATED TRENCH. ENSURE
- THE MESH AND FABRIC IS ATTACHED TO THE UP-SLOPE SIDE OF THE STAKES (EVEN WHEN DIRECTING A FENCE AROUND A CORNER OR SHARP CHANGE OF DIRECTION).
- WHenever possible, construct the sediment fence from a continuous roll of fabric, to join fabric either:
 - ATTACH EACH END TO TWO OVERLAPPING STAKES WITH THE FABRIC FOLDING AROUND THE ASSOCIATED STAKE ONE TURN, AND WITH THE TWO STAKES TIED TOGETHER WITH WIRE (METHOD 1), OR
 - OVERLAP THE FABRIC TO THE NEXT ADJACENT SUPPORT POST (METHOD 2).
- SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING 25 x 12.5mm STAPLES, OR THE WIRE AT MAXIMUM 150mm SPACING.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/SH (IF ANY) AT A MAXIMUM SPACING OF 10m.
- ENSURE THE COMPLETED SEDIMENT FENCE IS AT LEAST 450mm BUT NO MORE THAN 700mm HIGH, IF A SPILL-THROUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE GROUND LEVEL.
- BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.
- IF IT IS NOT POSSIBLE TO ANCHOR THE FABRIC IN AN EXCAVATED TRENCH, THEN USE A CONTINUOUS LAYER OF SAND OR AGGREGATE TO HOLD THE FABRIC FIRMLY ON THE GROUND.

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- CLEAR THE LOCATION FOR THE BANK, CLEARING ONLY THE AREA THAT IS NEEDED TO PROVIDE ACCESS FOR PERSONNEL AND EQUIPMENT.
- REMOVE ROOTS, STUMPS, AND OTHER DEBRIS AND DISPOSE OF THEM PROPERLY, DO NOT USE DEBRIS TO BUILD THE BANK.
- FORM THE BANK FROM THE MATERIAL, AND TO THE DIMENSION SPECIFIED IN THE APPROVED PLANS.
- IF EARTH IS USED, THEN ENSURE THE SIDES OF THE BANK ARE NO STEEPER THAN A 2:1 (H:V) SLOPE, AND THE COMPLETED BANK MUST BE AT LEAST 500mm HIGH.
- IF FORMED FROM SANDBAGS, THEN ENSURE THE BAGS ARE TIGHTLY PACKED SUCH THAT WATER LEAKAGE THROUGH THE BAGS IS UNLIKELY.
- CHECK THE BANK ALIGNMENT TO ENSURE POSITIVE DRAINAGE IN THE DESIRED DIRECTION.
- THE BANK SHOULD BE VEGETATED (PLANTED, SEEDED AND MULCHED), OR OTHERWISE STABILISED IMMEDIATELY UNLESS IT WILL OPERATE FOR LESS THAN 30 DAYS OR IF SIGNIFICANT RAINFALL IS NOT EXPECTED DURING THE LIFE OF THE BANK.
- ENSURE THE EMBANKMENT DRAINS TO A STABLE OUTLET AND DOES NOT DISCHARGE TO AN UNSTABLE FILL SLOPE.

MAINTENANCE

- INSPECT FLOW DIVERSION BANKS AT LEAST WEEKLY AND AFTER RUNOFF-PRODUCING RAINFALL.
- INSPECT THE BANK FOR ANY SLUAPS, WHEEL TRACK DAMAGE OR LOSS OF FREEBOARD, MAKE REPAIRS AS NECESSARY.
- CHECK THAT FILL MATERIAL OR SEDIMENT HAS NOT PARTIALLY BLOCKED THE DRAINAGE WITH UP-SLOPE OF THE EMBANKMENT, WHERE NECESSARY, REMOVE ANY DEPOSITED MATERIAL TO ALLOW FREE DRAINAGE.
- DISPOSE OF ANY COLLECTED SEDIMENT OR FILL IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.
- REPAIR ANY PLACES IN THE BANK THAT ARE WEAKENED OR IN RISK OF FAILURE.

DATE	BY	REVISION

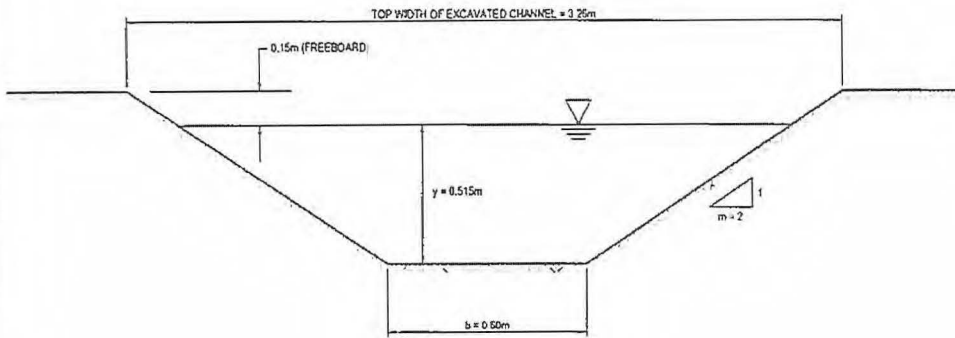


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PROJECT: MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES
FILE: NOTES AND DETAILS
SHEET 2 OF 4

PROJECT NAME: ROMA LEVELLE STAGE 2 PROJECT
STATUS: PRELIMINARY

DESIGNED	DRAWN	APPROVED	DATE	ISSUED UNDER
A.K.	N.C.	J.P.	14/06	2015-378C-C203
15201	378C			
DRAWN BY: MTS				REV: A



DIRTY WATER CHANNELS (IECA, 2008)
SCALE N.T.S.

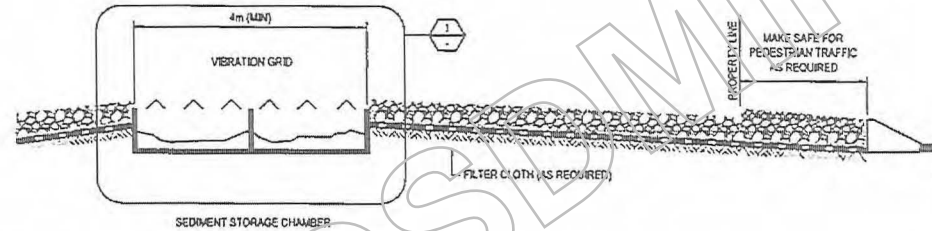


FIGURE 7 - TYPICAL LAYOUT OF VIBRATION GRID WITH ROCK RAMPS
SCALE N.T.S.

TYPICAL SITE ACCESS TRACK DETAIL (IECA, 2008)
SCALE N.T.S.

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- ENSURE ALL NECESSARY SOIL TESTING (E.G. SOIL pH, NUTRIENT LEVELS) AND ANALYSIS HAS BEEN COMPLETED, AND REQUIRED SOIL ADJUSTMENTS PERFORMED PRIOR TO PLANTING.
- CLEAR THE LOCATION FOR THE CHANNEL, CLEARING ONLY WHAT IS NEEDED TO PROVIDE ACCESS FOR PERSONNEL AND CONSTRUCTION EQUIPMENT.
- REMOVE ROOTS, STUMPS, AND OTHER DEBRIS AND DISPOSE OF THEM PROPERLY. DO NOT USE DEBRIS TO BUILD ANY ASSOCIATED EMBANKMENTS.
- EXCAVATE THE DIVERSION CHANNEL TO THE SPECIFIED SHAPE, ELEVATION AND GRADIENT. THE SIDES OF THE CHANNEL SHOULD BE NO STEEPER THAN A 2:1 (H:V) IF CONSTRUCTED IN EARTH, UNLESS SPECIFICALLY DIRECTED WITHIN THE APPROVED PLANS.
- STABILISE THE CHANNEL AND BANKS IMMEDIATELY UNLESS IT WILL OPERATE FOR LESS THAN 30 DAYS. IN EITHER CASE, TEMPORARY EROSION PROTECTION (MATTING, ROCK, ETC.) WILL BE REQUIRED AS SPECIFIED WITHIN THE APPROVED PLANS OR AS DIRECTED.
- ENSURE THE CHANNEL DISCHARGES TO A STABLE AREA.

MAINTENANCE

- DURING THE SITE'S CONSTRUCTION PERIOD, INSPECT THE DIVERSION CHANNEL WEEKLY AND AFTER ANY INCREASE IN FLOWS WITHIN THE CHANNEL. REPORT ANY SLUMPS, WHEEL TRACK DAMAGE OR LOSS OF FREEBOARD.
- ENSURE FILL MATERIAL OR SEDIMENT IS NOT PARTIALLY BLOCKING THE CHANNEL. WHERE NECESSARY, REMOVE ANY DEPOSITED MATERIAL TO ALLOW FREE DRAINAGE.
- DISPOSE OF ANY COLLECTED SEDIMENT OR FILL IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

VIBRATION GRID AND ROCK RAMPS INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION AND DIMENSIONAL DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- CLEAR THE LOCATION OF THE VIBRATION GRID REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE A FIRM FOUNDATION SO THAT THE ROCK IS NOT PRESSED INTO SOFT GROUND. CLEAR SUFFICIENT WIDTH TO ALLOW FOR PASSAGE OF LARGE VEHICLES, BUT CLEAR ONLY THAT NECESSARY FOR THE EXIT. DO NOT CLEAR ADJACENT AREAS UNTIL THE REQUIRED EROSION AND SEDIMENT CONTROL DEVICES ARE IN PLACE.
- GRADE THE LOCATION OF THE VIBRATION GRID SO THAT RUNOFF FROM THE UNIT WILL NOT FLOW INTO THE STREET, BUT WILL FLOW TOWARDS AN APPROPRIATE SEDIMENT-TRAPPING DEVICE.
- ENSURE THAT THE INSTALLATION OF THE VIBRATION GRID INCLUDES ADEQUATE SEDIMENT STORAGE VOLUME UNDER THE GRID. WHERE NECESSARY, INSTALL SUITABLE PRECAST SEDIMENT COLLECTION CHAMBERS.
- PLACE A ROCK PAD/RAMP FORMING A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK OVER THE ROADWAY BETWEEN THE VIBRATION GRID AND THE SEALED STREET TO PREVENT TYRES FROM PICKING UP MOIST SOIL AFTER THEY HAVE BEEN CLEARED.
- THE TOTAL LENGTH OF THE VIBRATION GRID AND ROCK RAMPS SHOULD BE AT LEAST 15m WHERE PRACTICABLE, AND AS WIDE AS THE FULL WIDTH OF THE ENTRY OR EXIT AND AT LEAST 3m. THE ROCK RAMP SHOULD COMMENCE AT THE EDGE OF THE OFF-SITE SEALED ROAD OR PAVEMENT.
- FLARE THE END OF THE ROCK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF THE TURNING VEHICLES DO NOT TRAVEL OVER UNPROTECTED SOIL.
- IF THE FOOTPATH IS OPEN TO PEDESTRIAN MOVEMENT, THEN COVER THE COARSE ROCK WITH FINE AGGREGATE OR GRAVEL, OR OTHERWISE TAKE WHATEVER MEASURES ARE NEEDED TO MAKE THE AREA SAFE.

RTIP RELEASE

		<p>maranoa REGIONAL COUNCIL</p>	<p>1 CARTWRIGHT STREET P.O. BOX 42, MITCHELL QLD 4465</p> <p>Phone: 1300 007 052 Fax: (07) 4574 6690 Email: council@maranoa.qld.gov.au Web: www.maranoa.qld.gov.au</p>	<p>PROJECT ROMA LEVEE STAGE 2 PROJECT</p>	<p>DATE 14/06</p>	<p>PROJECT NUMBER 2018-378C-C204</p>
				<p>PROJECT STATUS PRELIMINARY</p>	<p>DATE 15/201</p>	<p>PROJECT NUMBER 378C</p>
<p>FILE NOTES AND DETAILS SHEET 3 OF 4</p>				<p>SCALE 9:1 NTS</p>		

GHD

145 Ann Street Brisbane QLD 4000
GPO Box 668 Brisbane QLD 4001
T: (07) 3316 3000 F: (07) 3316 3333 E: bnemail@ghd.com

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	A. Kamal	J. Postlethwaite		J. Postlethwaite		

RTI RELEASE - DSDMIP

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LEGEND:

- BOREHOLE LOCATION (SHD 2015)
- TEST PIT LOCATION (SHD 2015)

NOTES:

- 1 REFER TO DRG 2016-378C-0002 AND 2016-378C-0003 FOR GENERAL NOTES
- 2 REFER TO DRG 2016-378C-0002 BSK DROP STRUCTURES PLAN AND DETAILS
- 3 REFER TO DRG 2016-378C-0001 FOR RELOCATION OF SERVICES
- 4 RAMP WILL REQUIRE ONGOING MAINTENANCE TO MAINTAIN ACCESS

BOREHOLE LOCATIONS				
BOREHOLE	EASTING	NORTHING	RL	DEPTH
BHR207	680166.000	7059780.000	296.750	3.00m
BHR208	680166.000	7059800.000	296.750	3.00m
BHR209	680178.000	7059820.000	296.750	7.50m

TEST PIT LOCATIONS				
BOREHOLE	EASTING	NORTHING	RL	DEPTH
TPR203	679442.000	7060480.000	296.250	3.90m
TPR204	679584.000	7060330.000	297.500	3.60m
TPR205	679796.000	7060180.000	297.250	3.90m
TPR206	679934.000	7060050.000	296.500	3.90m
TPR207	680162.000	7059790.000	296.750	4.50m

Lendgend

Red - Clear And Grub Zones

DATE	27/05/16	ISSUED FOR CONSTRUCTION	J.P.
SCALE	1:2000	AS SHOWN	AS SHOWN

ASSOCIATED CONSULTANT:

41-29431

1 CARTWRIGHT STREET
P O BOX 42, MITCHELL QLD 4460

Phone: 1300 007 662
Fax: (07) 4624 6690
Email: council@maranoa.qld.gov.au
Web: www.maranoa.qld.gov.au

DEPARTMENT OF WATER RESOURCES, CANBERRA, 2014

CLIENT:
MARANOA REGIONAL COUNCIL
DEPARTMENT OF INFRASTRUCTURE SERVICES

TITLE:
EASTERN DIVERSION DRAIN
GENERAL ARRANGEMENT PLAN

PROJECT:
ROMA FLOOD MITIGATION PROJECT - STAGE 2

STATUS:
FOR CONSTRUCTION

PROJECT NORTH

DESIGNED: J.K. M.M. J.P. DATE: 05/16
DRAWING NUMBER: 2016-378C-C001

WORK ORDER NUMBER: 15201 DESIGN NUMBER: 378C SCALE: 1:2000 SHEET: 0

Annexure 7.1

Native Title Assessment Form

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QNTIME

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5. Where a Module only applies to part of your proposed dealing area, ensure you have ticked the "Part of the proposed dealing area" box. Proceed through the form for the balance of your proposed dealing area. In this instance, a diagram should be attached to identify and to distinguish between the different areas.



Please ensure this assessment is still correct at the time you do the dealing.

Assessment Section

Module AA. Proposed Dealing

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bungri Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

Proposed Dealing Area

Lot(s)/Plan(s): Lot 21 on R8614
Lot 41 on R8614
Lot 96 on M5398

Parish: Roma **County:** Waldegrave

Current Status: Freehold

Locality Description: Tiffin Street and 51-85 George Street, Roma

Attached Plan/Map: As per submitted application

Module AB. Is this a dealing that can proceed without further reference to native title?

- Yes** Dealing is within a QNTIME conclusion boundary
[C/]. Go to Module BB (if conclusion based on Module BA).
- Dealing is not a future act, ie. it is listed in Part 2

Activities done in accordance with a valid lease, licence, permit or authority

Emergency action

Go to **Reason for Decision**

No

Module AC. Is there a registered ILUA that covers the proposed dealing?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

Module AD. Is there a determination of native title that covers the proposed dealing area?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

IF YES, does the determination state that native title does **not** exist over the proposed dealing area?

Yes – Go to Reason for Decision

No - Go to Modules F to N section of this Form as native title exists over the proposed dealing area unless subsequently extinguished by a later act.

Module BA. Is there or has there been a valid grant or vesting of exclusive possession over the proposed dealing area?

Yes – Go to Module BB Part of the proposed dealing area

No – Go to Module CA

Module BB. Can the extinguishing effect of the PEPA / QNTIME Conclusion be relied upon?

Yes – Go to Reason for Decision

No

Module CA. Is there or has there been a valid public work over the proposed dealing area?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

Module CB. Is there or has there been an area dedicated or declared as road over the proposed dealing area?

- Yes Part of the proposed dealing area
 No

IF YES, can the dedication/declaration be relied upon to carry out the proposed dealing?

- Yes – Go to **Reason for Decision**
 No

Module D. Is the area subject to other works that were done under the authority of the Crown, ie. (private works)?

- Yes Part of the proposed dealing area
 No

IF YES, can I proceed with my dealing on the basis of the works?

- Yes – Go to **Reason for Decision**
 No

Module E. Information Module ONLY regarding past and intermediate period acts

Proceed to Modules F to N.

Modules F to N. Do the future act sections apply to your proposed dealing?

- Yes Part of the proposed dealing area

Which future act provision and Module applies

Section/s: Modules:

Go to **Reason for Decision**

- No** – Your only options now are –
- an ILUA (Module Q); or
 - a non-claimant application (Module R).

Can a non-claimant application be made?

- Yes
 No – Your only option is an ILUA.
Go to **Reason for Decision**

Decision Section

Reason for Decision

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bungli Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

A check of the tenure for the subject property reveals that Lot 21 on R8614 is freehold, and deed of grant 10256068 was issued 15 September 1875. Lot 41 on R8614 is also freehold, and deed of grant 10239243 was issued 08 April 1875. Lot 96 on M5398 is also freehold, and deed of grant 10662130 was issued 12 July 1887.

The portion of the proposed dealing located within the above freehold lots can therefore proceed without further reference to Native Title as the area is subject to a previous grant of exclusive tenure (PEPA).

Native Title Parties & Procedural Rights (if relevant)

Types of native title parties	Names of native title parties	Procedural rights to be provided to the native title parties
Registered Native Title Claimants	Mandandanji People	No
Native Title Representative Body	Queensland South Native Title Services Ltd	No

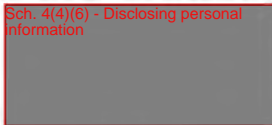
- Proceed (first providing any relevant procedural rights)
- Send to NTCO
- Send to Indigenous Services through NTCO

Name, title and signature of officer making this assessment –

Name: Sophie Smith

Title: Native Title Officer

Department/Agency: DILGP– SARA Central

Signature: 

Date: 19 April 2016

Don't forget to:

- 1) Enter your research into QNTIME.
RB / _____
RI / _____
- 2) Request a conclusion be published where you found a PEPA.

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Native Title Assessment Form

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Remember to –

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Native Title Assessment Form

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Please ensure this assessment is still correct at the time you do the dealing.

Assessment Section

Module AA. Proposed Dealing

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bungie Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

Proposed Dealing Area

Lot(s)/Plan(s): Adjacent to Lots 21 and 41 on R8614, and Lot 342 on WV219

Parish: Roma **County:** Waldegrave

Current Status: Unallocated State Land

Locality Description: Bungie Creek – Adjacent to Tiffin Street and George Street, Roma

Attached Plan/Map: As per attached location map and drawings supplied

Module AB. Is this a dealing that can proceed without further reference to native title?

- Yes Dealing is within a QNTIME conclusion boundary
[C/]. Go to Module BB (if conclusion based on Module BA).
- Dealing is not a future act, ie. it is listed in Part 2
- Activities done in accordance with a valid lease, licence, permit or authority
- Emergency action

No

Module AC. Is there a registered ILUA that covers the proposed dealing?

- Yes – Go to Reason for Decision Part of the proposed dealing area
 No

Module AD. Is there a determination of native title that covers the proposed dealing area?

- Yes – Go to Reason for Decision Part of the proposed dealing area
 No

IF YES, does the determination state that native title does not exist over the proposed dealing area?

- Yes – Go to Reason for Decision
 No - Go to Modules F to N section of this Form as native title exists over the proposed dealing area unless subsequently extinguished by a later act.

Module BA. Is there or has there been a valid grant or vesting of exclusive possession over the proposed dealing area?

- Yes – Go to Module BB Part of the proposed dealing area
 No – Go to Module CA

Module BB. Can the extinguishing effect of the PEPA / QNTIME Conclusion be relied upon?

- Yes – Go to Reason for Decision
 No

Module CA. Is there or has there been a valid public work over the proposed dealing area?

- Yes – Go to Reason for Decision Part of the proposed dealing area
 No

Module CB. Is there or has there been an area dedicated or declared as road over the proposed dealing area?

- Yes Part of the proposed dealing area
 No

IF YES, can the dedication/declaration be relied upon to carry out the proposed dealing?

Yes – Go to Reason for Decision

No

Module D. Is the area subject to other works that were done under the authority of the Crown, ie. (private works)?

Yes Part of the proposed dealing area

No

IF YES, can I proceed with my dealing on the basis of the works?

Yes – Go to Reason for Decision

No

Module E. Information Module ONLY regarding past and intermediate period acts

Proceed to Modules F to N.

Modules F to N. Do the future act sections apply to your proposed dealing?

Yes Part of the proposed dealing area

Which future act provision and Module applies

Section/s: 24KA(2) Module: KA

Go to Reason for Decision

No Your only options now are –
 an ILUA (Module Q); or
 a non-claimant application (Module R).

Can a non-claimant application be made?

Yes

No – Your only option is an ILUA.

Decision Section

Reason for Decision

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bungil Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

Construction of a diversion channel would be considered a facility for services to the public and will be established for the benefit of the community as a whole. The proposed act is onshore, in relation to a drainage facility or levee, is operated for the general public and the proposed act permits or requires the construction, operation, use maintenance and repair by or on behalf of the crown or by or on behalf of any person of a section 24KA(2) facility. The act does not prevent native title holders from having access to land and waters in the vicinity of the facility and is not the compulsory acquisition of native title rights and interests


The proposed act has therefore been assessed under module 24KA of the *Native Title Act 1993* and no notification is required to the native title parties.

Native Title Parties & Procedural Rights (if relevant)

Types of native title parties	Names of native title parties	Procedural rights to be provided to the native title parties
Registered Native Title Claimants	Mandandanji People	No
Native Title Representative Body	Queensland South Native Title Services Ltd	No

- Proceed (first providing any relevant procedural rights)
- Send to NTCO
- Send to Indigenous Services through NTCO

Name, title and signature of officer making this assessment –

Name: Sophie Smith
Title: Native Title Officer
Department/Agency: DILGP– SARA Central
Signature: 
Date: 19 April 2016

Don't forget to:

- 1) Enter your research into QNTIME.
 RB / _____
 RI / _____
- 2) Request a conclusion be published where you found a PEPA.

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Native Title Assessment Form

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Assessment Section

Module AA. Proposed Dealing

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bungi Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

Proposed Dealing Area

Lot(s)/Plan(s): Adjacent to Lots 21, 41 & 343 on R8614, Lot 96 on M5398 & Lot 342 on WV219

Parish: Roma **County:** Waldegrave

Current Status: Road Reserve

Locality Description: Ashburn Road, Short Street and George Street East, Roma

Attached Plan/Map: As per submitted application

Module AB. Is this a dealing that can proceed without further reference to native title?

- Yes Dealing is within a QNTIME conclusion boundary [C/]. Go to Module BB (if conclusion based on Module BA).
- Dealing is not a future act, ie. it is listed in Part 2
- Activities done in accordance with a valid lease, licence, permit or authority

Emergency action

Go to Reason for Decision

No

Module AC. Is there a registered ILUA that covers the proposed dealing?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

Module AD. Is there a determination of native title that covers the proposed dealing area?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

IF YES, does the determination state that native title does not exist over the proposed dealing area?

Yes – Go to Reason for Decision

No - Go to Modules F to N section of this Form as native title exists over the proposed dealing area unless subsequently extinguished by a later act.

Module BA. Is there or has there been a valid grant or vesting of exclusive possession over the proposed dealing area?

Yes – Go to Module BB Part of the proposed dealing area

No – Go to Module CA

Module BB. Can the extinguishing effect of the PEPA / QNTIME Conclusion be relied upon?

Yes – Go to Reason for Decision

No

Module CA. Is there or has there been a valid public work over the proposed dealing area?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

Module CB. Is there or has there been an area dedicated or declared as road over the proposed dealing area?

Yes

Part of the proposed dealing area

No

IF YES, can the dedication/declaration be relied upon to carry out the proposed dealing?

Yes – Go to **Reason for Decision**

No

Module D. Is the area subject to other works that were done under the authority of the Crown, ie. (private works)?

Yes

Part of the proposed dealing area

No

IF YES, can I proceed with my dealing on the basis of the works?

Yes – Go to **Reason for Decision**

No

Module E. Information Module ONLY regarding past and intermediate period acts

Proceed to Modules F to N.

Modules F to N. Do the future act sections apply to your proposed dealing?

Yes

Part of the proposed dealing area

Which future act provision and Module applies

Section/s:

Modules:

Go to **Reason for Decision**

No Your only options now are –

- an ILUA (Module Q); or
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Can a non-claimant application be made?

Yes

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Decision Section

Reason for Decision

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Plan M5398 clearly depicts the proposed dealing area as road. Deed of Grant 10662130 was granted over portion 96 on 12 July 1887 and Deed of Grant 10662118 was granted over portion 119 on 12 July 1807 (being the Executive Authority action) make reference to the above plan. Plan M5398 also references a number of plans which support that conclusion that the areas surrounding the lots are dedicated roads.

Native Title is wholly extinguished over the full width of the roads as depicted on the above mentioned plan.

Native Title Parties & Procedural Rights (if relevant)

Types of native title parties	Names of native title parties	Procedural rights to be provided to the native title parties
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Native Title Representative Body	Queensland South Native Title Services Ltd	No

Proceed (first providing any relevant procedural rights)

Send to NTCO

Send to Indigenous Services through NTCO

Name, title and signature of officer making this assessment –

Name: Sophie Smith
Title: Native Title Officer
Department/Agency: DILGP- SARA Central

Signature:

Sch. 4(4)(6) - Disclosing personal information

Date: 19 April 2016

Don't forget to:

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Assessment Section

Module AA. Proposed Dealing

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bung Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

Proposed Dealing Area

Lot(s)/Plan(s): Lot 343 on R3614
Lot 342 on WV219

Parish: Roma **County:** Waldegrave

Current Status: Reserve

Locality Description: 153 and 88-156 George Street, Roma

Attached Plan/Map: As per attached location map and drawings supplied

Module AB. Is this a dealing that can proceed without further reference to native title?

- Yes Dealing is within a QNTIME conclusion boundary
[C/]. Go to Module BB (if conclusion based on Module BA).
- Dealing is not a future act, ie. it is listed in Part 2
- Activities done in accordance with a valid lease, licence, permit or authority

Emergency action

Go to Reason for Decision

No

Module AC. Is there a registered ILUA that covers the proposed dealing?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

Module AD. Is there a determination of native title that covers the proposed dealing area?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

IF YES, does the determination state that native title does **not** exist over the proposed dealing area?

Yes – Go to Reason for Decision

No - Go to **Modules F to N** section of this Form as native title exists over the proposed dealing area unless subsequently extinguished by a later act.

Module BA. Is there or has there been a valid grant or vesting of exclusive possession over the proposed dealing area?

Yes – Go to Module BB Part of the proposed dealing area

No – Go to Module CA

Module BB. Can the extinguishing effect of the PEPA / QNTIME Conclusion be relied upon?

Yes – Go to Reason for Decision

No

Module CA. Is there or has there been a valid public work over the proposed dealing area?

Yes – Go to Reason for Decision Part of the proposed dealing area

No

Module CB. Is there or has there been an area dedicated or declared as road over the proposed dealing area?

Yes

Part of the proposed dealing area

No

IF YES, can the dedication/declaration be relied upon to carry out the proposed dealing?

Yes – Go to Reason for Decision

No

Module D. Is the area subject to other works that were done under the authority of the Crown, ie. (private works)?

Yes Part of the proposed dealing area

No

IF YES, can I proceed with my dealing on the basis of the works?

Yes – Go to Reason for Decision

No

Module E. Information Module ONLY regarding past and intermediate period acts

Proceed to Modules F to N.

Modules F to N. Do the future act sections apply to your proposed dealing?

Yes Part of the proposed dealing area

Which future act provision and Module applies

Section/s: 24JA Module: J

Go to Reason for Decision

No Your only options now are –

an ILUA (Module Q); or

a non-claimant application (Module R).

Can a non-claimant application be made?

Yes

No – Your only option is an ILUA.

Decision Section

Reason for Decision

A Development Application under the *Sustainable Planning Act 2009*, has been lodged by Maranoa Regional Council for the construction of a high flow diversion channel (1,200m long, 60m wide, 3.5m deep) through the excavation of 130,000 tonnes of soil in accordance with ERA 16 - extractive and screening activities for Stage 2 flood mitigation works for Bungil Creek, Roma. A number of alterations are also required to the adjoining local roads along with the removal of vegetation. All works are in conjunction with the already constructed Stage 1 earthen levee bank.

A check of the tenure for the proposed dealing revealed that Lot 343 on R3614 is a Reserve (reference 49006273) and was gazetted on 29 November 1884 for a Recreation and Drainage Reserve. Lot 342 on WV219 is a Reserve (reference 49002201) and was gazetted on 11 March 1933 for a Rubbish Reserve

As there is no evidence that Native Title has been extinguished and the reserves were gazetted before 23 December 1996 this portion of the application has been assessed under 24JA of the *Native Title Act 1993*. The non-extinguishment principle applies and no notification is required as the works will have no greater impact on native title than what could already occur on a Recreation, Drainage or Rubbish reserve.

Native Title Parties & Procedural Rights (if relevant)

Types of native title parties	Names of native title parties	Procedural rights to be provided to the native title parties
Registered Native Title Claimants	Mandandanji People	No
Native Title Representative Body	Queensland South Native Title Services Ltd	No

- Proceed (first providing any relevant procedural rights)
- Send to NTCO
- Send to Indigenous Services through NTCO

Name, title and signature of officer making this assessment –

Name: Sophie Smith

Title: Native Title Officer

Department/Agency: DILGP– SARA Central

Signature: 

Date: 19 April 2016

Don't forget to:

- 1) Enter your research into QNTIME.
RB / _____
RI / _____
- 2) Request a conclusion be published where you found a PEPA.



FOR RELEASE - DSD/MP

City of San Diego Council
Water Resources Management Study
Hydrology and Hydraulics for Sloughs and Wetlands
Mitigation Options

December 2013

Executive summary

The Maranoa Regional Council (MRC) commissioned GHD to investigate flood mitigation options to address regional and local flooding issues in response to the flooding event in 2012 that occurred in the town of Roma, and the previous significant flood events of 2010 and 2011. The specific project aim of the Roma flood mitigation project was to establish measures that would ultimately "reduce the risk of above floor flooding in township from a storm event equal to the 2012 flood".

Stage 1 of the project is documented in *Maranoa Regional Council, Roma Flood Mitigation Study, Stage 1, Hydrology and Hydraulic Assessment Report* (GHD, 2013a). The results of the study advanced significant advancement of this aim through the analysis, approval for construction of a Stage 1 Levee.

Further flood mitigation options assessments have been undertaken to seek ways to further reduce flood risks for the properties in the township which still face residual risk of inundation after the completion of Stage 1. This additional work has been carried out under Stage 2 of the project and the comprised a scope of works was defined to investigate further potential benefits. The Stage 2 study was undertaken holistically under the following hierarchal approach:

- 'Regional' Mitigation - This element considers runoff and flooding from the whole of the Bungil Creek catchment. The approach and results of the regional flood assessment are described in *Roma Flood Mitigation Study – Hydrology and Hydraulics for Stage 2 Regional Mitigation Options* (GHD, 2013b).
- 'Major Local' Drainage and Flood Mitigation - This element considers mid-scale mitigation options within the town of Roma to mitigation flooding that occurs due to a combination of local runoff and regional tailwater effects, such as occurs through the Long Drain system and in the vicinity of the Railway Dam.
- 'Minor Local' Drainage Improvements - This considers local stormwater drainage issues that occur on a regular basis due to local runoff, including road cross-drainage.

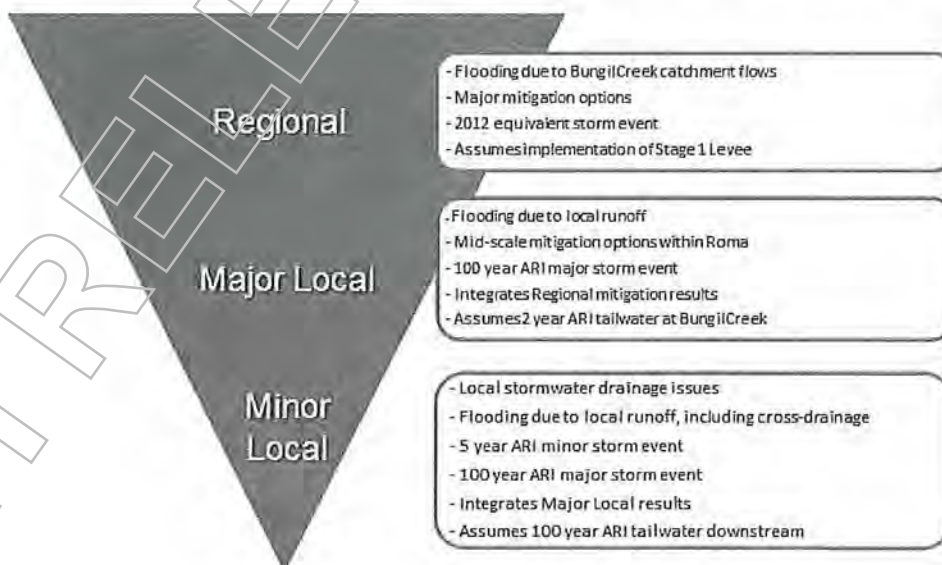


Figure i Study Hierarchy

This holistic approach integrates Stage 1 and Stage 2 works to provide a holistic flood mitigation and stormwater drainage strategy that aims to reduce the likelihood of above-floor flooding in Roma. The Stage 2 regional assessment identified works to provide additional mitigation to that achieved by the Stage 1 Levee. A preferred Stage 2 Regional mitigation option is described in *Roma Flood Mitigation Study – Hydrology and Hydraulics for Stage 2 Regional Mitigation Options* (GHD, 2013b).

This report describes and summarises the findings of the local mitigation assessment. The Major Local and Minor Local drainage improvement assessments are also discussed within the body of this report.

Modelling of Local Major Flood Mitigation Options

A hydraulic model was developed from the Stage 1 model for the Major Local assessment and was used to model 18 potential individual flood mitigation options at Major Local watercourses for a 100 year ARI local flood event with 2 year ARI regional tailwater conditions. Results of this modelling were used to identify options that provide the most benefit to areas identified as mitigation priority zones by MRC. These areas include the town centre, along the Long Drain system and in the vicinity of the Railway Dam. Individual options were combined into four combinations of the viable options as listed below in Table i.

Table i Major Local Flood Mitigation Combination Options

Option	Description
Local Combination 1 Long Drain Channel Works and Earthworks	Widening and deepening of existing overland flow path from: Bassett Lane to Charles Street; Powell Street to Lovell Street; and Bassett Lane to Alexander Avenue Upgrade crossings at Miscamble Street (2 locations), Lovell Street, Charles Street and Carnarvon Highway (2 locations) Open up existing overland flow path at: Carnarvon Highway and Lovell Street intersection; Between Arthur and Wyndham Streets; and Charles Street
Local Combination 2 Long Drain Channel Works and Earthworks, and Gregory Street Drainage Works	Local Combination 1, with the following additional Gregory Street Drainage works: Swale next to roadway along Charles Street, from Miscamble Street to Lovell Street, to improve conveyance of overland flows. Swales either side of Gregory Street to improve conveyance of overland flows. Additional/new culverts beneath Miscamble Street, Lovell Street and George Street. Twin 750 mm diameter pipes along Gregory Street from Lovell Street to Shady's Lagoon Charles Street swale length: 500 m Gregory Street swale length: 200 m (each side) Pipe diameter: 2 No. 750 mm Pipe length: 340 m
Local Combination 3 Long Drain Channel Works and Earthworks, and Railway Dam Extension with Station Street Pipes	Local Combination 1, with the following additional Railway Dam works: Increase storage capacity of rail dam. Improve conveyance along Feather Street and Station Street, discharging into Western Drain. Length of new pipe: 1,600 m (2 No. 1200 mm diameter)

Option	Description
Local Combination 4 Long Drain Channel Works and Earthworks, Gregory Street Drainage Works and Railway Dam Extension with Station Street Pipes	Local Combination 1, with the following additional works. Gregory Street Drainage Works (as described in Local Combination 2 above): Swale next to roadway along Charles Street and either side of Gregory Street Additional/new culverts beneath Miscamble Street, Lovell Street and George Street. Twin 750 mm diameter pipes along Gregory Street from Lovell Street to Shady's Lagoon Railway Dam Works (as described in Local Combination 3 above): Increase storage capacity of rail dam Twin 1200 mm diameter pipes along Feather Street and Station street, discharging into Western Drain

Of the four combination options investigated, the following two (Combination 1 and Combination 3) were found to provide the most benefit with regard to mitigating local flooding issues in the nominated priority areas.

- *Combination 1: Long Drain Channel Works and Earthworks*
 - Widening and deepening of existing overland flow path from Bassett Lane to Charles Street, Powell Street to Lovell Street, and Bassett Lane to Alexander Avenue
 - Upgrade crossings at Miscamble Street (2 locations), Lovell Street, Charles Street and Carnarvon Highway (2 locations)
 - Open up existing overland flow path at the Carnarvon Highway and Lovell Street intersection, between Arthur and Wyndham Streets, and at Charles Street
- *Combination 3: Long Drain Channel Works and Earthworks with Railway Dam Extension and Station Street Pipes.* This combination comprises the same works as Combination 1, plus the following additional works:
 - Increase storage capacity of Railway Dam
 - Improve conveyance along Feather Street and Station Street, discharging into Western Drain
 - Length of new pipe: 1,600 m (2 No. 1200 mm diameter)

Benefit of Local Major Flood Mitigation

The results of the modelling of the combinations show that the recommended works to the existing Local Major drainage system would provide improved flood mitigation benefits additional to those achieved from the implementation of the recommended Stage 1 Levee and Stage 2 Regional works. For a 100 year ARI flood event, the following improvements were identified:

- Decrease in flood extent and flood levels between Bassett Lane and Charles Street, generally between 400 mm and 1 m.
- The majority of the 100 year ARI surface water flow would be contained within the proposed augmented Long Drain channel.
- Local Combination 3 is the hydraulically preferred option. This option shows reduction in predicted flood water depths (up to 100 mm) and flood extent through the town centre due to Railway Dam and Station Street mitigation measures.

A total of nineteen properties would be at less risk of above-floor flooding should Local Combination 3 be the chosen option for implementation. Of these, 13 are commercial properties. Preliminary Cost-Benefit Analysis & Construction Staging

As expected, the benefit-cost ratio for the Major Local Combination works is lower than either the Stage 1 works or the proposed Stage 2 Regional works. For this reason, construction of the preferred Local Combination components should be undertaken using a staged approach to provide incremental benefit as funding and infrastructure renewal opportunities arise. Further economic analysis of these works, incorporating 'soft costs' associated with the flood damage experienced, should be undertaken in future stages of consideration. The suggested order of implementation, and approximate associated cost, is as given in Table ii.

Table ii Recommended Staging of Major Local Flood Mitigation Works

Stage	Description	Approximate Capital Cost Estimate
1	Long Drain Widening Earthworks Order: (a) Bassett Lane to Charles St (b) west branches	\$1.6 million
2	Railway Dam Extension Construction of the regional option Western Diversion Drain	\$1.3 million
3	Station Street Pipes	\$8.2 million
4	Long Drain Crossing Bridge Replacements (as existing infrastructure reaches end of life)	\$10.1 million
Total High Level Cost Estimate – Major Local		\$21.2 million

Benefit of Local Minor Drainage Improvements

The preferred Local Major Drainage mitigation Combination 3 was used as the baseline to assess areas affected by local drainage and flooding issues as identified by MRC. Eighteen areas were assessed as included Section 8, with solutions and high level cost estimates for the proposed works presented in Table ii. These works are recommended to improve drainage along Miscamble Street, Powell Street, Station Street, Quintin Street, Saunders Street, Borland Street, within the CBD, along the railway line and near the Golf Links Estate.

Table iii Recommended Minor Local Drainage Improvements

Local Drainage	Description	Solution	Cost Estimate
Case 1	Golf Links Estate Remedial Works	Earth bund to redirect flow, potential increase to capacity of road.	\$55,000
Case 3	Miscamble Street Pipe Network	Drainage line discharging into Long Drain, 375 mm to 900 mm diameter pipes with multiple gully pits.	\$330,000
Case 4	Powell Street Pipe Network	Construction of underground pipe network (450 mm to 900 mm diameter pipes) for Powell and a section of Kirkbride Street discharging to Long Drain.	\$445,000
Case 5	Station Street	Combined drainage system of underground	\$2,480,000

Local Drainage	Description	Solution	Cost Estimate
	Stormwater Line	(Station Street, Tiffin Street with 450 mm to 900 mm pipes) and open channel works (Station Street).	
Case 7	Railway Drainage Remedial Works	Maintenance and/or upgrade existing open channels and culverts on south side of railway.	\$1,490,000
Case 9	Saunders Street Trunk Stormwater Upgrade	New 1350 mm diameter pipe along Saunders Street.	\$620,000
Case 10	Quintin Street Drainage Works	Re-shape the verge to increase road capacity. Installation of gully pit with pipe.	\$28,000
Case 11	Charles Street Drain Remediation	Formalisation of the existing channels, earth bund. Maintenance of channels along Arthur, Ivy and Charles Streets.	\$125,000
Case 12	CBD Pipe Drainage Upgrade	Increase in capacity/capture of pits through removal/modification of garden beds, replacement of inlet structures along McDowell St with on-grade gullies, replacement of sag structures on southern side roads, addition of pipes along McDowell St.	\$3,520,000
Case 18	Borland Street Pipe Network	Increase the amount of inlet pits and grade out road to a legal point of discharge. Further information required.	
Total High Level Cost Estimate – Minor Local			\$9.1 million

Summary of Recommendations

The Major Local mitigation options assessed were high level conceptual designs for the purposes of a comparative assessment of flood mitigation benefits. Further modelling is required at detailed design phase to confirm the performance of the preferred mitigation option(s) under a range of storm durations and downstream boundary conditions, with greater detail of the proposed earthworks and bridge details included. This is particularly relevant to the Station Street pipes, which were found to have insufficient capacity to capture all of the overland flow from the railway dam in the 100 year ARI flood event. Further refinement of the proposed earthworks and pipe network may also result in improved performance of the mitigation option(s), and this should be included in the investigation during detailed design phase.

Major Local Combination 3 is the hydraulically preferred option; however, Major Local Combination 1 is presented as a slightly more affordable option. In addition to the Major Local preferred Combination 1 or Combination 3, a number of local drainage improvements are recommended to reduce frequent flooding near the centre of Roma. It is recommended that the scheduling of these works be designed based on the future approved scheduling of the Local Major works.

Table of contents

1.	Introduction.....	9
1.1	Background.....	9
1.2	Scope.....	11
1.3	Study Limitations and Qualifications.....	12
2.	Methodology and Data Collection.....	13
2.1	Methodology.....	13
2.2	Data Collection.....	15
3.	Hydrology Assessment.....	16
4.	Hydraulic Flood Model Development.....	17
4.1	Major Local Hydraulic Model Extents.....	17
4.2	TUFLOW Model Setup.....	19
4.3	Integration of Stage 2 Regional Flood Mitigation Options.....	21
5.	Individual Options for Major Local Drainage and Flood Mitigation.....	23
5.1	Target Mitigation Areas.....	23
5.2	Individual Flood Mitigation Options.....	23
5.3	Individual Options Case and Design Event.....	27
5.4	Hydraulic Model Results.....	27
5.5	Summary of Findings from Assessment of Individual Options.....	39
6.	Combined Options for Major Local Flood Mitigation.....	41
6.1	Combination Major Local Flood Mitigation Options.....	41
6.2	Base Case and Design Event.....	42
6.3	Hydraulic Model Results.....	45
6.4	Major Local Flood Mitigation Conclusions.....	47
7.	Recommended Flood Mitigation Options.....	50
7.1	Residual Flooding Impact.....	50
7.2	Cost Benefit Analysis.....	51
8.	Minor Local Drainage.....	53
8.1	Minor Local Design Criteria & Assumptions.....	53
8.2	Local drainage analysis.....	54
9.	Conclusion and Recommendations.....	73
10.	Glossary.....	75
11.	References.....	77

Table index

Table 1-1	Report Layout.....	11
-----------	--------------------	----

Table 4-1	Stage 2 Major Local Hydraulic Model Roughness Values.....	19
Table 5-1	Local Major Flood Mitigation Options	25
Table 5-2	Individual Major Local Mitigation Options – Decrease in Flood Levels	30
Table 6-1	Major Local Flood Mitigation Combination Options	41
Table 6-2	Impact of Regional Combination 6 on regional flooding.....	43
Table 7-2	Economic Analysis Summary	52
Table 8-1	Summary of Minor Local drainage improvement measures	54
Table 8-2	Culvert sizes for Case 7 (refer Figure 8-10).....	64
Table 9-1	Staging of Local Major Combination 3.....	74

Figure index

Figure 1-1	Locality and Stage 2 Investigation Areas.....	10
Figure 2-1	Methodology	13
Figure 2-2	Stage 2 Study Areas – Regional Major Local and Minor Local	14
Figure 4-1	Stage 2 Major Local Hydraulic Model Setup	18
Figure 4-2	Stage 2 Major Local Hydraulic Model Roughness Categories	20
Figure 5-1	Major Local Flood Mitigation Options	24
Figure 5-2	100 Year ARI Local Base Case 1' Flood Extent, 10 Year ARI Regional Tailwater	28
Figure 5-3	Major Local Hydraulic Model Results – Key Locations.....	29
Figure 6-1	100 Year ARI Local 'Base Case 2' Flood Extent, 2 Year ARI Regional Tailwater	44
Figure 6-2	Combination Major Local Mitigation Options – Decrease in Flood Levels	45
Figure 6-3	Major Local Combination 1, 100 Year ARI Flood Event Peak Afflux.....	48
Figure 6-4	Major Local Combination 3, 100 Year ARI Flood Event Peak.....	49
Figure 8-1	Proposed drainage system to convey flows towards Baker Finch Crescent.....	56
Figure 8-2	Photo taken at Miscamble Street facing North East	57
Figure 8-3	Proposed drainage system at Miscamble Street	58
Figure 8-4	Photo taken at Kirkbride Street facing north-west	59
Figure 8-5	Proposed drainage system at Powell and Kirkbride Streets	59
Figure 8-6	Photo taken at Station Street facing east	60
Figure 8-7	Aerial photo showing connection between Cases 2, 5 and 7	61
Figure 8-8	Proposed drainage system at Station Street	62
Figure 8-9	Proposed cross section for Station Street	62
Figure 8-10	Proposed drainage system at the sides of the railway (refer below for sizing of channels and culverts).....	63

Figure 8-11 Proposed typical cross sections for the proposed open channels at location A (in Figure 8-10)	63
Figure 8-12 Proposed typical cross sections for the proposed open channels at locations B, C, D and E (in Figure 8-10).....	64
Figure 8-13 Photo taken at Saunders Street facing north-east.....	65
Figure 8-14 Proposed drainage system at Saunders Street.....	66
Figure 8-15 Photo taken at Quintin Street facing north.....	67
Figure 8-16 Proposed drainage system at Quintin Street.....	67
Figure 8-17 Proposed verge profile at Quintin Street.....	68
Figure 8-18 Proposed verge profile at Quintin Street (driveway area).....	68
Figure 8-19 Proposed drainage system at Charles Street and surroundings.....	69
Figure 8-20 Proposed open channel at the back of the properties fronting Robertson Street	69
Figure 8-21 Photo taken at the intersection of McDowall and Wyndham Streets facing east	70
Figure 8-22 Photo taken at the intersection of McDowall and Hawthorne Streets facing west	70
Figure 8-23 Existing drainage network at McDowall Street and adjacent streets to be upgraded.....	71
Figure 8-24 Photo taken at Borland Street.....	72

Appendices

- Appendix A – Major Local Hydraulic Model Afflux Results
- Appendix B – Major Local Hydraulic Model Results with Stage 2 Regional Flood Mitigation Works
- Appendix C – Major Local Hydraulic Model Afflux Results – Combination Options
- Appendix D – CAPEX
- Appendix E – Concept Drawings

1. Introduction

1.1 Background

Roma has a long history of flooding. During 2010 and 2011, there were significant floods experienced in and around the township. In 2012, an unprecedented flood event occurred with the following consequences:

- One fatality resulted from the event.
- Approximately 580 properties experienced above floor flooding.
- Approximately 1,028 properties were within the recorded flood extent.
- The storm was greater than a 1 in 100 year event.

There was an estimated 2,200 m³/s flow rate at the flood peak. It has been reported that the damage due to flooding of the town over recent times has costs over \$200M.

For both Stage 1 and 2, the project aims to “reduce the risk of above floor flooding in Roma from a storm event equal to the 2012 flood.”

As a result of these historic floods, Maranoa Regional Council (MRC) commissioned GHD to investigate mitigation options to quantify and address the risk of future regional and local flooding. Stage 1 of these investigations resulted in the recommendation for a levee, which is scheduled to begin construction in September 2013. Stage 2 investigations aimed to establish additional mitigation measures and floodplain management procedures that would further reduce flood risk for the properties that would still potentially be affected by flooding even after the Stage 1 levee construction.

The Stage 2 assessment considered flood mitigation measures in a holistic manner from regional to minor local drainage, described as follows:

- 'Regional' Flood Mitigation - This considers flooding from runoff originating in the broader Bungil Creek catchment.
- 'Major Local Flooding and Drainage Mitigation - This considers mid-scale mitigation options within the town of Roma to mitigation flooding that occurs due to a combination of local runoff and regional tailwater effects, such as occurs through the Long Drain system and in the vicinity of the Railway Dam.
- 'Minor Local' Flooding and Drainage Improvements - This considers local stormwater drainage issues that occur on a regular basis due to local runoff, including road cross-drainage.

The Stage 2 regional flood mitigation investigations are documented separately in *The Maranoa Regional Council, Roma Flood Mitigation Project, Stage 2 Regional Flood Mitigation Assessment* (GHD, 2013b) subsequently referred to as the 'Stage 2 Regional Mitigation Report'. Further to that study, Stage 2 local flooding and drainage investigations were undertaken to assess options to mitigate local flooding issues currently being experienced the township. The purpose of this report is to document findings of the Stage 2 local flooding and drainage study and to recommend a preferred approach for Stage 2 local flood mitigation. This report follows on from, and incorporates the findings from, the aforementioned Stage 2 Regional Mitigation Report. In addition to the larger-scale local mitigation options described in this report, local drainage improvements are investigated and described in Section 8 of this report.



- LEGEND**
- Populated Places
 - Stage 1 Levee
 - Roads
 - Stage 2 Investigation Area
 - Cadastre
 - River

Based on or contains data provided by the State of QLD [2013]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

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Map Projection: Universal Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



Maranoa Regional Council
 Roma Flood Study

Job Number 41-25323
 Revision 0
 Date 11 Oct 2013

Locality &
 Stage 2 Investigation Area

Figure 1-1

1.2 Scope

The scope of the Stage 2 investigation includes the following tasks. Those tasks completed within this report are shown in ***bold italics***

- Environmental assessment of Stage 2 relevant areas
- Integrated flood and drainage modelling at the three scales, comprising the following:
 - Regional flood mitigation options development and assessment (as presented in the Stage 2 Regional Mitigation Report [GHD, 2013b])
 - ***Major Local flood mitigation options development and assessment (maximum of five locations). This assessment is the subject of this report***
 - ***Minor Local drainage improvement options assessment (maximum of 16 cases as described in the Drainage Master Plan for Roma [Engeny, December 2012]), See Section 8.***
- Multi-criteria options assessment based on wide-ranging considerations including the results of the environmental assessment, integrated flood modelling and the stakeholder consultation (see Appendix D of the Stage 2 Regional Mitigation report [GHD, 2013b])
- ***Concept design (for each of the final three preferred regional flood mitigation scenarios), cost estimation and cost/benefit analysis (for the regional, major and minor drainage options)***

The general layout for this report is provided in Table 1-1. A locality map which shows the Stage 2 study area map is presented in Figure 1-1.

Table 1-1 Report Layout

Section	Description
Section 1	An introduction to the project including scope, qualifications, and general assumptions
Section 2	The general methodology assessment used to approach and complete the investigation
Section 3	Discusses the hydrology performed to provide rainfall and runoff inputs to the hydraulic modelling;
Section 4	Outline the hydraulic modelling performed to assess flooding conditions
Section 5	Presents each of the 18 individual options investigated for flood mitigation along with the hydraulic modelling results for each option
Section 6	Discusses the four combination options that were investigated along with the hydraulic modelling results for each combination
Section 7	Describes the benefits in terms of the number of properties affected by above-floor Flooding and also summarises the cost benefit analysis and suggested construction scheduling
Section 8	Described existing Minor Local Drainage issues and mitigation measures
Section 9	Discusses the conclusions that could be made based on the completed hydraulic modelling and recommendations for next steps

Section	Description
Section 10	Provides a glossary of terms used throughout the report
Section 11	Includes references used for this study

1.3 Study Limitations and Qualifications

This report has been prepared by GHD for Maranoa Regional Council and may only be used and relied upon by Maranoa Regional Council for the purpose agreed between GHD and the Maranoa Regional Council as set out in section 1.2 of this report. The following qualifications apply to this study:

- GHD otherwise disclaims responsibility to any person other than Maranoa Regional Council arising in connection with this report
- GHD also excludes implied warranties and conditions, to the extent legally permissible.
- The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in this report and are subject to the scope limitations set out in this report
- The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared
- The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect
- GHD has prepared this report on the basis of information provided by Maranoa Regional Council and other third parties who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information
- GHD has prepared the preliminary cost-benefit analysis set out in Section 7.2 of this report ("Cost Estimate") using information reasonably available to the GHD employee(s) who prepared this report, and based on assumptions and judgments made by GHD (see Appendix D. GHD recommends that all cost estimates be confirmed by a licensed Quantity Surveyor.
- The Cost Estimate has been prepared for the purpose of performing a cost benefit analysis for the conceptual design and must not be used for any other purpose
- The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the works can or will be undertaken at a cost which is the same or less than the Cost Estimate
- Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile

2. Methodology and Data Collection

2.1 Methodology

Figure 2-1 shows the methodology undertaken for this Stage 2 Flood Mitigation Study. This methodology feeds the results from each level of assessment into the boundary conditions of the next, providing a holistic assessment that incorporates the benefits achieved at each step of assessment. The study areas assessed drainage from Regional, Major Local and Minor Local perspectives as shown in Figure 2-2.

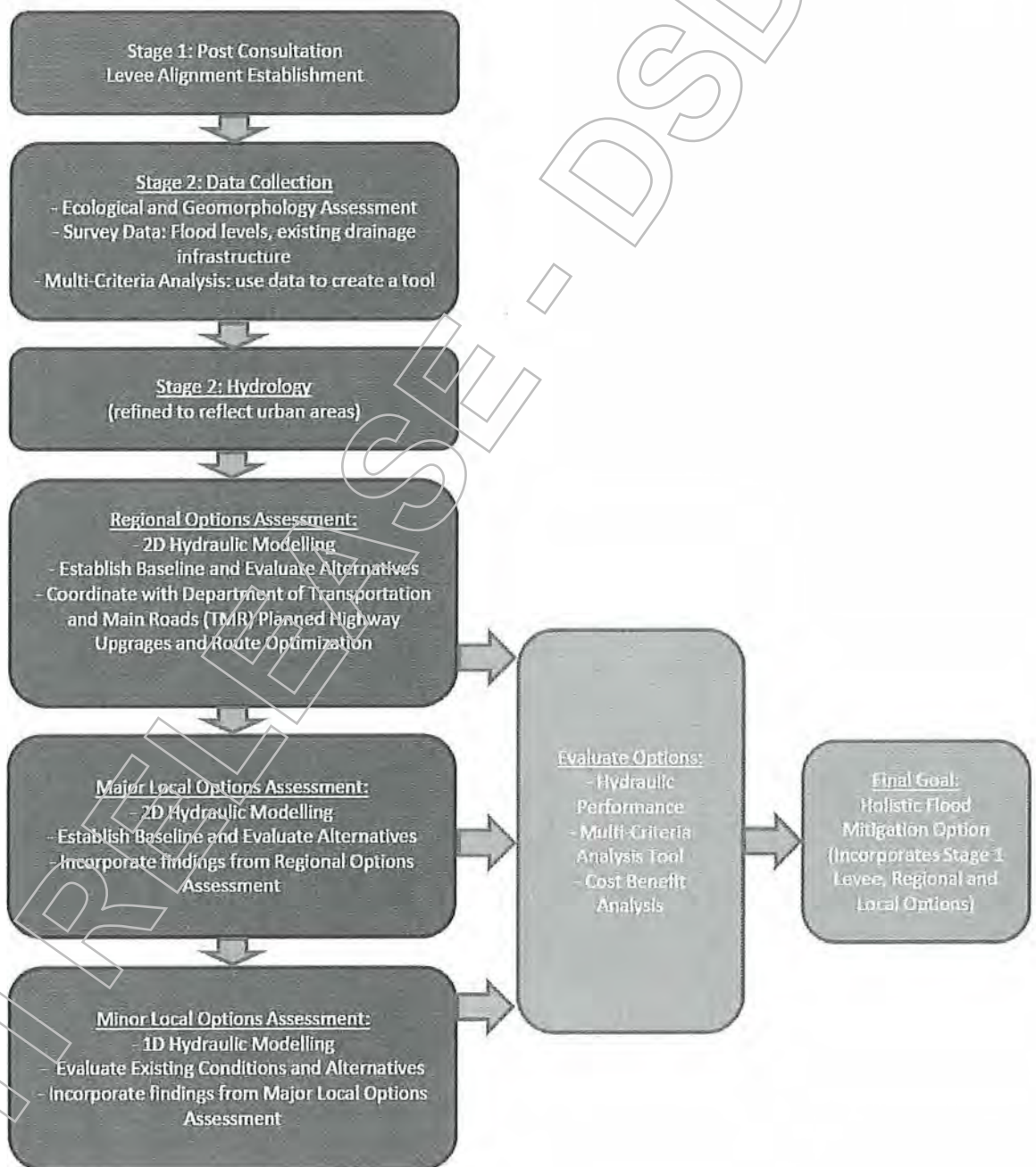


Figure 2-1 Methodology



- LEGEND**
- Highway
 - Road
 - Watercourse
 - Stage 1 Levee July 2013 Reference Design
 - ▭ Tuflow Major Local Hydraulic Model Boundary
 - ▭ Tuflow Regional Hydraulic Model Boundary
 - ▭ Minor Local Drainage Investigations
 - ▭ Cadastral

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 Metres
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 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



Maranoa Regional Council
 Roma Flood Study

Stage 2 Study Areas
 Regional, Major Local & Minor Local

Job Number 41-25323
 Revision 0
 Date 11 Oct 2013

Figure 2-2

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2.2 Data Collection

Previous studies, property databases and additional information used to inform this investigation are as listed in Section 2.2 of the Stage 2 Regional Mitigation Report (GHD, 2013b). Data provided by MRC, including data used in the development of the Stage 1 hydraulic model (see the Stage 1 Flood Study (GHD 2013a)), was not checked or verified by GHD. This data includes the following:

- Survey
- Geospatial data
- Information supplied for individual properties
- Stakeholder engagement databases (via EngagementPlus)
- Roma Strategic Plan
- Topography
- Stormwater infrastructure information

The local stormwater drainage pipe network built within for the Major Local hydraulic model was adopted directly from Engeny's study (Engeny, 2012), and was not checked or verified against survey data. The Major Local model included pipes sized 300 mm diameter and larger only.

3. Hydrology Assessment

Hydrology is study of the rainfall and runoff process; in particular the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of rainfall events across a defined catchment.

Detail of the refined local hydrology model developed for the Stage 2 Regional and Major Local investigation is described in Section 3 of the Stage 2 Regional Mitigation Report (GHD, 2013b).

In summary, the following was undertaken for the Stage 2 hydrology assessment:

- The regional hydrology as developed for the Stage 1 assessment was retained and not altered
- The five local subcatchments included in the Stage 1 model were further delineated to increase resolution at local catchment level. This included the creation of an additional more localised Unified River Basin Simulator (URBS) hydrologic model, based on the parameters of the calibrated regional URBS model
- Additional local catchment areas were added to the hydrology model in order to include runoff from areas contributing to the Railway Dam and other areas to the east of Bungil Creek
- Rainfall data was also updated to ensure that aerial reduction factors were not applied to the local rainfall
- Land use was utilised according to the projected future fully-developed urbanised scenario as described in the Draft Roma Strategic Plan as included in the appendices for the Engeny (2012) report

The runoff hydrographs developed from the modelling were input into the Major Local hydraulic model as described in Section 4

The following qualifications apply to the hydrology assessment study:

- Inflow hydrographs and tailwater boundary conditions assumed that the local storm event will occur and pass through Roma prior to the peak of the regional Bungil Creek catchment storm event arriving in Bungil Creek at the point just downstream of Shady's Lagoon
- To reflect this assumption, a 10 year ARI and 2 year ARI tailwater condition was applied to Bungil Creek within the hydraulic model developed for the Major Local assessment. The tailwater condition incorporated the benefit modelled following implementation of the Stage 1 Levee and subsequently the Regional Combination 6 as presented in the Stage 2 Regional Mitigation Report. These downstream boundary conditions allowed evaluation of the drainage system with consideration of works proposed downstream, while allowing evaluation of the Major Local system independently
- During the 2012 flood event, it appeared that the peak of the local storm coincided with the peak of the Regional event arriving at Roma; the joint probability of these two events occurring at the same time is statistically low. The 2012 event informed the regional flood mitigation assessment described in the Stage 2 Regional Mitigation Report GHD (2013b), however for the Major Local assessment a 100 year ARI event has been used. This is because the mitigation options described herein aim for reductions in the local flood peaks only

4. Hydraulic Flood Model Development

4.1 Major Local Hydraulic Model Extents

A TUFLOW model referred to as the 'Major Local hydraulic model' was developed for this element of the Stage 2 study. The model used a 3 m grid size to cover the area west of the Stage 1 Levee and the Western Drain, as shown in Figure 4-1. This model extent was chosen to allow a finer grid resolution within the town, while maintaining practical model run times.

The Stage 2 Major Local hydraulic model augments the modelling done for the regional flood analysis which adopted a 10 m grid cell size, TUFLOW hydraulic model described in the Stage 2 Regional Mitigation Report (GHD, 2013b). While the 10 m grid cell size model was appropriate for assessing flood mitigation works at the regional level, it was considered too coarse for the smaller scale Major Local flood mitigation options within the more urbanised areas of the town.

The hydraulic model extents include an area of floodplain east of Bungil Creek (shown in Figure 4-1). Increasing the extent of the model provided a more accurate simulation of the flow mechanisms across the Bungil Creek floodplain and to model out of bank flood flows along Bungil Creek. However, as flood levels within this area are dependent on the total flows across the floodplain, results from the Regional hydraulic model, rather than the Major Local hydraulic model, should be referred to for peak flood levels within this area.



- LEGEND**
- Highway
 - Road
 - Watercourse
 - Cadastre
 - Stormwater Pit
 - Stormwater Pipe
 - Stage 1 Levee March 2013 Reference Design
 - Stage 1 Levee July 2013 Reference Design
 - Culvert
 - Bridge
 - Tuflow Major Local Hydraulic Model Boundary

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Job Number 41-25323
Revision 0
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Stage 2 Major Local Hydraulic Model Setup

Figure 4-1

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4.2 TUFLOW Model Setup

4.2.1 TUFLOW Run Parameters

The hydraulic boundary of the Major Local hydraulic model is shown in Figure 4-1. A 3 m cell size was adopted, which is considered appropriate for the representation of major flow paths such as the Long Drain.

4.2.2 2D Domain

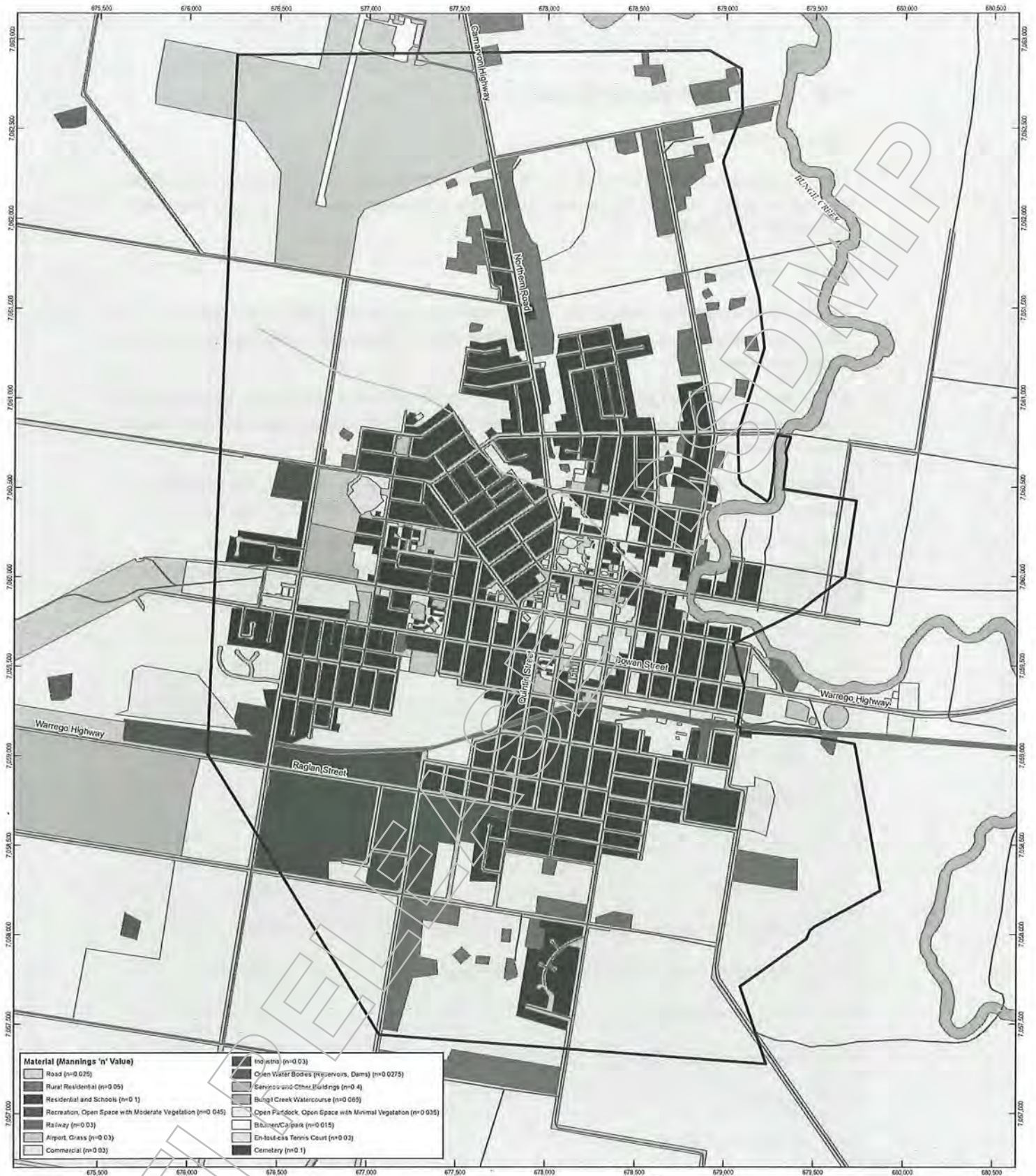
The hydraulic model boundary of the Major Local hydraulic model is shown in Figure 4-1. A 3 m cell size was adopted, as considered appropriate for the representation of major flow paths such as the Long Drain.

A DEM at 1 m resolution was used to assign elevations within the 2D domain. Key levels along channel inverts and road crests were represented within the model through the use of draped lines or polygons (2d_zsh layers) to modify cell elevations.

Manning's 'n' roughness values used for the regional model were adopted. The adopted roughness categories and values are tabulated in Table 4-1 and shown in Figure 4-2.

Table 4-1 Stage 2 Major Local Hydraulic Model Roughness Values

Category	Manning's 'n' Value
Bungil Creek Watercourse	0.065
Open Water Bodies (Reservoirs, Dams)	0.0275
Bitumen (e.g. car park)	0.015
Road Reserve	0.025
Railway	0.03
Airport	0.03
Short Grass	0.03
Open Paddock, Open Space with Minimal Vegetation	0.035
Recreation, Open Space with Moderate Vegetation	0.045
Rural Residential	0.05
Residential and Schools	0.1
Cemetery	0.1
Commercial and Industrial	0.3
Services and Other Buildings	0.4



Material (Mannings 'n' Value)	
[Light Grey Box]	Road (n=0.025)
[Medium-Light Grey Box]	Rural Residential (n=0.09)
[Medium Grey Box]	Residential and Schools (n=0.1)
[Dark Grey Box]	Recreation, Open Space with Moderate Vegetation (n=0.045)
[Very Dark Grey Box]	Railway (n=0.03)
[Lightest Grey Box]	Airport, Grass (n=0.03)
[White Box]	Commercial (n=0.03)
[Dark Grey Box]	Industrial (n=0.03)
[Medium-Light Grey Box]	Open Water Bodies (Reservoirs, Dams) (n=0.0275)
[Medium-Light Grey Box]	Service and Other Buildings (n=0.4)
[Medium-Light Grey Box]	Bigg's Creek Watercourse (n=0.085)
[Medium-Light Grey Box]	Open Paddock, Open Space with Minimal Vegetation (n=0.035)
[Medium-Light Grey Box]	Business/Car park (n=0.015)
[Medium-Light Grey Box]	En-lot-cas Tennis Court (n=0.02)
[Medium-Light Grey Box]	Cemetery (n=0.1)

- LEGEND**
- Road
 - Watercourse
 - ▭ Tufflow Major Local Hydraulic Model Boundary

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Stage 2 Major Local
Hydraulic Model Roughness Categories

Job Number 41-25323
Revision 0
Date 11 Oct 2013

4.2.3 Hydraulic Structures and 1D Pipe Network

In addition to the hydraulic structures included in the Regional hydraulic model, the Major Local hydraulic model also incorporated a number of bridges, smaller culvert crossings and sections of the local stormwater drainage network. These were modelled based on data provided by Council.

The locations of hydraulic structures and the extent of the stormwater drainage network included in the model are shown in Figure 4-1.

Bridge structures

Bridge structures were represented within the model through the use of layered flow constrictions (TUFLOW 2d_lfcsh layers). Large culverts were represented as 1D links (TUFLOW 1d_nwk layers).

Stormwater structures

Stormwater drainage details including minor culverts, drainage and pit locations were based on the details provided in the previous hydraulic model for the *Drainage Master Plan for Roma* study (Engeny, 2012). While the entire stormwater drainage network was not included in the model, pipe sizes of the modelled drainage system ranged between 300 mm diameter and 1350 mm diameter. Locations of pit inlets were as per the Engeny study and were confirmed to correspond to the location of entry pits through inspection of aerial photography and ground truthing.

4.2.4 Boundary Conditions

Based on an assessment of critical durations (refer Stage 2 Regional Mitigation Report [GHD, 2013b]) the 3 hour storm duration was found to result in peak water levels along the Long Drain system in Roma. While other durations may produce higher flood levels at some locations, for the purposes of this high level comparison between a sizeable number of potential mitigation options, it was considered more practical to adopt the 3 hour storm as the design storm duration for the local inflows. Further modelling of the preferred option(s) across multiple storm durations is recommended at detailed design stage.

Tailwater conditions

Water levels were extracted from the Stage 2 Regional hydraulic model at a number of locations, including Bungil Creek and the Western Drain. The estimated water levels were then applied to the Major Local hydraulic model as water level over time relationships ("HT" boundaries). The location of these boundary conditions is shown in Figure 4-1. Integration of the two models in this manner recognises that the hydraulic performance of the local drainage system is highly dependent on the downstream tailwater conditions. Integration of the Stage 2 Regional hydraulic model results is discussed in greater detail in Section 4.3.

Inflow hydrographs

Local catchment inflow hydrographs were applied either directly into the modelled pipe network or, where no pipes were modelled, directly onto the 2D domain. The hydrographs associated with these inflows were derived from the calibrated URBS model described in Section 3.

4.3 Integration of Stage 2 Regional Flood Mitigation Options

Findings from the Stage 2 Regional Mitigation Report (GHD, 2013b) were incorporated into this Major Local flooding and drainage study in the setting of model boundary conditions. The boundary condition was applied as a water level over time ("HT" boundary) relationship in

recognition of the fact that the local event is likely to pass through the system prior to the peak flood flow arriving in Roma along Bungil Creek. This represented the interaction between local and regional flooding in the hydraulic model and allowed for a holistic assessment of flood mitigation options. The Regional and Major Local assessments were undertaken somewhat in parallel; as a result the Major Local modelling was undertaken with two base case scenarios. These are described as follows:

- *Base Case 1 – Stage 1 Levee, March 2013 Reference Design.* See Section 0 and Figure 5-2. Major Local flooding and drainage mitigation options were individually modelled using this base case scenario during the initial assessment. This was selected as the base case because a preferred regional mitigation option had not yet been selected
- *Base Case 2 – Stage 1 Levee, July 2013 Reference Design plus Regional Mitigation Combination 6.* See Section 6.2 and Figure 6-1. Investigation into the Major Local Drainage and Flooding combination flood mitigation options and final preferred options was based on a scenario that included the Stage 1 Levee (July 2013 Reference Design), and the hydraulically preferred Regional Combination 6 mitigation option. In total, this scenario incorporates a number of levees, an eastern diversion channel extending through Warrego Highway and the railway embankments, a western diversion drain and widening of Bungil Creek at the Bungil Street Bridge. Detail on these proposed works can be found in the Stage 2 Regional Mitigation Report (GHD, 2013b)

The 100 year ARI event with 10 year ARI downstream boundary conditions within Bungil Creek was initially adopted as the design event for assessment of the Stage 2 Major Local mitigation options (see Section 0). However, as the lower areas of Roma are potentially inundated from 10 year ARI regional storm event, assessment of the combination mitigation option runs in the next stage of investigation considered the 2 year ARI regional event tailwater boundary conditions along Bungil Creek as the design event (see Section 6). This lower tailwater level provided a scenario in which the impact of the local storm event on flooding, particularly through the properties near the confluence of the Long Drain system and Bungil Creek, could be more clearly identified the influence of varying the high tailwater conditions within Bungil Creek which impacts the local areas due to the backflow of flood waters.

5. Individual Options for Major Local Drainage and Flood Mitigation

5.1 Target Mitigation Areas

A number of Major Local flood mitigation options were identified for investigation, including bridge crossings, retarding basins, earthworks, channel widening and levees. Target areas for mitigation by application of these options were identified through nomination in discussions with MRC, the community, and modelling results from previous phases. Target areas include the following:

- Major overland flow paths (Long Drain system and additional flow path north of Shady's Lagoon).
- The overflow from the railway dam, which currently flows north-east and exacerbates flooding issues within the centre of town along Bowen and McDowall Streets.

5.2 Individual Flood Mitigation Options

The individual Major Local flood mitigation options under investigation are tabulated in Table 5-1 and shown in Figure 5-1. Modelling of the Major Local Combination Mitigation Options assumed that the Regional Combination 6 would be implemented, in addition to the Stage 1 Levee.

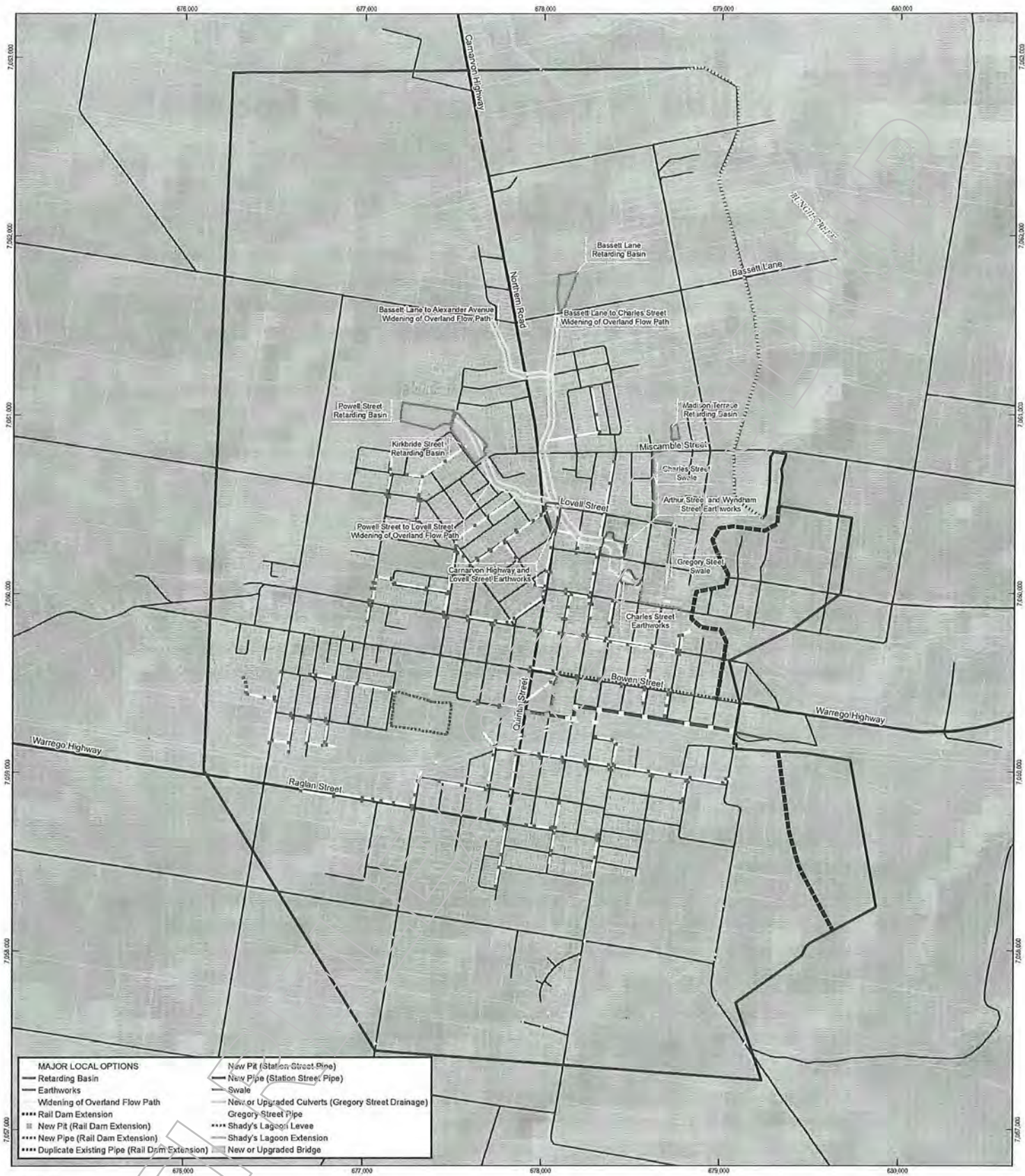
Where new bridge crossings are proposed, a preliminary bridge design was adopted and represented within the hydraulic model as a layered flow constriction (2d_lfcsh layer). The preliminary bridge design was based on the following:

- Channel bed based on the design tin
- Road deck levels based on the surrounding terrain
- Deck height of 600 mm
- Obstruction between the channel bed and bridge soffit of 5% to allow for piers and/or abutments

Retarding basins, earthworks and channel widening options were designed using 12d software, such that the proposed works merged with the existing terrain. Elevations from the design surface were then input into the TUFLOW model and replaced the existing conditions digital terrain model.

Levees were represented within the terrain by raising a line of cells along the proposed levee alignment to an arbitrary height that would not be overtopped during the 100 year ARI design event.

All options under consideration (as per Figure 5-1) are preliminary, high level conceptual designs. At this stage no checks have been made regarding conflicts with existing services or privately owned property. It is recommended that further survey and consultation with land owners be conducted for the preferred options at detailed design stage.

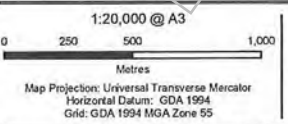


- MAJOR LOCAL OPTIONS**
- Retarding Basin
 - Earthworks
 - Widening of Overland Flow Path
 - Rail Dam Extension
 - || New Pit (Rail Dam Extension)
 - New Pipe (Rail Dam Extension)
 - Duplicate Existing Pipe (Rail Dam Extension)
 - New Pit (Station Street Pipe)
 - New Pipe (Station Street Pipe)
 - Swale
 - New or Upgraded Culverts (Gregory Street Drainage)
 - Gregory Street Pipe
 - Shady's Lagoon Levee
 - Shady's Lagoon Extension
 - New or Upgraded Bridge

- LEGEND**
- Modelled Local Drainage Pit
 - Highway
 - Road
 - Watercourse
 - Limit of Mapping
 - Modelled Culvert or Drainage Pipe
 - March 2013 Reference Design Stage 1 Levee Alignment
 - Cadastre
 - Modelled Bridge
 - Major Local Hydraulic Model Extent

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 Roma Flood Study

Job Number 41-25323
 Revision 0
 Date 11 Oct 2013

Major Local Mitigation Options

Figure 5-1

Table 5-1 Local Major Flood Mitigation Options

Option	Option Name	Description
L1	Bassett Lane Retarding Basin	Retarding basin north of Bassett Lane (south of race course). Basin volume: approx. 2,000 m ³
L2	Powell Street Retarding Basin	Retarding basin north of Powell Street, upstream of local overland flow path. Basin volume: approx. 5,000 m ³
L3	Kirkbride Street Retarding Basin	Retarding basin north of Miscamble Street, near Kirkbride Street. Basin volume: approx. 5,500 m ³
L4	Madison Terrace Retarding Basin	Retarding basin north of Miscamble Street, between Charles Street and Madison Terrace. Basin volume: approx. 2,000 m ³
L5	Rail Dam Extension	Increase storage capacity of rail dam. New 600 mm dia pipe along Feather Street and Quintin Street, and duplication of existing drainage along Bowen Street. Length of new pipe: 530 m (600 mm diameter) Length of duplicated pipe: 1050 m (600 mm – 1050 mm diameter)
L6	Rail Dam Extension with Station Street Pipe	Increase storage capacity of rail dam. Improve conveyance along Feather Street and Station Street, discharging into Western Drain. Length of new pipe: 1,600 m (2 No. 1200 mm diameter)
L7	Earthworks – Carnarvon Highway and Lovell Street	Earthworks to open up existing overland flow path at the Carnarvon Highway and Lovell Street intersection. Additional culverts and/or new bridges at Carnarvon Highway (pedestrian bridge and road bridge) and Lovell Street.
L8	Earthworks – Arthur Street and Wyndham Street	Earthworks to open up existing overland flow path between Arthur and Wyndham Streets. Additional culverts or new bridge at Arthur Street. Additional culverts at existing footpath crossing downstream of proposed earthworks.
L9	Earthworks – Charles Street	Earthworks to open up existing overland flow path west of Charles Street, upstream of Charles Street bridge. Upgrade Charles Street Bridge.
L10	Widening of Overland Flow Path – Bassett Lane to Charles Street	Widening and deepening of existing overland flow path from Bassett Lane to Charles Street. Channel length: 1800 m Upgrade crossings at Miscamble Street, Lovell Street and Charles Street.
L11	Widening of Overland Flow Path – Powell Street to Lovell Street	Widening and deepening of existing overland flow path from Powell Street to Lovell Street. Channel length: 800 m Upgrade crossings at Miscamble Street and Carnarvon Highway.
L12	Widening of Overland Flow Path – Bassett Lane to Alexander Avenue	Widening and deepening of existing overland flow path from Bassett Lane to Alexander Avenue. Channel length: 550 m Upgrade crossing at Carnarvon Highway
L13	Combined Widening of Overland Flow Path	Widening and deepening of existing overland flow path from: Bassett Lane to Charles Street; Powell Street to Lovell Street; and Bassett Lane to Alexander Avenue. Upgraded crossings at Miscamble Street (2 No.), Lovell Street, Charles Street and Carnarvon Highway (2 No.)

Option	Option Name	Description
L14	Swales – Gregory Street	Swales either side of Gregory Street to improve conveyance of overland flows. Culverts beneath Lovell Street and George Street. Swale length: 200 m (each side)
L15	Swales – Charles and Gregory Streets	Swale next to roadway along Charles Street, from Miscamble Street to Lovell Street, to improve conveyance of overland flows. Swales either side of Gregory Street to improve conveyance of overland flows. Additional/new culverts beneath Miscamble Street, Lovell Street and George Street. Charles Street swale length: 500 m Gregory Street swale length: 200 m (each side)
L16	Swales – Charles Street, Gregory Street with Pipe	Swale next to roadway along Charles Street, from Miscamble Street to Lovell Street, to improve conveyance of overland flows. Swales either side of Gregory Street to improve conveyance of overland flows. Additional/new culverts beneath Miscamble Street, Lovell Street and George Street. Twin 750 mm diameter pipes along Gregory Street from Lovell Street to Shady's Lagoon Charles Street swale length: 500 m Gregory Street swale length: 200 m (each side) Pipe diameter: 2 No. 750 mm Pipe length: 340 m
L17	Shady's Lagoon Levee	Levee around Shady's Lagoon area from Charles Street Bridge to Bungil Street Bridge. Levee length: 300 m
L18	Shady's Lagoon Levee with Basin Extension	Shady's Lagoon extended and channel connecting to Bungil Creek widened. Levee around Shady's Lagoon area from Charles Street Bridge to Bungil Street Bridge. Charles Street Bridge upgraded. Basin volume: approx. 40,000 m ³ Levee length: 300 m

5.3 Individual Options Case and Design Event

5.3.1 Design Event

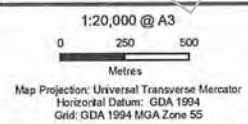
The 100 year ARI event with 10 year ARI downstream boundary conditions within Bungil Creek was adopted as the design event for assessment of the individual Stage 2 Major Local mitigation options. Given that the probability of a 100 year ARI event occurring within the Bungil Creek catchment together with a 100 year ARI storm event locally within Roma itself is relatively low, the use of a less extreme event as a tailwater condition was considered appropriate. Models were run until the peak of both the local hydrographs and the regional Bungil Creek hydrograph had passed through the system.

5.3.2 Integration of Regional Mitigation Options

As described in Section 4.3, 'Base Case 1' was used for modelling and comparison of the individual Local Major mitigation options at this stage of the investigation. Boundary conditions associated with this base case included the benefit from the Stage 1 Levee construction. The base case flood extent for assessment of the individual mitigation options (with a variety of tailwater conditions) is shown in Figure 5-2. It is against this baseline that the observations of benefit associated with each of the individual options have been made in Section 5.4.

5.4 Hydraulic Model Results

Figures showing the afflux (change in peak flood levels) under each Local Major mitigation scenario compared to the "Base Case 1" scenario (with Stage 1 Levee) are in Appendix A. Table 5-2 contains a summary of afflux values at a number of locations (shown in Figure 5-3). A brief description and discussion on the results of each Stage 2 Major Local mitigation option follows in Sections 5.4.1 to 5.4.6 with a summary of findings in Section 5.5.



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Job Number 41-25323
Revision 0
Date 11 Oct 2013

100 Year ARI Local 'Base Case 1' Flood Extent
10 Year ARI Regional Tailwater

Figure 5-2

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 Data Source: ©Commonwealth of Australia (Geoscience Australia) Watercourse/2007; DNRM Locality, Roads/2010, Cadastré, River/2012; GHD Flood Surface, Levee/2013. Created By: LB



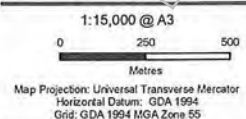
- LEGEND**
- Key Location Point Number
 - Highway
 - Road
 - Watercourse
 - Limit of Flooding
 - Cadastre
 - Modified Local Drainage Pit
 - Match 2013 Reference Design Stage 1 Levee Alignment
 - Modified Culvert or Drainage Pipe
 - Modified Bridge
 - Major Local Hydraulic Model Extent

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Major Local Hydraulic Model Results
Key Locations

Figure 5-3

Table 5-2 Individual Major Local Mitigation Options – Decrease in Flood Levels

Option Number	Option and Decrease in flood level (mm)	Upstream Arthur St Culverts (Point 3)	Upstream Lovell St (Point 4)	Upstream Miscamble St at Kirkbride St (Point 5)	Upstream Miscamble St at Carnarvon Hwy (Point 6)	Upstream Northern Rd at Howard St (Point 19)	Gregory St Properties (Point 21)	Intersection Bowen St and Arthur St (Point 12)	Intersection McDowall St and Wyndham St (Point 14)
L1	Bassett Lane Retarding Basin	0	10	0	9	0	0	0	0
L2	Powell Street Retarding Basin	0	-1	1	0	0	0	0	0
L3	Kirkbride Street Retarding Basin	0	0	-7	0	0	0	0	0
L4	Madison Terrace Retarding Basin	0	0	0	0	0	0	0	0
L5	Rail Dam Extension	0	0	0	0	0	0	12	4
L6	Rail Dam Extension with Station Street Pipe	49	0	0	0	0	0	15	5
L7	Earthworks – Carnarvon Highway and Lovell Street	0	53	0	52	0	0	0	0

Option Number	Option and Decrease in flood level (mm)	Upstream Arthur St Culverts (Point 3)	Upstream Lovell St (Point 4)	Upstream Miscamble St at Kirkbride St (Point 5)	Upstream Miscamble St at Carnarvon Hwy (Point 6)	Upstream Northern Rd at Howard St (Point 19)	Gregory St Properties (Point 21)	Intersection Bowen St and Arthur St (Point 12)	Intersection McDowall St and Wyndham St (Point 14)
L8	Earthworks – Arthur Street and Wyndham Street	0	88	0	11	0	0	0	0
L9	Earthworks – Charles Street	0	8	0	1	0	0	0	0
L10	Widening of Overland Flow Path – Bassett Lane to Charles Street	-2	427	0	593	0	0	0	0
L11	Widening of Overland Flow Path – Powell Street to Lovell Street	0	2	1033	73	0	0	0	0
L12	Widening of Overland Flow Path – Bassett Lane to Alexander Avenue	0	-11	0	-5	685	0	0	0

Option Number	Option and Decrease in flood level (mm)	Upstream Arthur St Culverts (Point 3)	Upstream Lovell St (Point 4)	Upstream Miscamble St at Kirkbride St (Point 5)	Upstream Miscamble St at Carnarvon Hwy (Point 6)	Upstream Northern Rd at Howard St (Point 19)	Gregory St Properties (Point 21)	Intersection Bowen St and Arthur St (Point 12)	Intersection McDowall St and Wyndham St (Point 14)
L13	Combined Widening of Overland Flow Path	-3	427	1059	667	851	0	0	0
L14	Swales – Gregory Street	0	0	0	0	0	13	0	0
L15	Swales – Charles and Gregory Streets	0	0	0	0	0	21	0	0
L16	Swales – Charles Street, Gregory Street with Pipe	0	2	0	0	0	37	0	0
L17	Shady's Lagoon Levee	-3	0	0	0	0	0	0	0
L18	Shady's Lagoon Levee with Basin Extension	-6	7	0	1	0	0	0	0

NB: negative values indicate an *increase* in flood levels compared to base case option. ***Bold Italics*** values indicate those options taken forward to the next phase of investigation.

5.4.1 Retarding Basin Options (Options L1-L4)

Four basins were investigated, at Bassett Lane, Powell Street, Kirkbride Street, and Madison Terrace. Results are shown in Appendix A, Figures A1 to A4. Locations and sizes of the proposed basins were limited by available space. As a result, the additional storage they provided was generally not large enough to provide significant mitigation against the large volumes of flow during a 100 year ARI event. Of the retarding basins modelled, only the Bassett Lane basin resulted in any noticeable impact downstream of the basin, however the reduction in levels with this option was less than 15 mm.

While the retarding basins investigated showed little impact during a 100 year ARI storm event, they may provide a more noticeable benefit during smaller events, involving smaller volumes of runoff.

5.4.2 Rail Dam Extension Options

Under existing conditions, overflows from the railway dam run along a channel east of the dam. While some of this flow is captured via the stormwater drainage system and piped along Chrystal Street, in large events a significant volume continues in a north-easterly direction, contributing to flooding issues within the centre of town, along Bowen and McDowall Streets. Two options involving enlargement of the railway dam were tested, with the aim of increasing the capacity of the railway dam, and providing additional conveyance via an underground network to reduce the volume of overland flows through the properties within the centre of town.

Rail Dam Extension (Option L5)

The first option ("Rail Dam Extension", see Appendix A, Figure A5 for results) includes a section of 600 mm diameter pipe from Feather Street, along Mayne Street to Hawthorne Street, joining into the existing stormwater drainage network along Bowen Street. The existing trunk drainage along Bowen Street is then duplicated, from Hawthorne Street to the outlet at Tiffin Street. This option results in slight decreases in flood levels, generally between 10 and 15 mm, between Mayne Street and McDowall Street, although through several properties, levels decrease by up to 40 mm.

Rail Dam Extension with Station Street Pipe (Option L6)

The second option ("Rail Dam Extension with Station Street Pipe", see Appendix A, Figure A6 for results) comprises the same earthworks at the railway dam, however twin 1200 mm diameter pipes convey flows along Mayne Street and Station Street, discharging into the Western Drain. Note that the design of this option assumed that the Stage 2 Regional Combination 6 Option is constructed, including widening and deepening of the existing Western Drain, resulting in the decreases in flood levels along Bungil Creek, along the Long Drain between Arthur Street and Shady's Lagoon, and along the Western Drain. Without these regional works in place, the effectiveness of the Station Street pipe is likely to be reduced, due to the higher tailwater levels without these works, and reduced pipe grade and/or size required for the proposed pipes to fit into the existing terrain.

The impact of this second option can be seen in the area between Bungil Street and the railway, where flood levels within the centre of town decrease by between 15 and 40 mm. Flooding through many of the properties within this area decreases by between 30 and 50 mm.

Summary

The results indicate that increasing the capacity of the railway dam and providing additional pipes to convey overflows from the dam underground could result in the reduction flooding at a relatively large area of residential and commercial properties through the centre of Roma. Of the

two options investigated, the second Station Street pipe option, with the larger capacity pipes, results in greater decreases in flood levels, and minimises disruption to the community as no works will need to be undertaken along Bowen Street. It is recommended that, if this option is selected as part of the preferred option(s), further modelling should be undertaken during detailed design phase. This should incorporate detailed survey of the railway dam and surrounding overland flow paths, and investigation of alternative alignments and sizes of the Station Street drainage to maximise the performance of the system.

5.4.3 Earthworks Options

Undertaking bulk earthworks to increase the capacity of the existing watercourses were considered at three locations along the Long Drain, to open up the overbank areas around the existing channel and upgrade culvert crossings and/or bridge structures at key constriction points.

Carnarvon Highway and Lovell Street Intersection (Option L7)

The first option ("Earthworks – Carnarvon Highway and Lovell Street", see Appendix A, Figure A7 for results) involves widening the existing floodway at Lovell Street at Carnarvon Highway, in addition to replacing the existing bridge and culvert crossings at Carnarvon Highway and Lovell Street with new bridge structures.

These works resulted in decreases in flood levels of up to 100 mm upstream of the new Lovell Street crossing, with a 50 mm decrease in flood levels at Miscamble Street east of Northern Road. There was also a decrease in flood levels upstream of the proposed Carnarvon Highway crossing, with flood levels immediately upstream of the bridge dropping by up to 140 mm. However, the impact along this flow path was more localised, with no noticeable change beyond Miscamble Street near Kirkbride Street. Due to the increased conveyance through the Carnarvon Highway and Lovell Street crossings, there is a small localised increase in flood levels directly downstream of Lovell Street, with flood levels at adjacent properties increasing by up to 30 mm.

Although this option results in decreases in flood levels, the extent is similar to base case conditions, with Northern Road/Carnarvon Highway inundated between Miscamble and Lovell Streets. Lovell Street is also still inundated, although the road level across the proposed bridge structure is higher than the existing road, so is likely to provide flood-free access during smaller events when the existing road would be inundated.

If this option is selected as part of the preferred option(s), further investigation would be required to assess the impact of the final bridge designs on flood levels, and modifications to the design may be required so that the proposed works do not worsen flooding issues at the properties adjacent to the Long Drain downstream of Lovell Street.

Arthur Street and Wyndham Street (Option L8)

Earthworks were also proposed between Arthur Street and Wyndham Street (see Appendix A, Figure A8 for results). This option also involved widening the existing crossing under Arthur Street. The results indicate that increasing conveyance through the Arthur Street crossing and providing additional storage decreases flood levels along the Long Drain, however the peak 10 year ARI regional flood levels within Bungil Creek extend up to Arthur Street, resulting in no change in the peak flood levels during the design event downstream of Arthur Street. Isolating the local flooding from the regional flooding will better enable assessment of the impact of these proposed works during localised storm events, when Bungil Creek is not simultaneously in flood.

Despite the impact of regional flooding, the results indicate decreases in flood level of up to 150 mm between Lovell Street and Arthur Street, and a decrease of approximately 10 mm at Miscamble Street and Northern Road. As the Carnarvon Highway crossing near Lovell Street constricts flows along the overland flow path to the west, flood levels along that branch of the Long Drain system remain unchanged from base case conditions.

Charles Street (Option L9)

The final earthworks option involved widening of the channel overbank area north of Charles Street, in addition to an upgrade of the existing Charles Street bridge. Results are presented in Appendix A, Figure A9. Similar to the results of the Arthur Street and Wyndham Street earthworks option (see Appendix A, Figure A8), the peak 10 year ARI regional flood levels within Bungil Creek extend up to Arthur Street, resulting in no visible change in the peak flood levels during the design event downstream of Arthur Street. However, there are decreases of between 10 and 20 mm between Lovell Street and Arthur Street, indicating that flood levels solely as a result of the localised storm do decrease with these proposed works in place. The decrease in flood levels between Arthur Street and Charles Street as a result of these works is likely to be greater than the 10 to 20 mm observed upstream of Arthur Street, without the influence of the regional flood.

Summary

The results indicate that the existing crossings along the Long Drain restrict the conveyance of flood flows along the existing channel. Upgrading these crossings, in addition to providing additional flood storage within the channel overbanks, results in noticeable decreases in peak flood levels during a local 100 year ARI storm event. During a regional 10 year ARI flood event along Bungil Creek however, properties downstream of Arthur Street are more likely to experience flooding as a result of the regional flood event than the local storm event.

Further investigation of these options with a lower tailwater boundary condition is recommended, to ascertain the performance without the influence of a regional flood. This is particularly relevant to the Arthur Street/Wyndham Street and Charles Street locations so as to better assess the performance of these earthworks and crossing replacement works across a range of design storm events.

5.4.4 Overland Flow Path Options

The Long Drain system plays a significant role in conveying stormwater through Roma, discharging flows into Shady's Lagoon and ultimately into Bungil Creek. There is potential to widen and deepen the existing channel to increase conveyance along this system, in conjunction with upsizing of the culvert and bridge crossings that currently restrict flow at a number of locations. Model results indicated that flood levels along the Long Drain are significantly reduced as a result of this formalisation of the existing channel. In particular, the 100 year ARI flows are shown to be contained within the channel where, under existing conditions, the channel banks would be overtopped by floodwater that impact several adjacent streets and properties. Each of the options is discussed individually below.

Bassett Lane to Charles Street (Option L10)

This option involved widening and deepening of approximately 1.8 km of existing channel. Results are shown in Appendix A, Figure A10. Upstream of the proposed upgraded crossing at Miscamble Street, flood levels within the channel decrease by between 500 and 600 mm. There is a noticeable decrease in flood extent either side of the channel, with Edna Street and Alexander Avenue in particular experiencing a significant reduction in flooding as a result of overflows from the channel. The lower levels within the channel also result in decreased

flooding along Wright Street (approximately 135 mm decrease) and a slight (< 10 mm) decrease in flood levels along Allen Street and Nightingale Street.

Between Miscamble Street and Lovell Street, the impact of the formalised channel and upgrades to the Miscamble and Lovell Street crossings results in 400 to 600 mm in decreased flood levels, and a reduction in the length of the Northern Road/Carnarvon Highway that is inundated.

Downstream of Lovell Street, the impact of the proposed works begins to be drowned out by the peak flood levels that result from the high tailwater conditions within Bungil Creek. It is anticipated that flood levels due to local flooding will have decreased to a similar degree as elsewhere along the channel (approximately 500 mm), should the backwater effects of the regional tailwater be removed. This likely reduction should be confirmed through further modelling with lower tailwater boundary conditions.

Powell Street to Lovell Street (Option L11)

This option involved widening and deepening of one of the side branches of the Long Drain, as shown in Appendix A, Figure A11. The results indicate that flood levels along this section of channel decrease by 500 to 600 mm as a result of the channel works and construction of new bridge crossings at Miscamble Street and Carnarvon Highway. The 100 year ARI flood extent also now remains largely within the modified channel, resulting in removal of flood extent from a number of properties along Laman and Bond Streets. Additionally, the crossing at Miscamble Street is no longer overtopped with the proposed bridge structure in place. This option also results in lowered flood levels east of Northern Road, between Alexander Avenue and Lovell Street, of up to 150 mm, without noticeably increasing flood levels downstream of the works.

Bassett Lane to Alexander Avenue (Option L12)

This option involved widening and deepening of one of the existing side branches of the Long Drain, as shown in Appendix A, Figure A12. The results indicate that flood levels along this section of channel decrease by 300 to 700 mm as a result of the channel works and construction of a new bridge crossing at Northern Road. The 100 year ARI flood extent also now mostly is contained within the modified channel, resulting in the removal of flood extent from a number of properties along Everingham Avenue and Northern Road. Additionally, the crossing at Northern Road is no longer overtopped with the proposed bridge structure in place, improving trafficability through the area during flood events up to the 100 year ARI event.

Although there are reductions in flood levels along the proposed channel and also slight reductions between Bassett Lane and Alexander Avenue, this option also results in a slight increase in flood levels downstream of the works, between Alexander Avenue and Arthur Street, although these increases are generally less than 5 mm. If these works are to be considered in future options, combining these works with those along the main drainage flow path (Bassett Lane to Charles Street option) is likely to provide a better overall mitigation option that addresses constrictions along the entire Long Drain system.

Combined Widening of Overland Flow Path (Option L13)

This fourth option (refer Appendix A, Figure A13 for results) combines all three overland flow path options discussed above. In addition to widening and deepening three reaches of the existing overland flow path, new crossings have been modelled along Northern Road/Carnarvon Highway (at 2 locations), Miscamble Street (2 locations), Lovell Street, Arthur Street and Charles Street.

This option provides the greatest benefit of all the overland flow path options, as the performance of the works down along the two branches to the west (Powell Street to Lovell

Street and Basset Lane to Alexander Avenue options) are enhanced by the channel works along the longest reach of the channel. The results also show a very minor increase in flood levels downstream of Arthur Street (3 mm). Peak flood levels within this area are the result of regional flooding, and the slight difference may be due to the channel works and increased conveyance through the bridge structures at Arthur and Charles Street modifying flow patterns, however this increase is minimal.

Similar to all other options being assessed, the 10 year ARI regional tailwater level results in peak water levels between Arthur Street and Shady's Lagoon. Further runs with lower tailwater levels would be required to assess the reductions in flood levels achieved by this option during a local storm event, without flooding of Bungil Creek occurring.

Upstream of Arthur Street, the results indicate that these channel works and structure upgrades result in a significant reduction in flood extent and levels during the 100 year ARI local storm event. Notably, the flood extent remains mostly within the new channel, especially upstream of Lovell Street, with flooding impacting fewer properties adjacent to these drainage paths, and Miscamble Street and Northern Road/Carnarvon Highway remaining trafficable at a number of crossings that were previously inundated during flood events. While the proposed Lovell Street is still inundated during the 100 year ARI flood event, the depth over the roadway is significantly less than under existing conditions, due to the combination of raised roadway and lowered flood level. All these crossings should be checked at detailed design stage if selected as the preferred option(s) to confirm their impact on flood levels and flood immunity across a range of events and storm durations.

Summary

Based on the modelling results, improving the conveyance along the Long Drain system through upgrading crossing structures and formalisation of the existing drainage paths to a deeper and wider channel provides significant benefits in terms of reduced flood extents and levels along these channels and adjacent properties, and improves the flood immunity at a number of crossings. While the combined option that incorporates all three reaches of the Long Drain provides the greatest benefit, there would be the option of progressing these works using a staged approach, with the main reach (from Basset Lane to Charles Street) being constructed first, followed by the two branches to the west.

5.4.5 Charles and Gregory Street Swale Options

The following options aim to address existing flooding issues within the residential properties along Gregory Street, between Lovell Street and Shady's Lagoon. They comprise a combination of swales within the road reserve, with culvert crossings beneath roadways, and in the third option, pipes under Gregory Street to provide additional conveyance of flood flows. Mitigation options at this location were limited by available space, flat terrain resulting in extremely flat grades and little cover for pipes and culverts, and its proximity to Shady's Lagoon and therefore the influence of Bungil Creek tailwater levels.

Gregory Street (Option L14)

This option (refer Appendix A, Figure A14 for results) requires the least works, comprising swales either side of Gregory Street, with culverts under Lovell Street and George Street.

While there is a localised decrease of 85 mm at the upstream end of the swales, the impact on flood levels along Charles Street and the properties between Lovell Street and George Street is small, generally 10 to 15 mm. Given the large volumes of flow during a 100 year ARI event, works of this small scale will generally have minimal effect during these larger storm events; however they will probably provide some benefit during smaller events.

Additionally, flooding at the lower end of Gregory Street is influenced by the 10 year tailwater boundary condition applied within Bungil Creek, which backflows through Shady's Lagoon and results in flooding at a number of properties along Gregory Street. Further modelling with lower tailwater conditions may be required to assess the performance of this option without the influence of Bungil Creek levels.

Charles Street and Gregory Street (Option L15)

This second option (refer Appendix A, Figure A15 for results) builds on the Gregory Street swale option discussed above, with the addition of a swale along Charles Street from Miscamble Street to Lovell Street, and upgrade of the existing culverts under Miscamble Street.

Results indicate that the reduction in flood level achieved by this option (approximately 20 mm) are only slightly greater than those of the Gregory Street only option, and does not result in a noticeable decrease in flood extent. Properties south of Lovell Street and along Gregory Street are still inundated, partially due to overland flows across Lovell Street, and partially due to backflow from high tailwater levels within Bungil Creek.

Charles Street and Gregory Street with Pipe (Option L16)

The third and final Gregory Street drainage option (refer Appendix A, Figure A16 for results) combines the Charles Street and Gregory Street swale option described above with twin 750 mm diameter pipes providing additional capacity underneath Gregory Street, in addition to the swales proposed either side of the street.

This option produces the largest decrease in flood level of the three options modelled, with decreases of 30 to 40 mm along Lovell Street, and up to 40 mm decreases in flood level within the properties south of Lovell Street. However, Lovell Street is still overtopped and there is little change in the flood extent. Additionally, peak flood levels along the southern section of Gregory Street are the result of the levels in Bungil Creek, making it difficult to assess the impact of these works on these properties during a local storm event when flooding is not caused by Bungil Creek levels.

Summary

Investigation into potential mitigation works for the Gregory Street area revealed that works are limited by the flat terrain in the area, restricting the size and grade of swale and piped options. Additionally, the proximity of this location to Shady's Lagoon leaves it susceptible to backflow from Bungil Creek.

While these options may provide some mitigation benefit during smaller, more frequent local rainfall events, further investigation would be required to assess the potential benefit of these works during an event when Bungil Creek levels do not cause flooding within Roma.

5.4.6 Shady's Lagoon Options

Two options were tested for mitigation works occurring at Shady's Lagoon. These options involved a short levee along the southern edge of Shady's Lagoon to reduce the risk of flows overtopping Shady's Lagoon from entering properties south of Bungil Street. The second option included extension works to increase the capacity of Shady's Lagoon, and replacement of the existing Charles Street bridge with a new structure with a larger flow area and higher soffit.

Shady's Lagoon Levee (Option L17)

This levee only option, while during small events may offer some protection to the properties south of Bungil Street, results in *increases* in flood levels upstream of Shady's Lagoon to Arthur Street and George Street, as it forms an obstruction to flood flows during a regional flood event.

As shown in the results in Appendix A, Figure A17, the 10 year ARI regional flood overtops Bungil Street and construction of the levee results in approximately 5 mm afflux within Shady's Lagoon and along the Long Drain system to Arthur Street.

Shady's Lagoon Levee with Basin Extension (Option L18)

In addition to the levee proposed above, this second option (refer to Appendix A, Figure A18 for results) includes works to increase the capacity of Shady's Lagoon and conveyance through Charles Street Bridge. This resulted in decreased flood levels of up to 25 mm between Lovell Street and Arthur Street, however the peak flood levels in the area downstream of Arthur Street are the result of the 10 year ARI Bungil Creek tailwater levels, rather than localised stormwater.

Similar to the levee only option discussed above, the proposed levee restricts the passage of overland flows overtopping Bungil Street, resulting in slightly higher flood levels between Arthur Street and Shady's Lagoon.

Summary

Based on the model results, during regional flood events when Bungil Street is overtopped, the Shady's Lagoon levee forms a barrier to overland flow and results in increased flood levels within Roma. Although it may provide some flood mitigation benefit during smaller, localised events, the negative impact of this option on flooding during regional events must also be considered.

The second Shady's Lagoon option also contains the levee, and therefore peak flood levels upstream of the levee increase as the peak of the regional flood passes through the system. However, the combination of widening the Charles Street Bridge opening and increasing the capacity of Shady's Lagoon did provide some benefit, although this is also largely drowned out by high tailwater levels in Bungil Creek. Further modelling may be required to assess the impact of these two components during a local storm event when Bungil Creek is not in flood.

5.5 Summary of Findings from Assessment of Individual Options

The findings from investigation into the 18 individual Major Local flooding and drainage mitigation options can be summarised as follows:

- During a 10 year ARI regional flooding event within the Bungil Creek catchment, flood levels from Bungil Creek cause flooding issues within Roma, up to Arthur Street to the west and Lovell Street to the north. Peak flood levels within this area are the result of the 10 year ARI tailwater boundary conditions, rather than the 100 year ARI local storm event. In order to assess the potential impact of local flood mitigation works within this area, a lower tailwater boundary condition has been applied in the next phase of investigation
- The proposed retarding basins did not provide much benefit during the 100 year ARI storm event. Although they may provide some mitigation during smaller events, the volumes of flow during a 100 year ARI event result in the basins generally already being at capacity prior to the peak flows entering the basin
- Of the two rail dam options, the option with the Station Street pipes provided better flood mitigation, reducing flood levels within the town centre. However, the capacity of the proposed pipes was insufficient to capture all the overland flow from the railway dam and further design is recommended to optimise this option.
- While the retarding basins provide little mitigation benefit, the three earthworks options (at Carnarvon Highway/Lovell Street, Arthur Street/Wyndham Street and Charles Street) did result in noticeable decreases in flood level, suggesting that the existing bridge structures

and surrounding terrain currently restrict flood flows, and that increasing the conveyance at these key locations can significantly improve the drainage through the Long Drain system.

- Widening and deepening the existing overland flow paths along the Long Drain system, including the two branches to the west, significantly improves drainage through the system and results in decreases in flood levels along the entire channel. Replacement of bridge structures along these channels also improves conveyance through the system, and is likely to allow continued access across these roads during smaller flood events
- The combination of Charles Street swale, Gregory Street swale and pipes along Gregory Street resulted in slight decreases in flood level along the Gregory Street properties. However, peak flood levels within the properties towards the southern end of Gregory Street were the result of the 10 year ARI tailwater conditions in Bungil Creek, rather than the localised storm. Further assessment of this option with lower tailwater levels is recommended to gain a better understanding of the effect of the proposed mitigation option
- The Shady's Lagoon levee, while potentially providing a level of flood mitigation during localised flood events, was found to obstruct the passage of overland flows from a regional flood event along Bungil Creek, and is therefore not recommended
- The benefit to local drainage of any works within Shady's Lagoon is likely to be minimal during a flood event in which tailwater levels from Bungil Creek backflow and fill the lagoon

6. Combined Options for Major Local Flood Mitigation

6.1 Combination Major Local Flood Mitigation Options

Following on from the assessment of each of the Major Local flood mitigation options at an individual level, a number of 'combination' options were developed and testing. Each combination comprises two or more of the individual options. The modelled combinations are listed and described in Table 6-1. The individual components of each option are also shown in Figure 5-1. The Local Combination options target the following three areas for mitigation works:

- The Long Drain system, with channel works and replacement/upgrade of existing structures
- Gregory Street, with minor swale and drainage works
- The town centre, with the railway dam extension and Station Street drainage works

Individual options were combined according to their estimated benefit to these areas during the modelling described in Section 5. Local Combination 1 addresses the Long Drain and its branches. Local Combinations 2 and 3 target the Long Drain, in addition to Gregory Street (Local Combination 2) and the town centre (Local Combination 3). Local Combination 4 comprises mitigation options to address all three areas.

Table 6-1 Major Local Flood Mitigation Combination Options

Option	Description
Local Combination 1 Long Drain Channel Works and Earthworks	Widening and deepening of existing overland flow path from: Bassett Lane to Charles Street; Powiil Street to Lovell Street; and Bassett Lane to Alexander Avenue Upgrade crossings at Miscamble Street (2 locations), Lovell Street, Charles Street and Carnarvon Highway (2 locations) Open up existing overland flow path at: Carnarvon Highway and Lovell Street intersection; Between Arthur and Wyndham Streets; and Charles Street
Local Combination 2 Long Drain Channel Works and Earthworks, and Gregory Street Drainage Works	Local Combination 1, with the following additional Gregory Street Drainage works: Swale next to roadway along Charles Street, from Miscamble Street to Lovell Street, to improve conveyance of overland flows. Swales either side of Gregory Street to improve conveyance of overland flows. Additional/new culverts beneath Miscamble Street, Lovell Street and George Street. Twin 750 mm diameter pipes along Gregory Street from Lovell Street to Shady's Lagoon Charles Street swale length: 500 m Gregory Street swale length: 200 m (each side) Pipe diameter: 2 No. 750 mm Pipe length: 340 m

Option	Description
Local Combination 3 Long Drain Channel Works and Earthworks, and Railway Dam Extension with Station Street Pipes	Local Combination 1, with the following additional Railway Dam works: Increase storage capacity of rail dam. Improve conveyance along Feather Street and Station Street, discharging into Western Drain. Length of new pipe: 1,600 m (2 No. 1200 mm diameter)
Local Combination 4 Long Drain Channel Works and Earthworks, Gregory Street Drainage Works and Railway Dam Extension with Station Street Pipes	Local Combination 1, with the following additional works: Gregory Street Drainage Works (as described in Local Combination 2 above): Swale next to roadway along Charles Street and either side of Gregory Street Additional/new culverts beneath Miscamble Street, Lovell Street and George Street. Twin 750 mm diameter pipes along Gregory Street from Lovell Street to Shady's Lagoon Railway Dam Works (as described in Local Combination 3 above): Increase storage capacity of rail dam Twin 1200 mm diameter pipes along Feather Street and Station street, discharging into Western Drain

Modelling of the Major Local Combination Mitigation Options assumed that the Stage 2 Regional Combination 6 Option would be implemented (see the Stage 2 Regional Mitigation Report [GHD, 2013b]), in addition to the Stage 1 Levee (July 2013 Reference Design). Impacts of the preferred Stage 2 Major Local Combination Mitigation Options are likely to change if the constructed Stage 1 Levee and/or the Stage 2 Regional flood mitigation works differ from what is modelled in this study.

6.2 Base Case and Design Event

The base case and design event adopted for comparison of the Major Local Combination flood mitigation options differs from the base case and design event used for assessment of the individual flood mitigation options. The differences are described in the following section.

6.2.1 Design Event

Based on the recommendations arising from comparison of individual mitigation options as summarised in Section 5.5, a lower tailwater level was adopted for the assessment of these Major Local Combination options. This was due to the 10 year ARI Bungil Creek levels contributing to significant flooding issues in the lower areas of Roma due to backwatering and masking potential benefit of local mitigation options in this area. As the main focus of this section of the investigation is on mitigation works to address flooding issues arising from local rainfall events, 2 year ARI tailwater levels were applied as downstream boundary conditions within Bungil Creek and the Western Drain for the continued assessment of the Major Local options. With these lower boundary conditions, the impact of the mitigation works on local flooding issues could be more clearly assessed.

6.2.2 Integration of Stage 2 Regional Flood Mitigation Option

For the combined option investigation, the base case scenario (Base Case 1 – Stage 1 Levee (March 2013 Reference Design) was modified to Base Case 2, with an update of the Stage 1 Levee alignment and incorporation of the Stage 2 Regional Combination 6 preferred mitigation

works in accordance with the outcomes of the Stage 2 Regional Mitigation Report (GHD, 2013b). These changes are detailed as follows:

- Stage 1 Levee alignment updated from the March 2013 Reference Design to the approved July 2013 Reference Design
- The Stage 2 Regional flood mitigation option Combination 6 added to model, including construction of
 - A number of levees
 - Diversion channels
 - Channel and bridge works at the existing Bungil Street Bridge

This Stage 2 Regional Combination 6 mitigation option and results from the Stage 2 Regional investigation can be found in the Stage 2 Regional Mitigation Report (GHD, 2013b).

Inclusion of the Stage 2 Regional Combination 6 works, which is the hydraulically preferred option from the Stage 2 Regional investigation, recognises that the regional flood mitigation works are likely to result in a reduction in flood levels at a local scale due to lowering of the tailwater conditions along Bungil Creek. Integration of the Regional Combination 6 works provides a holistic overview of the expected benefit when combined with the Major Local works. Water level results from the Regional Combination 6 hydraulic model were extracted for the 2 year ARI event and applied as boundary conditions into the Major Local hydraulic model.

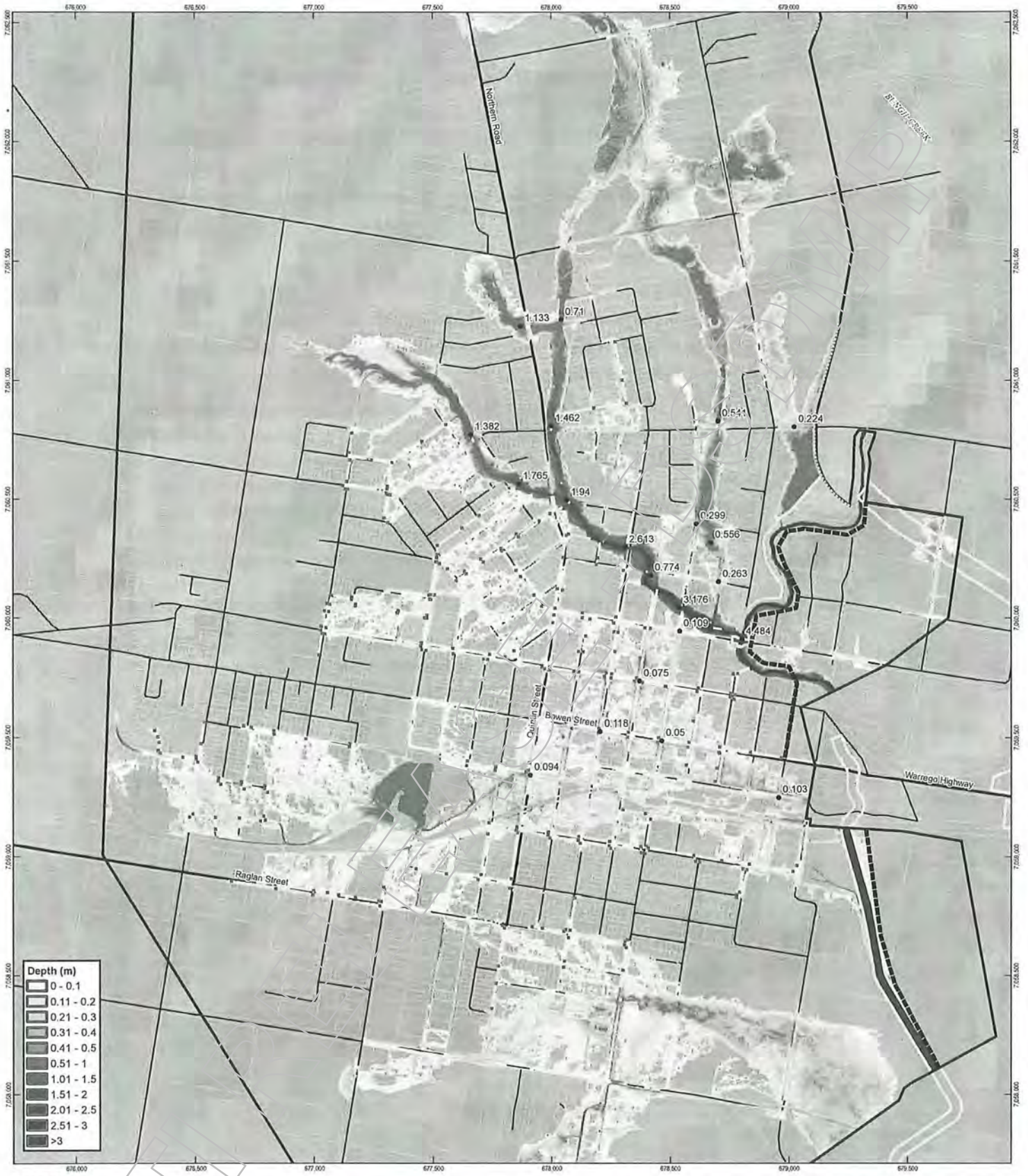
6.2.3 Impact on Tailwater of Stage 2 Regional Combination 6 Mitigation

A comparison was made between the tailwater with the Stage 1 Levee only (July 2013 Reference Design) and Base Case 2, to show the baseline changes in flood level before implementation of the Major Local combination works. These results are shown in Appendix B, and indicate changes as described in Table 6-2.

Table 6-2 Impact of Regional Combination 6 on regional flooding

Flood Level Location of Interest	Change Base Case 2 versus Base Case 1	Reason
Behind proposed Stage 2 Western Levee	Increase in flood levels.	Insufficient drainage to allow local flows to drain through the levee.
Within Shady's Lagoon	35-40 mm decrease.	Success of regional mitigation.
Bungil Ck Upstream of Bungil St	Slight decrease.	Success of regional mitigation.
Bungil Ck Downstream of Bungil St	Minor increase (< 20 mm).	Increased conveyance through the Bungil St crossing.
Western Drain	Approximately 400 mm decrease.	Success of regional mitigation.
Upstream of the Arthur St culverts	Up to 10 mm	Increase within the error margin of the modelling. May be due to a difference in flow regime through the culvert.

The base case flood extent for comparison of the Major Local Combination flood mitigation options is shown in Figure 6-1.



Depth (m)

0 - 0.1
0.11 - 0.2
0.21 - 0.3
0.31 - 0.4
0.41 - 0.5
0.51 - 1
1.01 - 1.5
1.51 - 2
2.01 - 2.5
2.51 - 3
>3

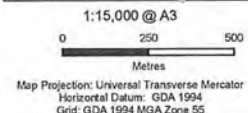
- LEGEND**
- Sample Point
 - Modelled Local Drainage Pit
 - ▬ Modelled Bridge
 - ▬ Highway
 - ▬ Modelled Culvert or Drainage Pipe
 - ▬ Major Local Hydraulic Model Extent
 - ▬ Road
 - ▬ July 2013 Reference Design Stage 1 Levee Alignment
 - ▬ Watercourse
 - ▬ Stage 2 Regional Combination 6 Works
 - ▬ Limit of Mapping
 - ▬ Cadastre

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Maranoa Regional Council
Roma Flood Study

Job Number 41-25323
Revision 0
Date 11 Oct 2013

**100 Year ARI Local 'Base Case 2' Flood Extent
2 Year ARI Regional Tailwater**

Figure 6-1

6.3 Hydraulic Model Results

Figures showing the afflux under each combined mitigation scenario compared to the 'Base Case' scenario (with Stage 1 Levee and Stage 2 Regional Combination 6 works) are in Appendix C.

Mitigation options considered in this report were represented within the model for the purposes of a high level comparison of options. Further modelling of the preferred option(s) is recommended to confirm performance of the proposed works across a range of storm durations and ARIs, and with differing tailwater boundary conditions. It is also recommended that additional survey, checks to ensure no conflict with existing services, and consultation with affected landowners occur during detailed design phase of the preferred option(s).

Afflux values at a number of locations (shown in Figure 5-3) are tabulated in Figure 6-2 below.

Figure 6-2 Combination Major Local Mitigation Options – Decrease in Flood Levels

Option and Decrease in flood level (mm)	Upstream Arthur St Culverts (Point 3)	Upstream Lovell St (Point 4)	Gregory St Properties (Point 21)	Intersection Bowen St and Arthur St (Point 12)	Intersection McDowall St and Wyndham St (Point 14)
Local Combination 1	1130	905	0	0	0
Long Drain Channel Works and Earthworks					
Local Combination 2	1133	906	38	0	0
Long Drain Channel Works and Earthworks, and Gregory Street Drainage Works					
Local Combination 3	1149	905	0	21	17
Long Drain Channel Works and Earthworks, and Railway Dam Extension with Station Street Pipes					
Local Combination 4	1151	905	38	21	17
Long Drain Channel Works and Earthworks, Gregory Street Drainage Works and Railway Dam Extension with Station Street Pipes					

NB: negative value would indicate an *increase* in flood levels compared to base case option.

The results of modelling the Local Combination options can be summarised for each of the targets areas as follows:

Long Drain Channel Works and Earthworks

- The Long Drain works (Local Combination 1) result in a significant decrease in flood extent and flood levels between Bassett Lane and Charles Street, generally between 400 mm and 1 m
- The 100 year ARI flows are generally contained within the proposed channel. Some flooding still occurs alongside the channel, although this is largely the result of overland

flows entering the channel, rather than levels within the channel overtopping the channel banks

- The increased conveyance along the Long Drain system results in a slight increase in peak flood level within Shady's Lagoon, however this is in the order of 20 – 30 mm, and does not impact any adjacent properties
- The lower tailwater levels within the Long Drain system are likely to improve the performance of the local stormwater drainage network in some locations, although during the 100 year ARI event a large proportion of the local stormwater runoff exceeds the capacity of the stormwater drainage network and flows overland into the drainage channels. The impact of these works on the local stormwater network may be more evident in a smaller flood event

Gregory Street Drainage Works

- The proposed swales and piped drainage works along Charles Street and Gregory Street resulted in small decreases in flood level between Miscamble and Lovell Streets, generally in the order of 35 mm, although there are small localised reductions of up to 75 mm near the intersection of Miscamble Street and Charles Street
- While there is a small reduction of up to 40 mm in flood levels through the properties between Charles Street and Gregory Street, and up to 100 mm reduction along Gregory Street itself, there is little reduction in flood extent
- There is also a slight increase in peak flood levels at the downstream end of the Gregory Street swales (near George Street), although this is potentially able to be addressed through redesign of the culverts conveying flow under George Street, and/or regrading of George Street to allow flows to pass overland and directly into Shady's Lagoon
- There was a slight reduction in the flood extent occurring near the Lovell Street and Wyndham Street intersection as a result of the decreased flood levels and flows at the Charles Street and Lovell Street intersection
- While these works potentially provide more significant benefit during smaller flood events, there is only marginal benefit during a 100 year ARI event, due to the volume of flow along the Charles Street overland flow path
- This location is also significantly influenced by the downstream levels within Bungil Creek and Shady's Lagoon, so the flood benefits observed through the hydraulic model would only be achieved when Bungil Creek is not significantly flooded

Railway Dam Extension and Station Street Pipes

- The proposed extension to the railway dam and additional pipes along Station Street result in a significant reduction in flood levels (up to 100 mm) and flood extent through the town centre
- There is a slight increase in flood levels along Station Street, however this is generally between 15 and 30 mm, and generally contained within the road reserve
- Overall, there is a significant benefit during the 100 year ARI event as a result of these works, and the impact during smaller flood events is expected to be more noticeable, when a larger proportion of the overland flow can be captured and conveyed underground via the Station Street pipes
- The performance of this option is dependent on the downstream tailwater conditions, as the levels within the Western Drain at the proposed outlet will influence the conveyance through the Station Street pipes

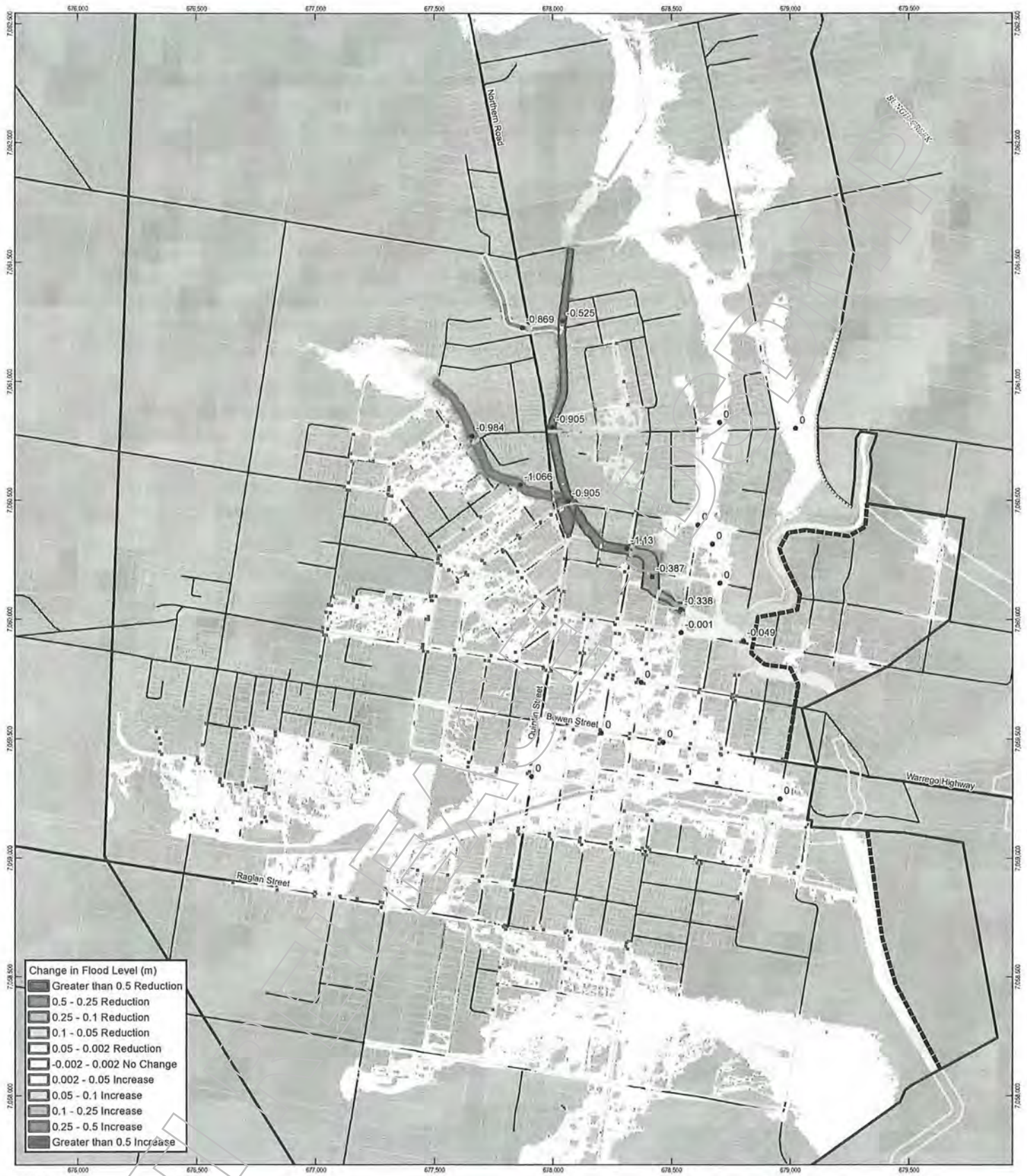
- It may be possible to increase the effectiveness of this mitigation option through alternative designs of inlet locations, pipe grades and sizes. This should be considered at detailed design stage when more detailed survey information is available

6.4 Major Local Flood Mitigation Conclusions

Based on the hydraulic model results, the proposed mitigation works through the Long Drain and in the vicinity of the Railway Dam and Station Street were seen to provide the best benefit to adjacent properties. The Gregory Street works were seen to provide minimal comparative benefit to urbanised areas of Roma, as many buildings in this area are already situated away from major identified flow paths and the greatest potential benefit is only a slight reduction in flood level.

The modelling results of the proposed Station Street works comparatively show provide much stronger benefit to the urbanised areas of Roma with regard to reducing flood risk by mitigating flooding in this area. For this reason Local Combinations 1 and 3 are preferred over Local Combinations 2 and 4. Local Combinations 1 and 3 provide significant decreases in flood levels and extent during a local 100 year ARI storm event. The decreases in flood level and extent as a result of these options are presented in Figure 6-3 and Figure 6-4.

The results presented assume construction of the Stage 1 Levee and Stage 2 Regional Combination 6. The two preferred combinations were then run for a range of ARIs from 2 year to PMF, all with 2 year ARI regional event downstream boundary conditions within Bungil Creek and the Western Drain.



Change in Flood Level (m)

[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[White Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Light Grey Box]	0.002 - 0.05 Increase
[Medium-Light Grey Box]	0.05 - 0.1 Increase
[Medium-Dark Grey Box]	0.1 - 0.25 Increase
[Dark Grey Box]	0.25 - 0.5 Increase
[Darkest Grey Box]	Greater than 0.5 Increase

LEGEND

● Sample Point	■ Modified Local Drainage Pit	— Widening of Overland Flow Path - Bassett Lane to Charles Street
— Highway	— July 2013 Reference Design Stage 1 Levee Alignment	— Widening of Overland Flow Path - Powell Street to Lovell Street
— Road	— Modified Culvert or Drainage Pipes	— Widening of Overland Flow Path - Bassett Lane to Alexander Avenue
— Watercourse	— Earthworks - Carnarvon Highway and Lovell Street Intersection	— Stage 2 Regional Combination 6 Works
— Limit of Mapping	— Earthworks - Andrew Street and Wyndham Street	■ Modified Bridge
— Cadastre	— Earthworks - Charles Street	■ New or Upgraded Bridges
		■ Major Local Hydraulic Model Extent

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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
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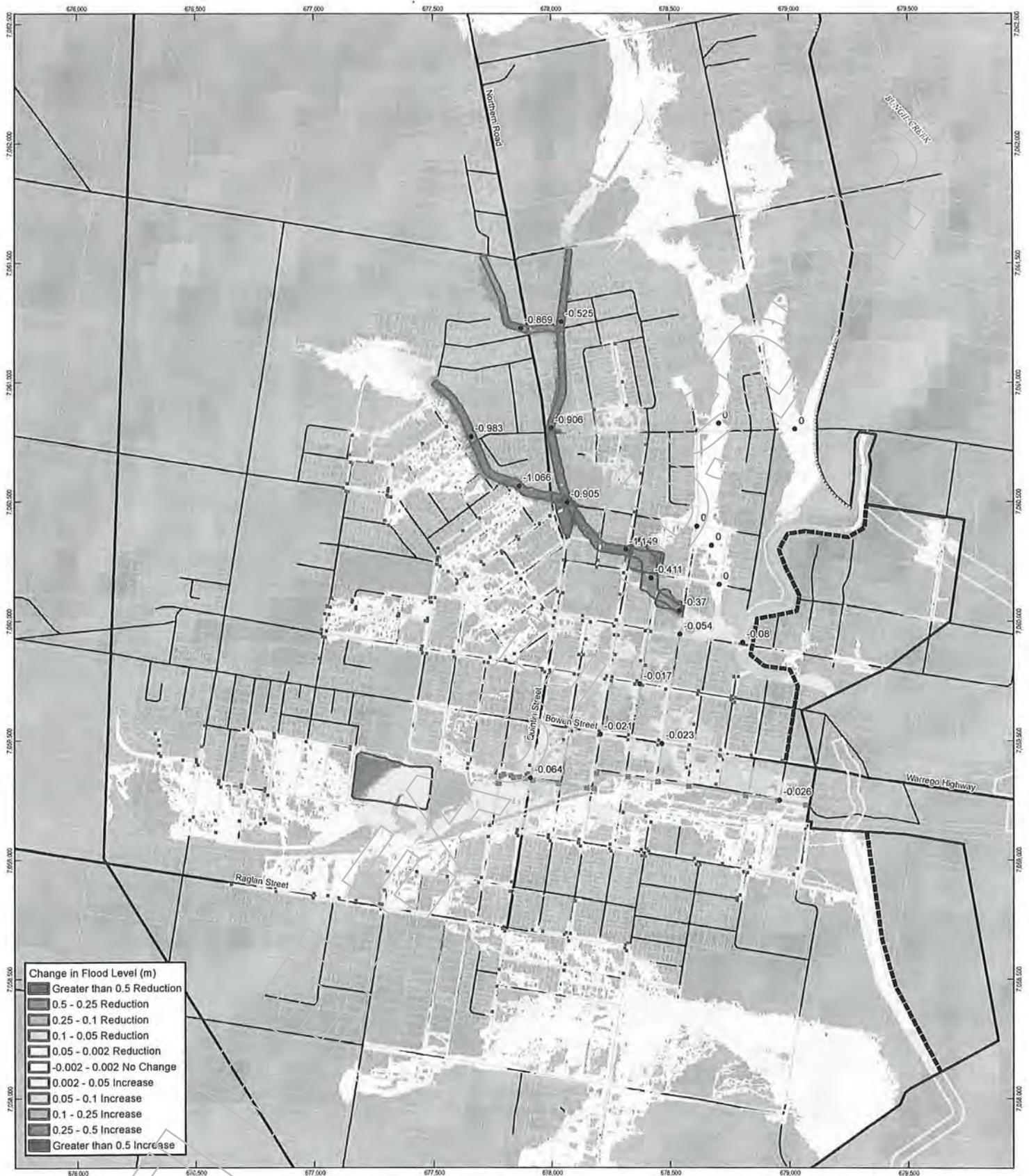


Maranoa Regional Council
Roma Flood Study

Job Number 41-25323
Revision 0
Date 11 Oct 2013

Major Local Combination 1
100 Year ARI Flood Event Peak Afflux

Figure 6-3



Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

- LEGEND**
- Sample Point
 - Modified Local Drainage Pit
 - Modelled Bridge
 - Highway
 - Road
 - Watercourse
 - Limit of Mapping
 - Cadastra
 - New pit
 - July 2013 Reference Design Stage 1 Levee Alignment
 - Modelled Culvert or Drainage Pipe
 - New pipe (2 No. 1200fa)
 - Rd. Dam Extension
 - Long Chain Works (Local Combination 1)
 - Stage 2 Regional Combination 6 Works
 - Major Local Hydraulic Model Extent

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Maranoa Regional Council
 Roma Flood Study

Job Number | 41-25323
 Revision | 0
 Date | 11 Oct 2013

Major Local Combination 3
 100 Year ARI Flood Event Peak Afflux

Figure 6-4

7. Recommended Flood Mitigation Options

7.1 Residual Flooding Impact

Based on the hydraulic model results and cost-benefit analysis, Local Combination 1 and 3 (as described in Table 6-1) provide decreases in potential flood levels and extent during a local 100 year ARI storm event and are considered effective in providing local flood mitigation. The decreases in flood level and extent as a result of these options are presented in Figure 6-3 and Figure 6-4 and correspond to the descriptions provided in Section 6.3. Concept designs for each of the preferred combination are provided in Appendix E.

The Minor Local drainage assessments as detailed in Section 8 were undertaken to reduce those remaining flood nuisance areas as identified by MRC. A summary of the solutions and associated costs is provided in Section 7.1.3.

7.1.1 Local Major Combination 1

When combined with the Stage 1 Levee and the Stage 2 Regional Combination 6, Local Major Combination 1 prevents above-floor flooding in the 100 year ARI local event for five of the properties with residual flooding issues following implementation of the regional mitigation options. Of these, one is a commercial property and four are residential. For a more frequently occurring flood such as the 20 year ARI event, the number of benefitted properties is three.

30 properties within the local major modelling extent will continue to experience above-floor flooding in the 100 year ARI flood event.

7.1.2 Local Major Combination 3

When combined with the Stage 1 Levee and the Stage 2 Regional Combination 6, Local Major Combination 3 prevents above-floor flooding in the 100 year ARI local event for 19 of the properties with residual flooding issues following implementation of the regional mitigation options. Of these, 13 are commercial properties and six are residential. For a more frequently occurring flood such as the 20 year ARI event, the number of properties benefitted is 12.

16 properties within the local major modelling extent will continue to experience above-floor flooding in the 100 year ARI flood event.

7.1.3 Local Flooding Issues

Eighteen local areas that experience more frequent local flood impacts were identified by MRC for assessment. Tailwater levels following construction of the Local Major Combination 6 mitigation measures were used to inform modelling of the remnant drainage issues. Solutions are detailed in Section 8.

7.2 Cost Benefit Analysis

The model and associated result for each of the Local Combinations assumes prior construction of the Stage 1 Levee and Stage 2 Regional Combination 6 as per the concept designs included in Appendix E. Each of these two combinations was run for a range of ARIs from 2 year through to the PMF, all with 2 year ARI downstream boundary conditions within Bungil Creek and the Western Drain. These results were used to inform the cost-benefit analysis and explore the benefit provided to properties during both high and low ARI local flood events.

To perform a cost benefit analysis, indicative Capital Expenditures (CAPEX) have been prepared for the two preferred combinations: Combination 1 and Combination 3. These cost estimates are included in Appendix D. The methodology outlined in Section 9 of the Regional mitigation report; "Roma Flood Mitigation Study – Hydrology and Hydraulics for Stage 2 Regional Options (2013) has been adopted for this cost benefit analysis.

The calculated CAPEX for each option was compared against the associated cost of flood damages. The comparison was made between the Average Annual Damage (AAD) as calculated using the Hawkesbury-Nepean flood damage curves (Hawkesbury-Nepean Floodplain Management Steering Committee document titled "Managing Flood Risk through Planning Opportunities" (2006)) and the cost of mitigation (CAPEX for Local Major Combination 1 and Combination 3). A comparison was also made between the net present value (NPV) of the damage under the existing case and the NPV of the reduced damages predicted to be experienced under the Stage 1 Levee plus regional Combination 6, and the Local Major Combinations 1 and 3.

The results of the cost-benefit analysis are summarised in Table 7-1.

Table 7-1 Economic Analysis Summary

	Existing (no Stage 1 or 2 works)	Local Major Combination 1 with Stage 2 Regional Combination 6 and Stage 1 Levee	Local Major Combination 3 with Stage 2 Regional Combination 6 and Stage 1 Levee
AAD (\$M/Annum)	\$2.98	\$0.05	\$0.02
NPV of damage (\$M/Annum)	\$41.2	\$0.76	\$0.25
Cost of Mitigation (\$M)	N/A	\$42.0	\$50.4
Cost Benefit Ratio	N/A	0.96	0.81
Reduction in NPV of damages (\$M/Annum)	N/A	\$40.4	\$40.9

As expected, the cost-benefit ratio for each the proposed works packages at the Local Major scale are lower than those calculated in the Regional analysis. The construction of the Stage 1 and Stage 2 Levees will provide large-scale flood mitigation to the town of Roma, and additional works such as these major local options will only provide incremental improvements on this. Works are suggested to be undertaken in a staged approach, subject to funding availability and infrastructure upgrade planning

To calculate the AAD for Stage 2, methodology (and stage-damage curve) used for Stage 1 has been adopted again for consistency. Note that the Hawkesbury-Nepean Floodplain Management Steering Committee document titled "Managing Flood Risk Through Planning Opportunities" (2006) has been referenced in this process. The AAD is reflective of structural, contents and other external damages to single storey residential properties.

The Hawkesbury-Nepean document contains data valid in 2006. Therefore inflation adjustment has been applied to the data to estimate their current value. An inflation rate of 1.2% has been adopted for the Stage 2 analysis, calculated using an online tool provided by the Australian Bureau of Statistics (ABS, October 2013).

Robust property data (such as number of storeys and property type) should be collected to support a more detailed economic analysis. At this preliminary stage, all properties have been analysed as single storey residential category, to maintain consistency with the Stage 1 analysis and reporting. Soft costs for shutting the highway for days when the road is cut by flooding have not been included; these costs could be quite substantial given the agricultural, livestock, and coal seam gas industry activities in the region. In addition, the costs associated with loss of life have not been included as a part of this analysis. A detailed economic analysis for the area would be required to fully evaluate the soft costs associated with each option for Stage 2; performing such an analysis is outside the scope of this project. This analysis does not consider the structural damage & reinstatement losses resulting from total destruction of buildings. Consideration of these costs should be made in a detailed economic analysis

8. Minor Local Drainage

GHD investigated minor local drainage issues in conjunction with options to mitigate regional and major local flooding. The local drainage issues were initially identified as a part of the Drainage Master Plan for Roma (Engeny, 2012). The purpose of this investigation was to describe the local drainage issues and provide a preliminary concept design and a high level cost of mitigation options for each individual case.

The effects of implementing regional and major local flood mitigation options have been considered when developing the preliminary concept designs discussed in this section. GHD assessed each individual case in conjunction with the flood mitigation options and identified alternative mitigation solutions when applicable.

8.1 Minor Local Design Criteria & Assumptions

The following design criteria have been used for this assessment:

- Design Guidelines - Council's Planning Scheme refers to QUDM and Australian Rainfall and Runoff for stormwater standards. Therefore, these have been adopted as the main basis of guidelines for the local drainage assessment.
- Design event - Design average recurrence intervals have been chosen in accordance with Capricorn Municipal Development Guidelines, with 5yr ARI being adopted as the minor storm event and 100yr ARI as the major storm event.
- Rainfall Data - Rainfall data used was calculated using the CRC-FORGE method and checked against the data present on the Capricorn Municipal Development Guidelines for the Maranoa Regional Council.
- Capacity verification / modelling - PC-Drain was the software utilized to model most cases and checking overland flow against overland flow capacity, estimate the number of gullies and to determine the pipe sizing whenever applicable. Culvert Master was used to determine/verify adequate cross drainage sizing.

Because of the high level nature of this minor local drainage assessment, assumptions and best management practices were used when accurate information was not available, i.e. without a detailed survey it is not possible to accurately calculate the overland flow capacity of existing roads and therefore, in most cases if not all, considerations were taken from the information available to enable the best possible analysis. The results should be confirmed during the detailed design when more accurate information becomes available. In addition to assumptions noted within Section 8.2, the following general assumptions were used for this minor local drainage assessment:

- Stage 1 levee is in place;
- Preferred Regional Combination 6 and Major Local Combination 3 mitigation works have been completed;
- For cost estimates, GHD has prepared a high level cost estimate for each case using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD. These assumptions are documented in Section 8.2 for each case.

8.2 Local drainage analysis

There were 18 individual minor local drainage cases identified in the Drainage Master Plan for Roma (Engeny, 2012). Each of these cases were re-examined in conjunction with the Regional and Major Local flood mitigation studies. Investigations for each of the 18 cases are discussed in the following sections. Investigations include a description of the issue, verification, proposed solution, and a high level cost estimate. Table 8-1 summarises the cost estimates for each of the cases with works proposes.

Table 8-1 Summary of Minor Local drainage improvement measures

Local Drainage	Description	Solution	High Level Cost Estimate
Case 1	Golf Links Estate Remedial Works	Earth bund to redirect flow, potential increase to capacity of road.	\$55,000
Case 2	Railway Dam Detention Basin	<i>Determined to be an issue at the 'Major Local' scale.</i>	-
Case 3	Miscamble Street Pipe Network	Drainage line discharging into Long Drain, 375 mm to 900 mm diameter pipes with multiple gully pits.	\$330,000
Case 4	Powell Street Pipe Network	Construction of underground pipe network (450 mm to 900 mm diameter pipes) for Powell and a section of Kirkbride Street discharging to Long Drain.	\$445,000
Case 5	Station Street Stormwater Line	Combined drainage system of underground (Station Street, Tiffin Street with 450 mm to 900 mm pipes) and open channel works (Station Street).	\$2,480,000
Case 6	Miscamble Street Culvert Upgrade	<i>Determined to be an issue at the 'Major Local' scale.</i>	-
Case 7	Railway Drainage Remedial Works	Maintenance and/or upgrade existing open channels and culverts on south side of railway.	\$1,490,000
Case 8	Lovell Street Drainage Works	<i>Determined to be an issue at the 'Major Local' scale.</i>	-
Case 9	Saunders Street Trunk Stormwater Upgrade	New 1350 mm diameter pipe along Saunders Street.	\$620,000
Case 10	Quintin Street Drainage Works	Re-shape the verge to increase road capacity. Installation of gully pit with pipe.	\$28,000
Case 11	Charles Street Drain Remediation	Formalisation of the existing channels, earth bund. Maintenance of channels along Arthur, Ivy and Charles Streets.	\$125,000

Local Drainage	Description	Solution	High Level Cost Estimate
Case 12	CBD Pipe Drainage Upgrade	Increase in capacity/capture of pits through removal/modification of garden beds, replacement of inlet structures along McDowell St with on-grade gullies, replacement of sag structures on southern side roads, addition of pipes along McDowell St.	\$3,520,000
Case 13	Carnarvon Highway Culvert Upgrade at Howard St	<i>Currently being reviewed by the Department of Transport and Main Roads.</i>	-
Case 14	Lovell Street Culvert Upgrade	<i>Determined to be an issue at the 'Major Local' scale.</i>	-
Case 15	Edwardes Street Open Drain	<i>Determined to be improved by construction of Stage 1 Levee.</i>	-
Case 16	Bassett Lane Detention Basin	<i>Determined to be an issue at the 'Major Local' scale.</i>	-
Case 17	Future Urban Area Regional Detention Basin	<i>Determined to be an issue at the 'Major Local' scale.</i>	-
Case 18	Borland Street Pipe Network	Increase the amount of inlet pits and grade out road to a legal point of discharge. Further information required.	-

8.2.1 Case 1: Golf Links Estate Remedial Works

Issue: From existing contours and study carried out by Engeny, it appears that the central drainage line of the recently built development was not constructed at the natural low point of the catchment. This causes flooding of some properties in the area. In addition, the report suggests that Baker Finch Street may not have capacity for 100y ARI flows.

Verification: We have been unable to verify/duplicate the extent of this issue as there is insufficient survey. Assumptions were made based on the information available (i.e. anecdotal information and aerial photo contour data) a proposed solution for the issue is presented below.

Solution proposed: It is proposed that an earth bund of 1m maximum height is constructed to re-direct the overland flow path to take the designated route avoiding the dwellings and eliminate the flooding issue.

In addition, it appears as though benefit would be achieved increasing capacity of the road reserve in Baker Finch Crescent. While no capacity calculations have been undertaken, it appears as though the overland flow channel requires, at minimum, maintenance and possibly increase of the channel dimensions and cross drainage dimensions, once the additional flow is concentrated.

A detailed review of this system is required if flow is to be concentrated along Baker Finch Street.

A sketch of the proposed earth bunding is shown on Figure 8-1.



Figure 8-1 Proposed drainage system to convey flows towards Baker Finch Crescent

Effect from the Regional and Local Major:

This is a local issue only and will not be affected by the Regional and Local Major issues.

High level Estimated Cost:

The cost for this proposed solution is expected to be in the order of \$55,000.

8.2.2 Case 2: Railway Dam Detention Basin

This case has been evaluated as part of the local major modelling and it will be detailed in Section 3.

8.2.3 Case 3: Miscamble Street Pipe Network

Issue: The Engeny report suggests the section of Miscamble Street between Queen Street and Long Drain currently experiences nuisance flooding during minor and major storm events. At present, there is no existing underground stormwater network to manage runoff from the street and dwellings and the stormwater runs through kerb and channel and concrete inverts across intersections. Both road cross section and the longitudinal grades are flat (including the verge), limiting the road capacity.



Figure 8-2 Photo taken at Miscamble Street facing North East

Verification: We have modelled the local catchment and system in PC Drain to investigate the suggested issue, and it appears to be valid. The capacity of the road reserve in a major storm is insufficient, and this is more significant than the minor storm nuisance. The addition of pits and pipes to add capacity in a major event also allows the mitigation of the minor nuisance.

Solution proposed: It is proposed the construction of a stormwater line with gully pits within that section of the street to collect the stormwater runoff during minor events, increasing the current level of service for local residents. Concept design has been carried out and it is expected that the drainage line will comprise of a range between 375mm to 900mm diameter pipes with multiple gully pits and the network will discharge directly into the Long Drain. The figure below shows the schematic of the proposed solution.



Figure 8-3 Proposed drainage system at Miscamble Street

Effect from the Regional and Local Major: As the proposed network will discharge onto the Long Drain, the tail water conditions at the point of discharge within the drain were taken into consideration when modelling the system network. Tailwater level used was the peak level for a rainfall event similar to the 2012 flood event. Tailwater conditions used for this local drainage assessment have assumed that the preferred mitigation options discussed in the Regional report have been implemented. If the preferred option is not constructed, then the tail water assumptions used here are invalid. The Regional mitigation preferred option dropped the tailwater level at this location from approximately 299.220 to 298.200.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$330,000.

8.2.4 Case 4: Powell Street Pipe Network

Issue: Stormwater runoff from Powell Street and adjacent dwellings is currently managed through kerb and channel as there is no underground stormwater network. This results in nuisance flooding with prolonged ponding in both minor and major storm events.



Figure 8-4 Photo taken at Kirkbride Street facing north-west

Verification: The existing scenario was modelled in PC Drain and it has been confirmed that due to the flat slopes, in both cross and longitudinal sections, the road doesn't have sufficient capacity and for that reason the nuisance occurs.

Solution proposed: Construction of an underground pipe network with gullies is proposed for Powell and a section of Kirkbride Streets. This would reduce the amount of runoff during the minor events and would improve the standard of service of Powell Street. In addition, this implementation would provide adequate drainage for the trapped sag at the intersection of Elmer Street and Powell Street. According to the concept design carried out the stormwater line running down Powell and Kirkbride Streets comprises of a range of diameter pipes going from 450mm to 900mm and it would discharge directly into the Long Drain. The figure below shows the schematic of the proposed solution. In addition to the piped drainage, additional formalisation of the overland flow path from the sag to the creek would be beneficial.



Figure 8-5 Proposed drainage system at Powell and Kirkbride Streets

Effect from the Regional and Local Major: As the proposed network will discharge onto the Long Drain, the tail water conditions at the point of discharge within the drain were taken into consideration when modelling the system network. Tail water level used was the peak level for an event similar to the 2012 flood event.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$445,000.

8.2.5 Case 5: Station Street Stormwater Line

Issue: Station Street does not currently have an underground stormwater network. The section of Station Street between Edwardes Street and Tiffin Street is fairly flat and it does not have kerb and channel. There are small existing open drains on each side of Station Street.



Figure 8-6 Photo taken at Station Street facing east

There are two significant upstream catchments which contribute to flows on Station Street. These are:

- The overflow from the Railway Dam Detention Basin (Case 2);
- Discharge from the railway drainage open channels (Case 7);



Figure 8-7 Aerial photo showing connection between Cases 2, 5 and 7

Verification: The existing scenario has been modelled in PC drain. It has been verified that the road cross section doesn't have sufficient capacity to adequately deal with the runoff from rainfall events. The tail water levels at the Long Drain in the minor and major storms are high, causing flooding to a number of properties in this area. This is more than a local drainage issue and therefore is not part of the scope of this study. This issue can be verified in the main report (Roma Flood Mitigation Study, Hydrology and Hydraulics for Stage 2, Major Local Mitigation Options (GHD, 2013)) as part of the results for the Regional and Local Major Models. The results of these investigations have been taken into consideration.

Solution proposed: Concept design has been carried out and it is proposed to construct a combined drainage system with both underground stormwater network and open channels to minimize nuisance in the adjacent properties in the minor and major storm events. As there are existing shallow open channels at each side of the road, it is proposed to increase their size to adequately convey the runoff from a major event. As part of the proposed solution for Case 2 it has been proposed to run two large pipes under Station Street to convey and re-direct the overflow from the Railway Dam Detention Basin (for details on this refer to *Roma Flood Mitigation Study, Hydrology and Hydraulics for Stage 2, Major Local Mitigation Options (GHD, 2013)*). These pipes will be running full when the detention basin reaches its peak discharge. Therefore, it is proposed to run a separate parallel network to cater for the local drainage as well as flows from the railway side channels (Case 7). The proposed open channel on the south side of Station Street is intended to cater for the flow from the channels running south of the railway as well as local catchment flows whilst the one on the north side is a formalisation of the existing channel. The figures below illustrate the proposed works and the proposed cross section for Station Street. It is important to note that due to a high depth-velocity product a few measures will need to take place to maintain appropriate safety requirements to road users. This can be determined and detailed in the detailed design phase.



Figure 8-8 Proposed drainage system at Station Street

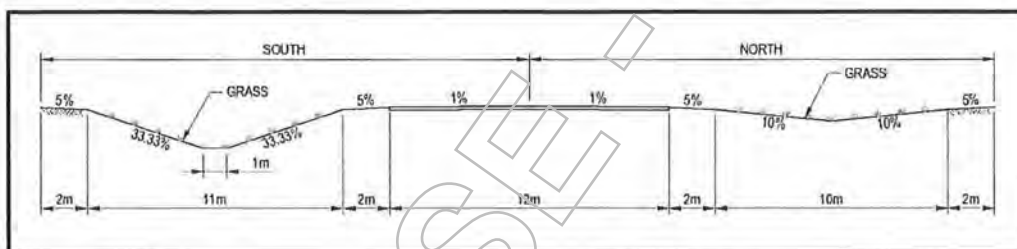


Figure 8-9 Proposed cross section for Station Street

According to the concept design carried out the stormwater line running down Station Street comprises of a range of diameter pipes going from 450mm to 900mm. Preliminary calculations were carried out to size the proposed culverts running under any crossing required for access to existing properties as well as under Tiffin Street. As the channel on the north side of Station Street is quite small, it is expected that vehicles will be able to cross it without the need for culverts. The cross drainage required for the flow on the north side of Station Street (under Tiffin Street) will be 1 / 2400 x 1200 RCBC. Currently there are seven driveways which provide access to existing properties on the south side of Station Street and therefore seven sets of culverts which are 4 / 2400 x 1200 RCBC would be required to provide Q100 immunity as well as an additional one to cross Tiffin Street.

Effect from the Regional and Local Major: As previously mentioned, tail water levels at the point of discharge into the local creek are high and therefore it is expected flows to back it up through the pipes and surcharge at some points of the system. Tailwater conditions used for this local drainage assessment have assumed that the preferred mitigation options discussed in the Regional report have been implemented. If the preferred option is not constructed, then the tail water assumptions used here are invalid. The Regional mitigation preferred option dropped the tailwater level at this location from approximately 298.170 to 297.770.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$2,480,000. A large part of this cost is related to crossing to properties on the south side of Station Street. Benefit could be achieved by reducing the immunity of a crossing in addition to revising the number of crossings.

8.2.6 Case 6: Miscamble Street Culvert Upgrade

This case has been evaluated as part of the local major modelling discussed in Section 3.

8.2.7 Case 7: Railway Drainage Remediation Works

Issue: This area has been identified as a known flood prone area. The existing stormwater system consist of a combination of existing open channels along each side (north and south) of the railway line and culverts under the streets which cross the railway line.

Verification: Analysis of the catchment and existing channels suggest that the existing system which comprises of channels and culverts do not have sufficient capacity to convey major discharge (Q100).

Solution proposed: The existing channels and culverts located north of the railway line require maintenance. Concept design has been carried out and it is proposed to upgrade the existing open channels on the south side of the railway and the culverts to convey Q100 flows from upstream catchment. This flow will then be re-directed to Station Street via Wyndham Street. The minor and major flow will be conveyed via the proposed open channels in Station Street.



Figure 8-10 Proposed drainage system at the sides of the railway (refer below for sizing of channels and culverts)

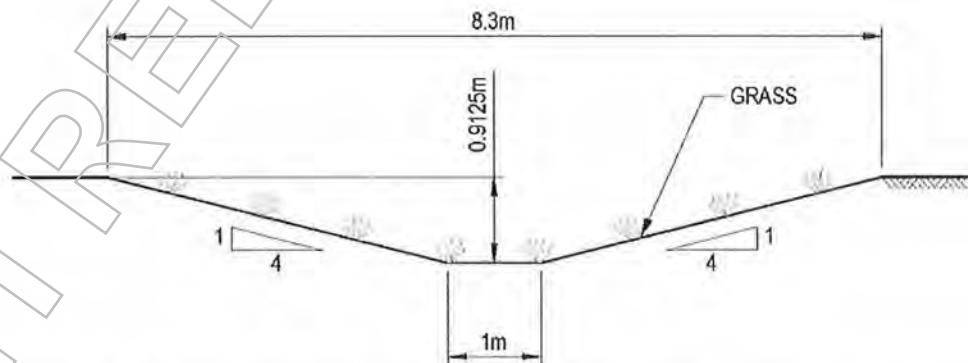


Figure 8-11 Proposed typical cross sections for the proposed open channels at location A (in Figure 8-10)

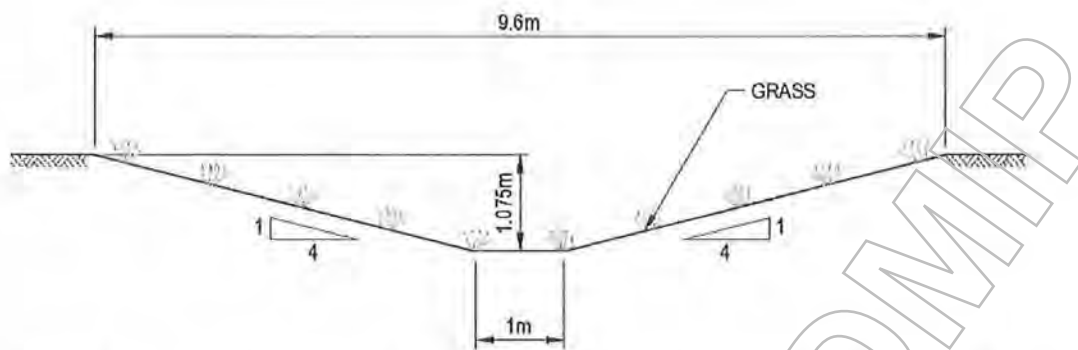


Figure 8-12 Proposed typical cross sections for the proposed open channels at locations B, C, D and E (in Figure 8-10)

Table 8-2 Culvert sizes for Case 7 (refer Figure 8-10)

CULVERT ID	EXISTING CULVERTS TO BE MAINTAINED	ADDITIONAL CULVERTS TO BE INSTALLED
1	None	4 / 2100 x 900 RCBC
2	1 / 1050 x 450 RCBC	3 / 1500 x 900 RCBC
3	2 / 1200 x 600 RCBC	2 / 1500 x 900 RCBC
4	2 / 1200 x 600 RCBC	2 / 1500 x 900 RCBC
5	1 / 1200 x 300 RCBC	3 / 1800 x 900 RCBC

Effect from the Regional and Local Major: This is a local issue only and will not be affected by the Regional and Local Major issues.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$1,490,000.

8.2.8 Case 8: Lovell Street Drainage Works

This case has been evaluated as part of the local major modelling as discussed in Section 3.

8.2.9 Case 9: Saunders Street Trunk Stormwater Upgrade

Issue: Badgery Street and Saunders Street are located at the lower end of a catchment which contributes both overland and piped drainage. The existing stormwater pipe network starts in Cottell Street and runs through the catchment and down Badgery Street. The overland flow path for the catchment generally follows the pipe network until the intersection of Queen Street, Timbury Street, Saunders Street and Duke Street, where it diverges from the pipe network and flows down Saunders Street.

It appears as though the piped network is capable of providing a 2 year ARI level of service, and there are concerns regarding the flooding of properties along Saunders Street.

It is known that the development of a site at McDowall Street is being proposed. If nothing is done prior to the site development, nuisance flooding will be worsened in the area.



Figure 8-13 Photo taken at Saunders Street facing north-east

Verification: Modelling of the existing stormwater network confirms the following are relevant:

- The piped network along Badgery Street surcharges in events greater than Q2
- The road capacity in Saunders Street is insufficient to cater for a Q100 event

Solution proposed: It is proposed to install a new pipe running along Saunders Street to increase the capacity of the piped drainage network. Concept design has been carried out indicating a 1350mm diameter pipe as an additional outlet from the existing pipe on Queen Street and running along Saunders Street and this indicates:

- The pipe network along Badgery Street no longer surcharges until events greater than Q5
- Saunders Street has sufficient capacity (via pit and pipe) to convey flows up to Q100

This is based on the assumption that the verge on Saunders Street falls at 2.5% towards the street, and also that there is sufficient pipe capacity west of Queen Street for Q5 to be captured and conveyed within pipes. These assumptions should be verified in future design iterations, and the scope of works altered to suit.



Figure 8-14 Proposed drainage system at Saunders Street

Effect from the Regional and Local Major: As the proposed network will discharge onto the Long Drain, the tail water conditions at the point of discharge within the drain were taken into consideration when modelling the system network. Tail water level used was the peak level for an event similar to the 2012 flood event. Tailwater conditions used for this local drainage assessment have assumed that the preferred mitigation options discussed in the Regional report have been implemented. If the preferred option is not constructed, then the tail water assumptions used here are invalid. The Regional mitigation preferred option dropped the tailwater level at this location by approximately 200mm.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$620,000.

8.2.10 Case 10: Quintin Street Drainage Works

Issue: Runoff from the highway is concentrated towards the property located on the corner of Quintin and Derry Streets. It appears there is insufficient capacity within the road reserve to cater for this discharge.



Figure 8-15 Photo taken at Quintin Street facing north

Verification: Modelling of the existing system shows that road profile in Quintin Street doesn't have enough capacity to convey overland flow.

Solution proposed: It is proposed to re-shape the verge on the eastern side of Quintin Street creating a bund, increasing road capacity for overland flow and to install a gully pit with pipe to drain the water to the existing network on the western side of the street. The figure below shows a schematic of the proposed works for this area and the following one shows the concept design for the verge works required in this area.



Figure 8-16 Proposed drainage system at Quintin Street

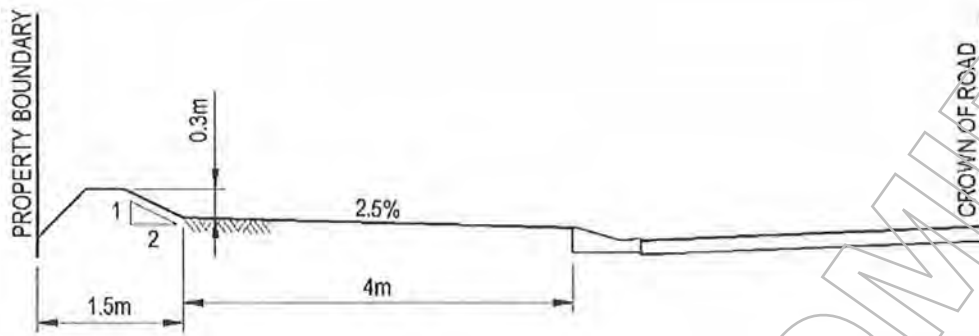


Figure 8-17 Proposed verge profile at Quintin Street

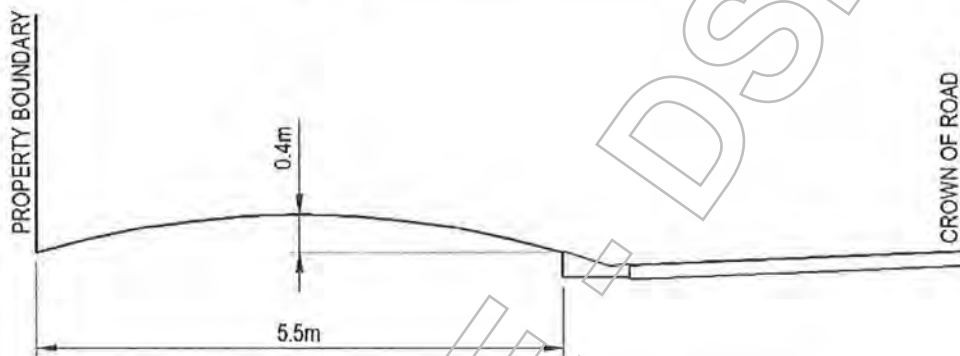


Figure 8-18 Proposed verge profile at Quintin Street (driveway area)

Effect from the Regional and Local Major: This is a local issue only and will not be affected by the Regional and Local Major issues.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$28,000.

8.2.11 Case 11: Charles Street Drain Remediation

Issue: Properties along Robertson Street and Derry Street experience nuisance flooding from the overland flow path located to the rear.

Verification: It was verified during a site inspection that the existing channels need to be formalized to adequately convey the flow and prevent nuisance to the currently affected properties.

Solution proposed: Formalisation of the existing channels is proposed to convey the overland flow within the channel. It is also proposed an earth bund at the back of the properties fronting Robertson Street. Preliminary calculations have been carried out and the channel is expected to be as per Figure 8-19. The channels running along Arthur, Ivy and Charles Streets need maintenance. The figure below shows a concept of what is being proposed.



Figure 8-19 Proposed drainage system at Charles Street and surroundings

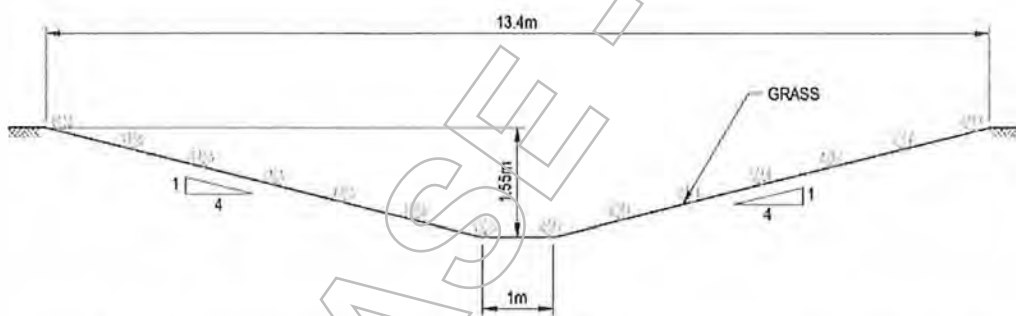


Figure 8-20 Proposed open channel at the back of the properties fronting Robertson Street

Effect from the Regional and Local Major: This is a local issue only and will not be affected by the Regional and Local Major issues.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$125,000.

8.2.12 Case 12: CBD Pipe Drainage Upgrades

Issue: Roma CBD frequently floods even in the minor storm events. Ponding occurs at each intersection due to trap sags, insufficient inlet pits along each block and insufficient road capacity for the major storms.

Verification: During a site visit to Roma CBD it was verified that there are a number of issues related to the minor and major drainage of the CBD, these are:

- The garden beds which are in place at every corner of the CBD create trapped sags causing localized nuisance in minor events, and potentially significant flooding in major events, with flows in excess of the inlet capacity bypassing via the verge/footpath and into properties on both sides of the road. The trapped sag pits have very little capacity.
- The overland flow capacity of the road reserve is reduced by the relatively steep cross-fall of the parking bays, which appear to be greater than 4%.

- The crown of McDowall Street is higher than the properties on the southern side of the CBD. In combination with the steep cross fall, and restricted overland flow path, there is a significant issue for properties.

PC Drain was used to model the existing network/scenario and it has been verified that the existing system is inadequate as it has insufficient capacity.



Figure 8-21 Photo taken at the intersection of McDowall and Wyndham Streets facing east



Figure 8-22 Photo taken at the intersection of McDowall and Hawthorne Streets facing west

Solution proposed: There are several measures which are proposed to improve the drainage within the CBD:

- Removal/modification of the garden beds located at each intersection to aid in increasing the capacity/capture of the pits in this area and the overland flow capacity for flows in excess of the pit capacity
- Replacement of the inlet structures along McDowell Street to on-grade gullies to increase capture in all events
- Replacement of the sag structures on the side roads to the south, to completely capture major discharge
- Significant additional pipes are required to convey the additional capture – up to 2 x 1500mm diameter pipes for the length of McDowell Street

It is anticipated that these improvements will provide a complete reduction in nuisance flooding in a minor (Q5) event and immunity to properties for a Q100 local event (with no freeboard). Conservative assumptions have been made due to the expected accuracy of the survey data available, and it is possible that with more accurate survey the outcomes of a revised analysis will differ.



Figure 8-23 Existing drainage network at McDowell Street and adjacent streets to be upgraded

Effect from the Regional and Local Major: The tail water level for the pipe network has a significant effect on maintaining the immunity for the CBD in a major event. Tailwater level used was the peak level for an event similar to the 2012 flood event. Tailwater conditions used for this local drainage assessment have assumed that the preferred mitigation options discussed in the Regional report have been implemented. If the preferred option is not constructed, then the tail water assumptions used here are invalid. The Regional mitigation preferred option dropped the tail water level at this location by approximately 200mm.

High level Estimated Cost: The cost for this proposed solution is expected to be in the order of \$3,520,000.

8.2.13 Case 13: Carnarvon Highway Culvert Upgrade at Howard Street

This case is currently being reviewed by DTMR. It is currently proposed to upgrade the existing culverts.

8.2.14 Case 14: Lovell Street Culvert Upgrade

This case has been evaluated as part of the local major modelling as discussed in Section 3.

8.2.15 Case 15: Edwardes Street Open Drain

Issue: Existing open drains served as overland flow path in close to Basset Lane. These drains were a secondary channel of Bungil Creek. During the last 3 large floods silt has been deposited in these drains.

Solution: Flood modelling indicates that the construction of the Stage 1 levee will significantly improve the situation in this area. Minor earthworks are recommended to reinstate these drains.

8.2.16 Case 16: Bassett Lane Detention Basin

This case has been evaluated as part of the local major modelling as discussed in Section 3.

8.2.17 Case 17: Future Urban Area Regional Detention Basin

This case has been evaluated as part of the local major modelling as discussed in Section 3

8.2.18 Case 18: Borland Street Pipe Network

Issue: A few property owners in Borland Street have indicated nuisance flooding at minor storm events. It appears as though there is no or very little longitudinal fall and only a couple of inlet pits along Borland Street.



Figure 8-24 Photo taken at Borland Street

Verification: Existing contours have been verified and a site visit was carried out. There is no As Constructed information on the existing pipe network, but it has been verified on site the existence of a couple of pits.

Solution proposed: Based on the information available, it is proposed to increase the amount of inlet pits and grade it out to a legal point of discharge increasing the standard of service of the road, but further information of the existing scenario is required to determine the extent/dimension of the work.

9. Conclusion and Recommendations

The Major Local phase of this Stage 2 investigation found that local mitigation works were able to provide additional flood mitigation benefits above those achieved by the recommended Stage 2 Regional works. The benefit of these Major Local works has been carried into the assessment of the 'Minor Local' scale drainage issues, as described in Section 8.

Of the individual and combination options investigated, channel modification works and the upgrade of a number of existing crossings within Roma resulted in significant decreases in flood extent and levels along the Long Drain system. These works were modelled as Local Combination 1. Local Combination 3 was found to provide these same benefits plus reduce the extent of flooding through the town centre during a 100 year ARI storm event. This combination incorporates the Long Drain works of Local Combination 1 with an increase in capacity of the railway dam, and augmentation of the stormwater drainage system to capture overflow from the dam and convey it underground via Station Street.

Other options were investigated, including retarding basins and local swales and drainage pipes at Gregory Street, however these had minimal impact during a 100 year ARI event, mainly due to the large volumes of flow experienced during this large storm event. These works may provide more significant flood mitigation during smaller flood events, but were not investigated further.

The following specific benefits were observed for the preferred Local Combinations.

- The Long Drain works (Local Combination 1 & 3) result in a significant decrease in flood extent and flood levels between Bassett Lane and Charles Street, generally between 400 mm and 1 m
- The 100 year ARI flows are generally contained within the proposed channel (Local Combination 1 & 3). Some flooding still occurs alongside the channel, although this is largely the result of overland flows entering the channel, rather than levels within the channel overtopping the channel banks
- The increased conveyance along the Long Drain system results in a slight increase in peak flood level within Shady's Lagoon, however this is in the order of 20 – 30 mm, and does not impact any adjacent properties (Local Combination 1 & 3)
- With Local Combination 1 implemented there are five properties that no longer experience above-floor flooding in a 100 year ARI flood event
- The proposed extension to the railway dam and additional pipes along Station Street result in a significant reduction in flood levels (up to 100 mm) and flood extent through the town centre. There is a slight increase in flood levels along Station Street, however this is generally between 15 and 30 mm, and generally contained within the road reserve (Local Combination 3)
- Overall, there is a significant benefit during the 100 year ARI event as a result of these works, and the impact during smaller flood events is expected to be more noticeable, when a larger proportion of the overland flow can be captured and conveyed underground via the Station Street pipes (Local Combination 3)
- With Local Combination 3 implemented there are nineteen properties that no longer experience above-floor flooding

This Stage 2 assessment is for works undertaken in addition to the Stage 1 Levee. Any benefit of these works is dependent on the construction of the Stage 1 Levee.

The options assessed were high level conceptual designs for the purposes of a comparative assessment of flood mitigation benefits. Further modelling is required at detailed design phase to confirm the performance of the preferred mitigation option(s) under a range of storm durations and downstream boundary conditions, with greater detail of the proposed earthworks and bridge details included. This is particularly relevant to the Station Street pipes, which were found to have insufficient capacity to capture all of the overland flow from the railway dam in the 100 year ARI flood event. Further refinement of the proposed earthworks and pipe network may also result in improved performance of the mitigation option(s), and this should be included in the investigation during detailed design phase.

Based on the benefits listed above, Combination 3 is the recommended option. While it does reduce the potential for above-floor flooding in a 100 year ARI local event, the benefit-cost ratio for the Major Local Combination works is low. For this reason, it is recommended that construction of the preferred components be undertaken using a staged approach to provide incremental benefit as funding and infrastructure renewal opportunities arise. Further economic analysis of these works, incorporating 'soft costs' associated with the flood damage experienced, should be undertaken in future stages of consideration.

It should be noted that successful construction of the Station Street pipes depends on prior completion of the Western Diversion Drain as recommended for regional implementation (see Stage 2 Regional Mitigation Report [GHD, 2013b]). Staging of implementation of the Combination 3 components is therefore recommended as per the schedule in Table 9-1.

Table 9-1 Staging of Local Major Combination 3

Stage	Description	Approximate Capital Cost Estimate (million dollars)
1	Long Drain Widening Earthworks Order: (a) Bassett Lane to Charles St (b) west branches	\$1.6
2	Railway Dam Extension Construction of the regional option Western Diversion Drain	\$1.3
3	Station Street Pipes	\$8.2
4	Long Drain Crossing Bridge Replacements (as existing infrastructure reaches end of life)	\$10.1

It should be noted that modelling has not been undertaken to assess the predicted flood impact at each step of the recommended infrastructure staging. This modelling should be undertaken during detailed design once scheduling is confirmed on a regional and local level.

In addition to the recommended option to reduce risk from Major Local flooding, options to address Minor Local flooding are discussed and recommendations for drainage improvements are given in Section 8 as listed in Section 7.1.3. These works are recommended to improve drainage along Miscamble Street, Powell Street, Station Street, Quintin Street, Saunders Street, Borland Street, within the CBD, along the railway line and near the Golf Links Estate across ten work packages totalling a high level estimated cost of \$9.1 million.

10. Glossary

A number of flood related terms are used in this report. Definitions for some of the more frequently used terms are provided below. In addition, to assist in the understanding of the terminology used in this document, an 'introduction to flood risk' is provided in Appendix H of the Stage 2 Regional Mitigation Report (GHD, 2013b).

Average Recurrence Interval (ARI): The long-term average number of years between the occurrences of a flood as big as or larger than, the selected event. For example, floods with a discharge as great as, or greater than, the 20 year ARI flood event will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event.

Annual Exceedance Probability (AEP): The chance of a given or larger size occurring in any one year, usually expressed as a percentage. For example, if a peak flood discharge of 500 m³/s has an AEP of 5%, it means that there is a 5% chance (that is 1 in 20 chance) of a peak flood discharge of 500 m³/s or larger occurring in any one year.

Average Annual Damage (AAD): Depending on its size (or severity), each flood will cause a different amount of flood damage to a flood prone area. AAD is the average damage per year that would occur in a nominated development situation from flooding over a very long period of time.

Calibration: is the comparison between numerical model results and recorded values.

Design Flood: A design flood is a hypothetical flood that has been determined for the purpose of floodplain management and planning, e.g. a flood study. Design floods are typically assigned to a probability of occurrence that is specified as an Average Recurrence Interval (ARI) or as an Annual Exceedance Probability (AEP). A summary of the chance of flooding in a lifetime for a range of ARIs is provided in Table 9-1.

Table 9-1 Chance of experiencing flooding in a lifetime

Size of Flood (Annual Recurrence Interval)	Chance of occurrence in any year (AEP)	Probability of experiencing the given flood in a lifetime (70 years)	
		At least Once	At least twice
10 year ARI	10%	99.9%	99.3%
20 year ARI	5%	97.0%	86.4%
50 year ARI	2%	75.3%	40.8%
100 year ARI	1%	50.3%	15.6%
200 year ARI	0.5%	29.5%	4.9%

Direct Tangible Flood Damages: The loss of assets with an easily quantifiable value such as buildings, contents, vehicles, stock and crops.

Flood Frequency Analysis (FAA): Provides an estimate of the magnitude of a flood of a selected probability, from a statistical analysis of recorded flood data.

Hydraulics: Term given to the study of water flow in waterways; in particular the evaluation of flow parameters such as water level and velocity.

Hydrograph: A graph which shows how the discharge or level of a flood at any particular location varies with time during a flood.

Hydrology: Term given to the study of the rainfall and runoff process; in particular the evaluation of peak flows, flow volumes and the derivation of hydrographs for a range of floods

Major Local Drainage: This considers measures within the major drainage paths of Roma (such as the Long Drain system, Shady's Lagoon, major storages including the Railway Dam) to reduce flooding occurring due to a combination of local runoff and regional tailwater effects.

Minor Local Drainage: This considers local stormwater drainage issues that occur on a regular basis due to local runoff and surcharge of stormwater infrastructure, including road cross-drainage.

Regional Drainage: This refers to flooding caused by runoff that originates in the broader Bungil Creek catchment, filling the creek and spilling into the adjacent floodplain.

11. References

Australian National University, 1992. *ANUFLOOD: A Field Guide*, prepared by D.I Smith and M.A. Greenaway at the Centre for Resource and Environmental Studies, Canberra.

Engeny, 2012. *Drainage Master Plan for Roma, December 2012*.

GHD, 2013a. *Maranoa Regional Council, Roma Flood Mitigation Study, Stage 1, Hydrology and Hydraulic Assessment Report, April 2013*.

GHD, 2013b. *Roma Flood Mitigation Study – Hydrology and Hydraulics for Stage 2 Regional Mitigation Options, July 2013*.

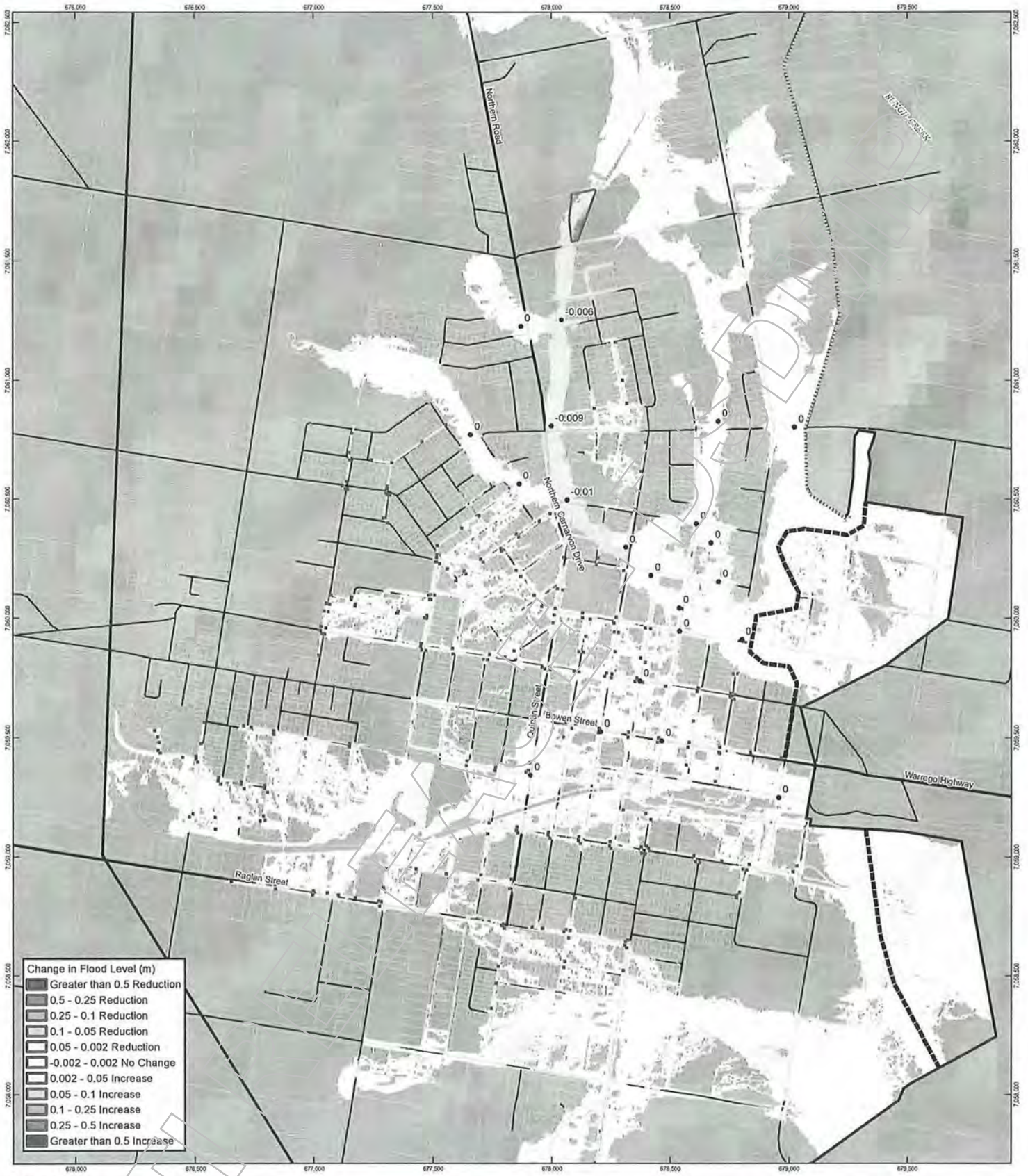
Australian Bureau of Statistics, *Inflation Calculation Tool*, available at: <http://www.abs.gov.au/websitedbs/d3310114.nsf/home/consumer+price+index+inflation+calculator> (ABS, October 2013).

RTI RELEASE - DSDMIP

Appendices

Appendix A – Major Local Hydraulic Model Afflux Results

RTI RELEASE - DSDMIP



Change in Flood Level (m)

[Dark Grey]	Greater than 0.5 Reduction
[Medium-Dark Grey]	0.5 - 0.25 Reduction
[Medium Grey]	0.25 - 0.1 Reduction
[Light Grey]	0.1 - 0.05 Reduction
[Very Light Grey]	0.05 - 0.002 Reduction
[White]	-0.002 - 0.002 No Change
[Very Light Grey]	0.002 - 0.05 Increase
[Light Grey]	0.05 - 0.1 Increase
[Medium Grey]	0.1 - 0.25 Increase
[Medium-Dark Grey]	0.25 - 0.5 Increase
[Dark Grey]	Greater than 0.5 Increase

LEGEND

● Sample Point	■ Modified Local Drainage Pit	▬ Modified Bridge
— Highway	— March 2013 Reference Design Stage 1 Levee Alignment	▬ Major Local Hydraulic Model Extent
— Road	— Modelled Culvert or Drainage Pipe	
— Watercourse	— Bassett Lane Retarding Basin	
▬ Limit of Mapping		
▭ Cadastral		

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Map Projection: Universal Transverse Mercator
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Grid: GDA 1994 MGA Zone 55

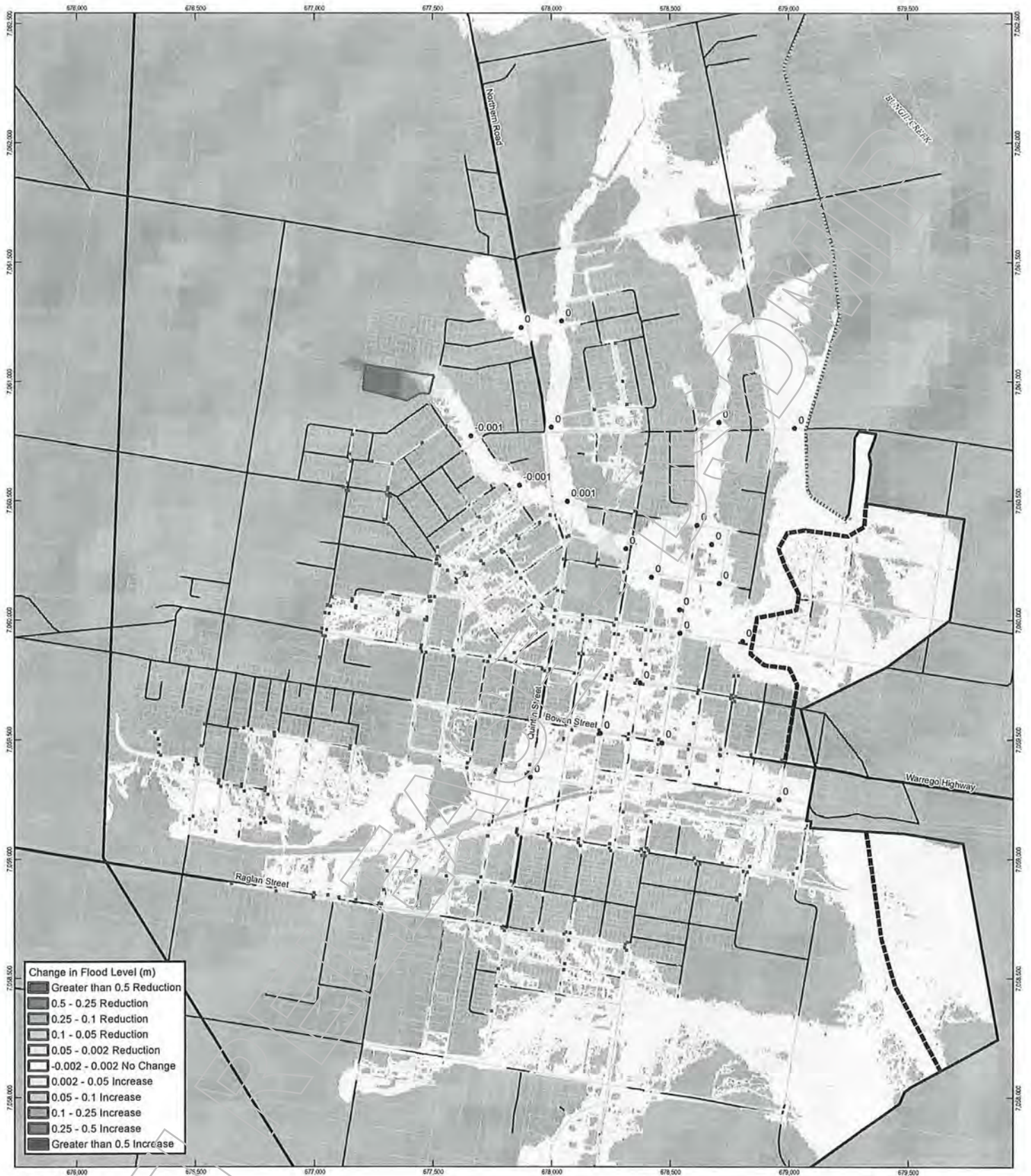


Maranoa Regional Council
Roma Flood Study

Job Number 41-25323
Revision 0
Date 11 Oct 2013

Bassett Lane Retarding Basin
100 Year ARI Flood Event Peak Afflux

Figure A1



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[White Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Light Grey Box]	0.002 - 0.05 Increase
[Medium-Light Grey Box]	0.05 - 0.1 Increase
[Medium-Dark Grey Box]	0.1 - 0.25 Increase
[Dark Grey Box]	0.25 - 0.5 Increase
[Darkest Grey Box]	Greater than 0.5 Increase

LEGEND			
●	Sample Point	■	Modelled Local Drainage Pit
—	Highway	—	March 2013 Reference Design (Stage 1 Level Alignment)
—	Road	—	Modelled Culvert or Drainage Pipe
—	Watercourse	—	Powell Street Retarding Basin
—	Limit of Mapping	—	Modelled Bridge
—	Cadastre	—	Major Local Hydraulic Model Extent

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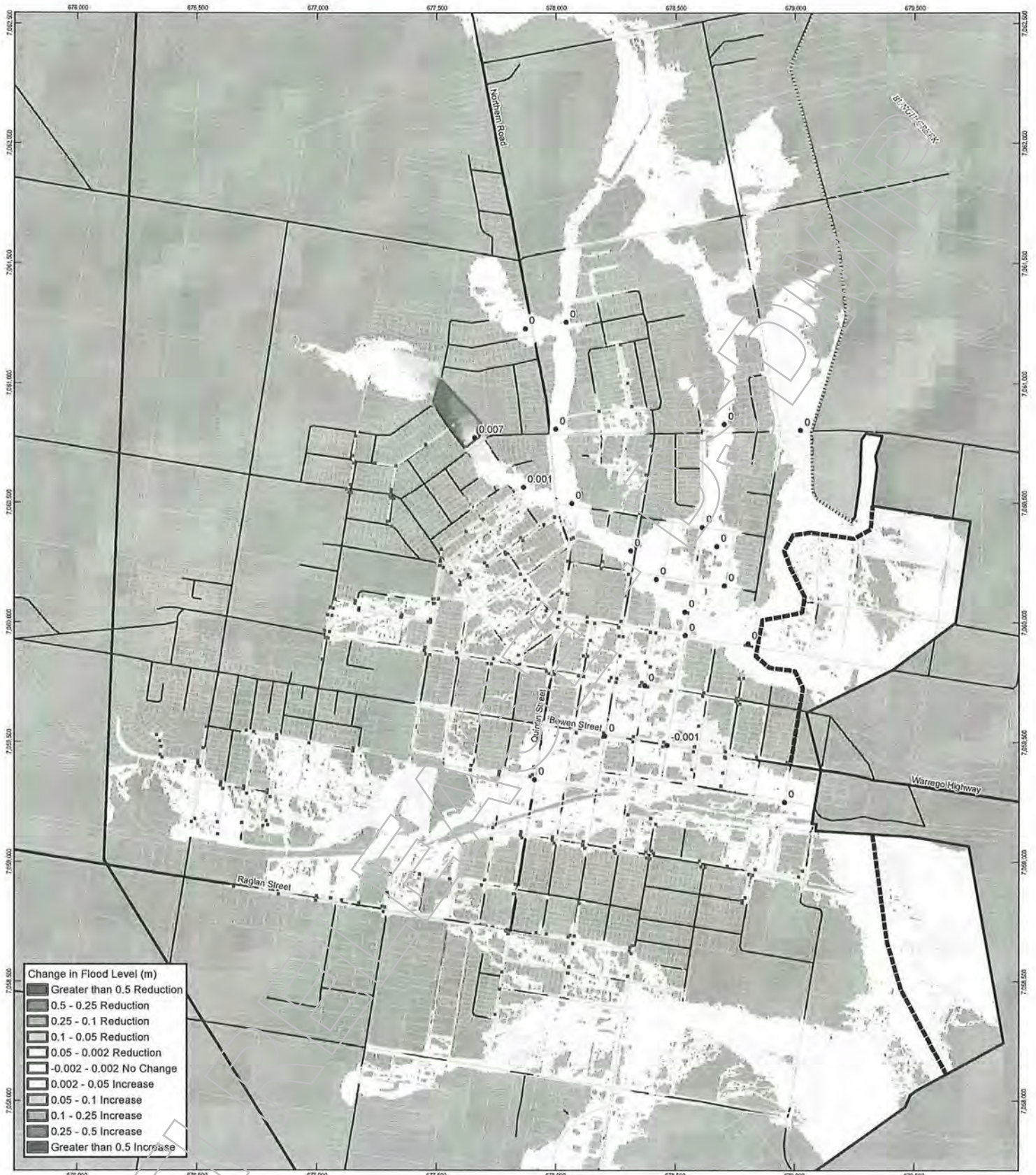
Maranoa Regional Council
 Roma Flood Study

Job Number	41-25323
Revision	0
Date	11 Oct 2013

Powell Street Retarding Basin
 100 Year ARI Flood Event Peak Afflux

Figure A2

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 Level 9, 145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com
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 Data Source: © Commonwealth of Australia (Geoscience Australia); Watercourses/2007; DNRM Locality Roads/2010; Cadastre; River/2012; GHD Flood Surface; Sample Points; Level/2013; USGS Relief/2009; Created By: LS



Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

LEGEND

● Sample Point	■ Modified Local Drainage Pit	▭ Modelled Bridge
— Highway	— March 2013 Reference Design Stage 1 Levee Alignment	▭ Major Local Hydraulic Model Extent
— Road	— Modelled Culvert or Drainage Pipe	
— Watercourse	▭ Kirkbride Street Retarding Basin	
▭ Limit of Mapping		
▭ Cadastral		

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Map Projection: Universal Transverse Mercator
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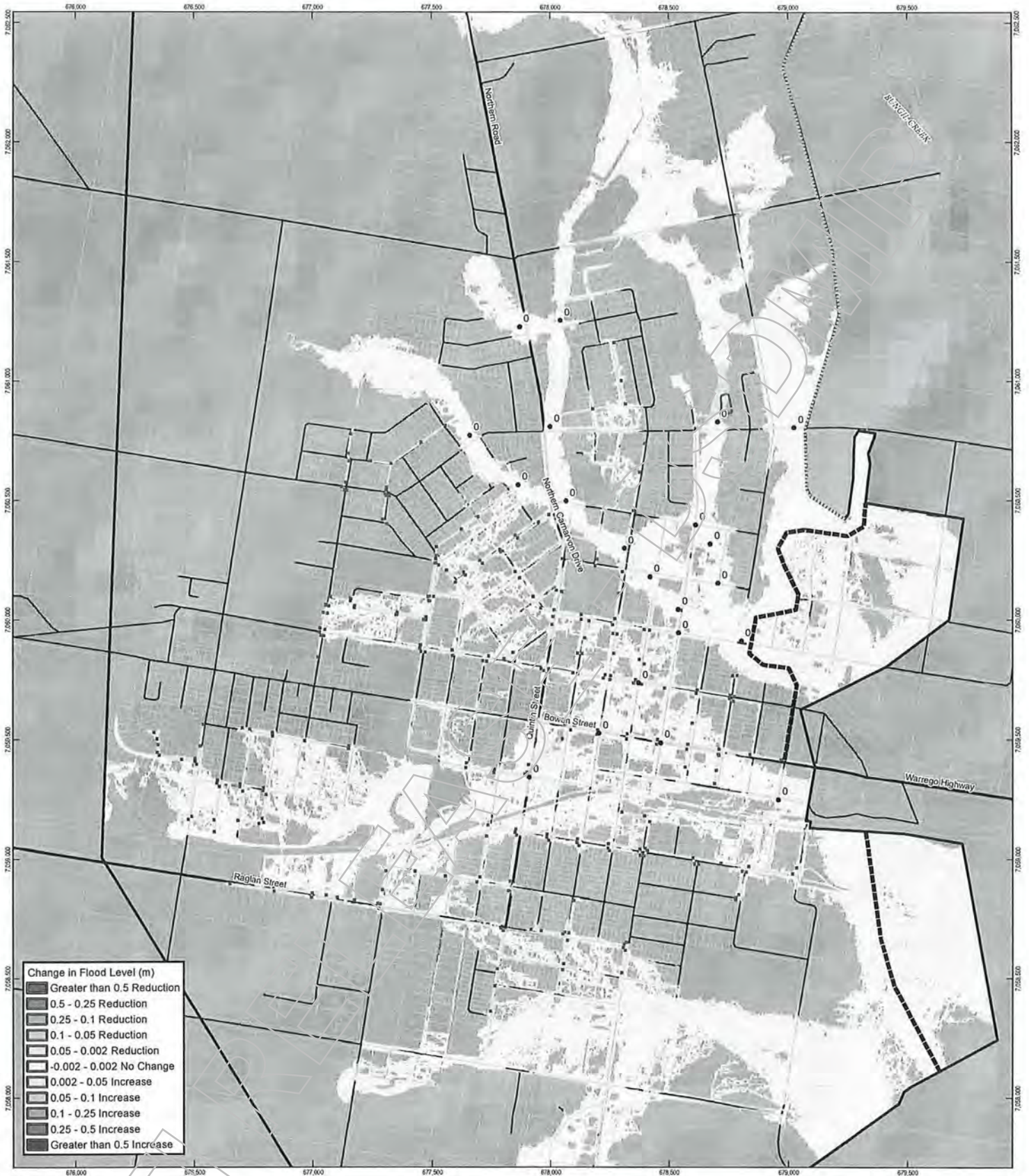


Maranoa Regional Council
Roma Flood Study

Job Number 41-25323
Revision 0
Date 11 Oct 2013

Kirkbride Street Retarding Basin
100 Year ARI Flood Event Peak Afflux

Figure A3



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[Very Light Grey Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Very Light Grey Box]	0.002 - 0.05 Increase
[Light Grey Box]	0.05 - 0.1 Increase
[Medium-Light Grey Box]	0.1 - 0.25 Increase
[Medium-Dark Grey Box]	0.25 - 0.5 Increase
[Dark Grey Box]	Greater than 0.5 Increase

LEGEND		
●	Sample Point	■
—	Highway	■
—	Road	■
—	Watercourse	■
—	Limit of Mapping	■
□	Cadastre	■
●	Modified Local Drainage Pit	■
—	March 2013 Reference Design Stage 1 Level Alignment	■
—	Modelled Culvert or Drainage Pipe	■
—	Madison Terrace Retarding Basin	■
—	Modelled Bridge	■
—	Major Local Hydraulic Model Extent	■

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 Metres
 Map Projection: Universal Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55



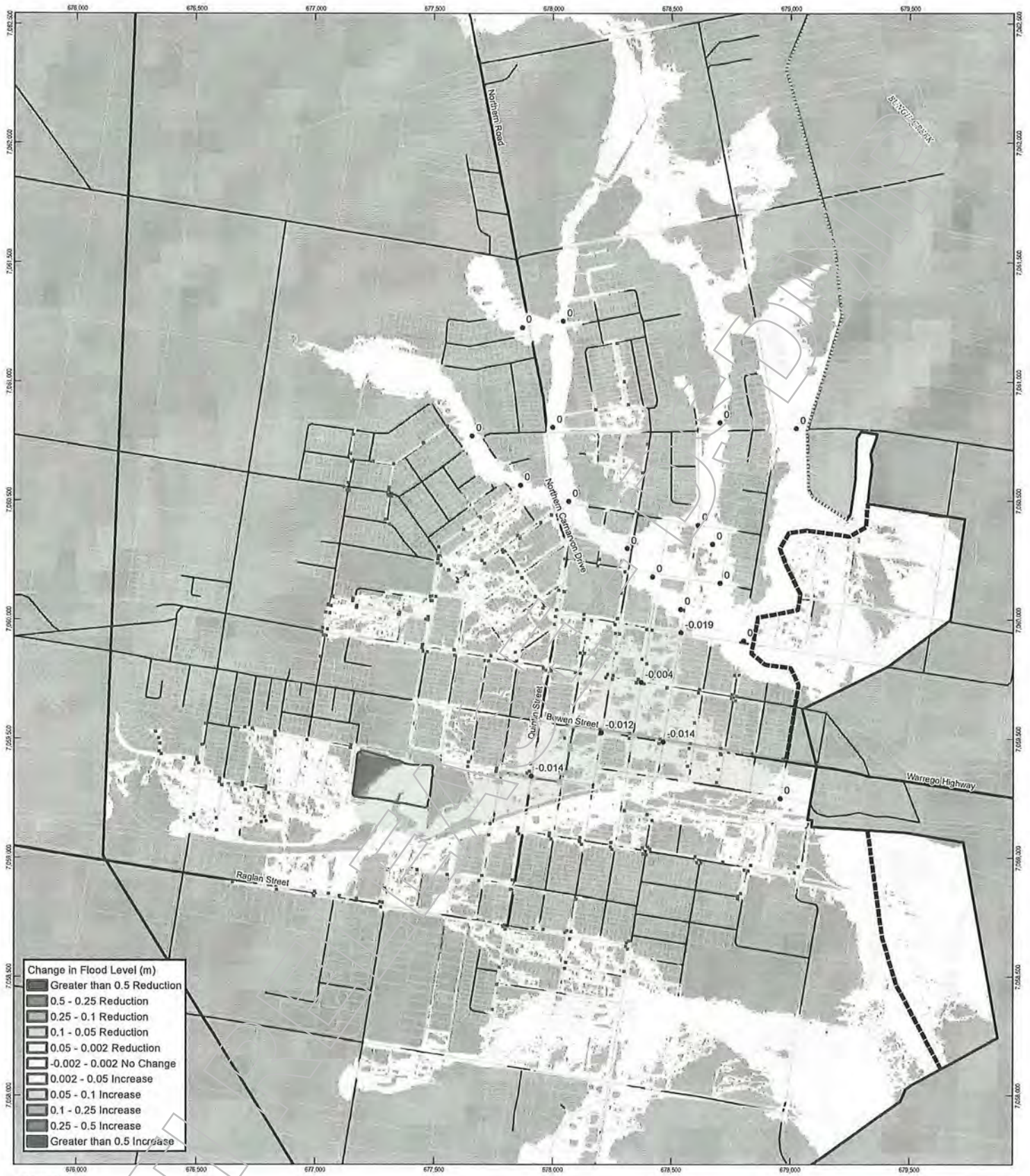
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 Roma Flood Study

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Madison Terrace Retarding Basin
 100 Year ARI Flood Event Peak Afflux

Figure A4

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Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

LEGEND

● Sample Point	■ Modified Local Drainage Pit	▬ Modelled Bridge
— Highway	■ New pit	▬ Major Local Hydraulic Model Extent
— Road	— March 2013 Reference District Stage 1 Levee Alignment	
— Watercourse	▬ Modelled Culvert or Drainage Pipe	
▬ Limit of Mapping	▬ New Pipe (114v: 0001a)	
▬ Cadastre	▬ Duplicate Existing Pipe (600dia to 1050dia)	
	▬ Gull Dam Extension	

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Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



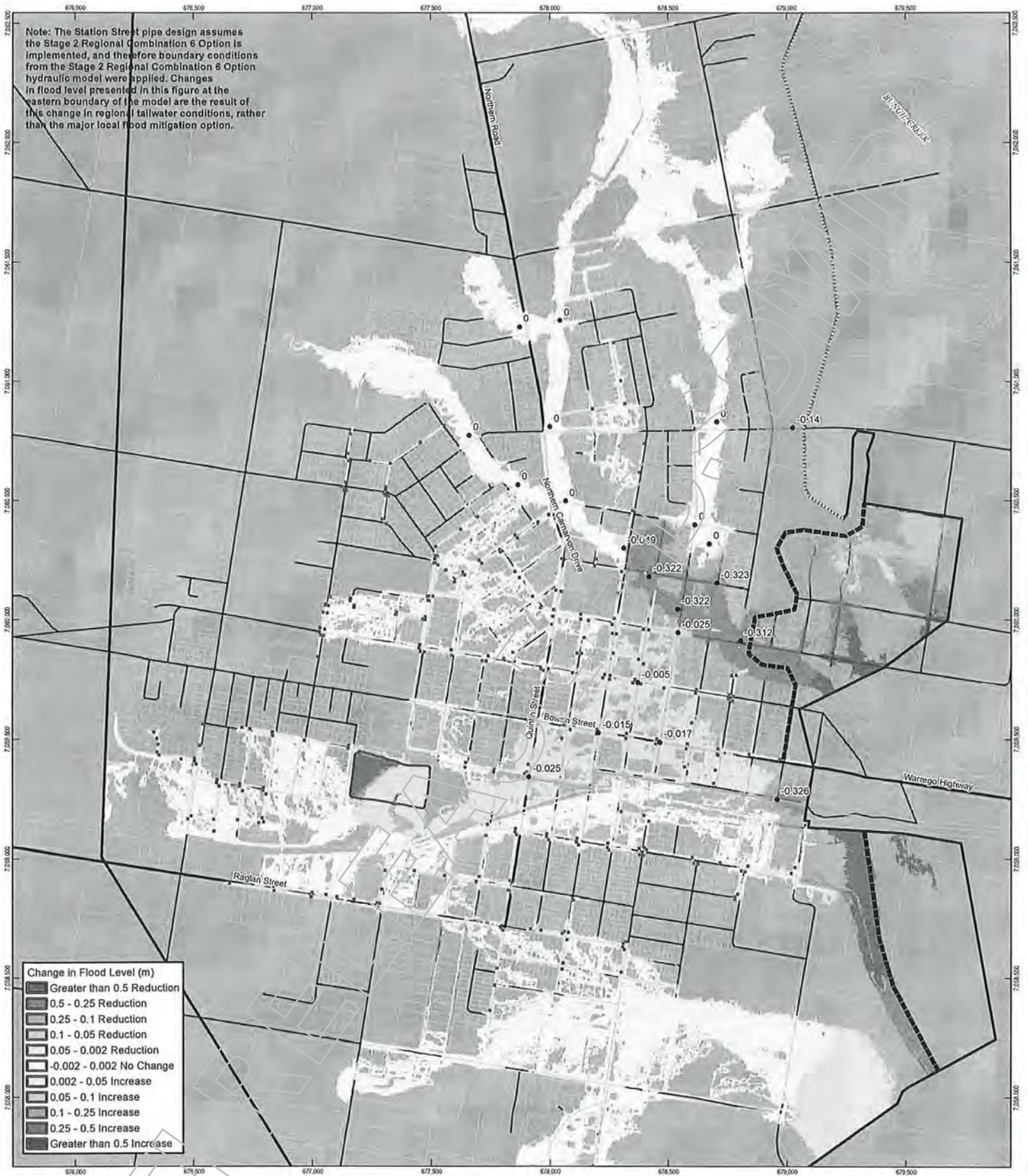
Maranoa Regional Council
Roma Flood Study

Job Number 41-25323
Revision 0
Date 11 Oct 2013

Rail Dam Extension
100 Year ARI Flood Event Peak Afflux

Figure A5

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Note: The Station Street pipe design assumes the Stage 2 Regional Combination 6 Option is implemented, and therefore boundary conditions from the Stage 2 Regional Combination 6 Option hydraulic model were applied. Changes in flood level presented in this figure at the eastern boundary of the model are the result of this change in regional tallwater conditions, rather than the major local flood mitigation option.

Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[Very Light Grey Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Very Light Grey Box]	0.002 - 0.05 Increase
[Light Grey Box]	0.05 - 0.1 Increase
[Medium-Light Grey Box]	0.1 - 0.25 Increase
[Medium-Dark Grey Box]	0.25 - 0.5 Increase
[Dark Grey Box]	Greater than 0.5 Increase

LEGEND		
●	Sample Point	■
—	Highway	—
—	Road	—
—	Watercourse	—
—	Limit of Mapping	—
—	Cadastral	—
●	Modified Local Drainage Pit	—
—	Flow pit	—
—	March 2013 Reference Design Stage 1 Levee Alignment	—
—	Modified Culvert or Drainage Pipe	—
—	New pipe (2 No. 1200ds)	—
—	Rail Dam Extension	—
—	Modified Bridge	—
—	Major Local Hydraulic Model Extent	—

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 Map Projection: Universal Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 55

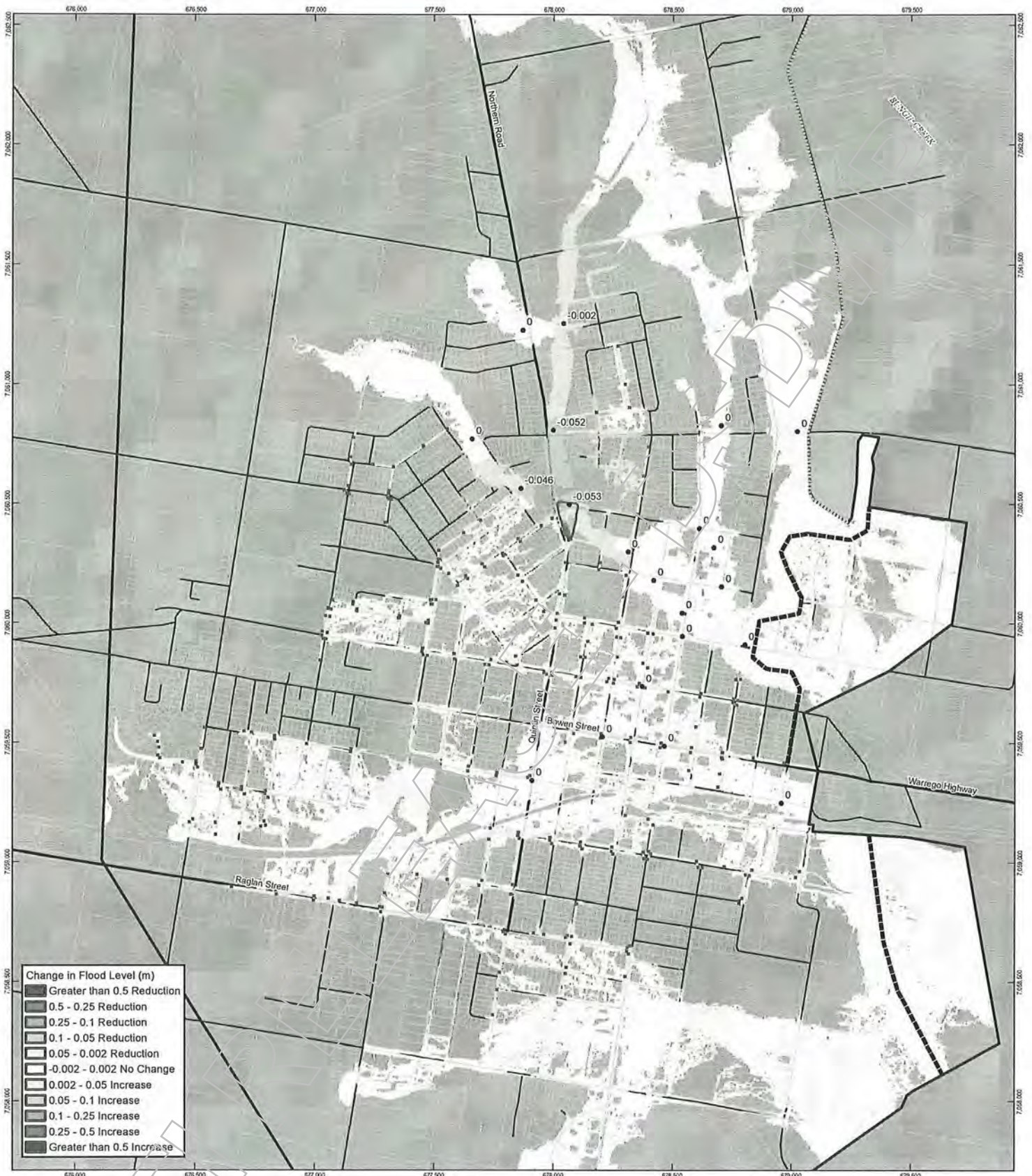


Maranoa Regional Council
 Roma Flood Study

Rail Dam Extension with Station St Pipe
 100 Year ARI Flood Event Peak Afflux

Job Number | 41-25323
 Revision | 0
 Date | 11 Oct 2013

Figure A6



Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

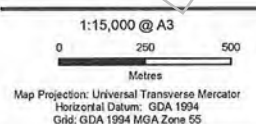
LEGEND

● Sample Point	■ Modified Local Drainage Pit	▬ Modelled Bridge
— Highway	— Murch 2013 Reference Design Stage 1 Levee Alignment	▬ New Bridge
— Road	— Modelled Culvert or Drainage Pipe	▬ Major Local Hydraulic Model Extent
— Watercourse	— Earthworks - Carnarvon Highway and Lovell Street Intersection	
▬ Limit of Mapping		
▬ Cadastral		

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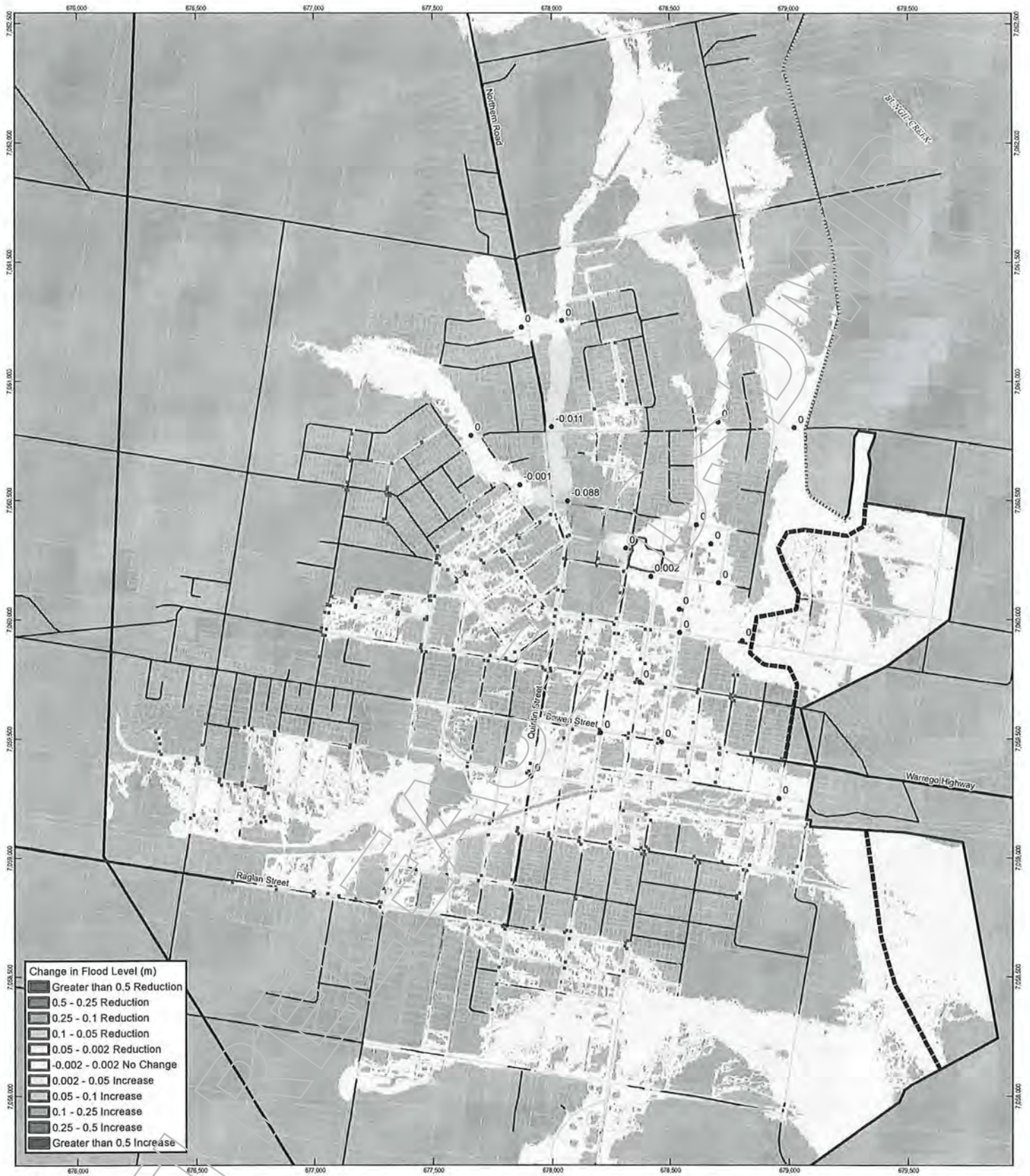


Maranoa Regional Council
Roma Flood Study

Job Number 41-25323
Revision 0
Date 11 Oct 2013

Earthworks - Carnarvon Hwy and Lovell St
100 Year ARI Flood Event Peak Afflux

Figure A7



Change in Flood Level (m)	
[Dark Gray Box]	Greater than 0.5 Reduction
[Medium-Dark Gray Box]	0.5 - 0.25 Reduction
[Medium Gray Box]	0.25 - 0.1 Reduction
[Light Gray Box]	0.1 - 0.05 Reduction
[Very Light Gray Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Lightest Gray Box]	0.002 - 0.05 Increase
[Light Gray Box]	0.05 - 0.1 Increase
[Medium-Light Gray Box]	0.1 - 0.25 Increase
[Medium Gray Box]	0.25 - 0.5 Increase
[Dark Gray Box]	Greater than 0.5 Increase

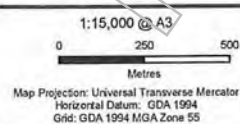
LEGEND

- Sample Point
- Highway
- Road
- Watercourse
- Limit of Mapping
- Cadastre
- Modelled Local Drainage Pit
- Mycra 2013 Reference Design Stage 1 Ligne Alignment
- Modelled Culvert/Drainage Pipe
- Earthworks - Arthur Street and Wyndham Street
- Modified Bridge
- New Bridge
- Major Local Hydraulic Model Extent

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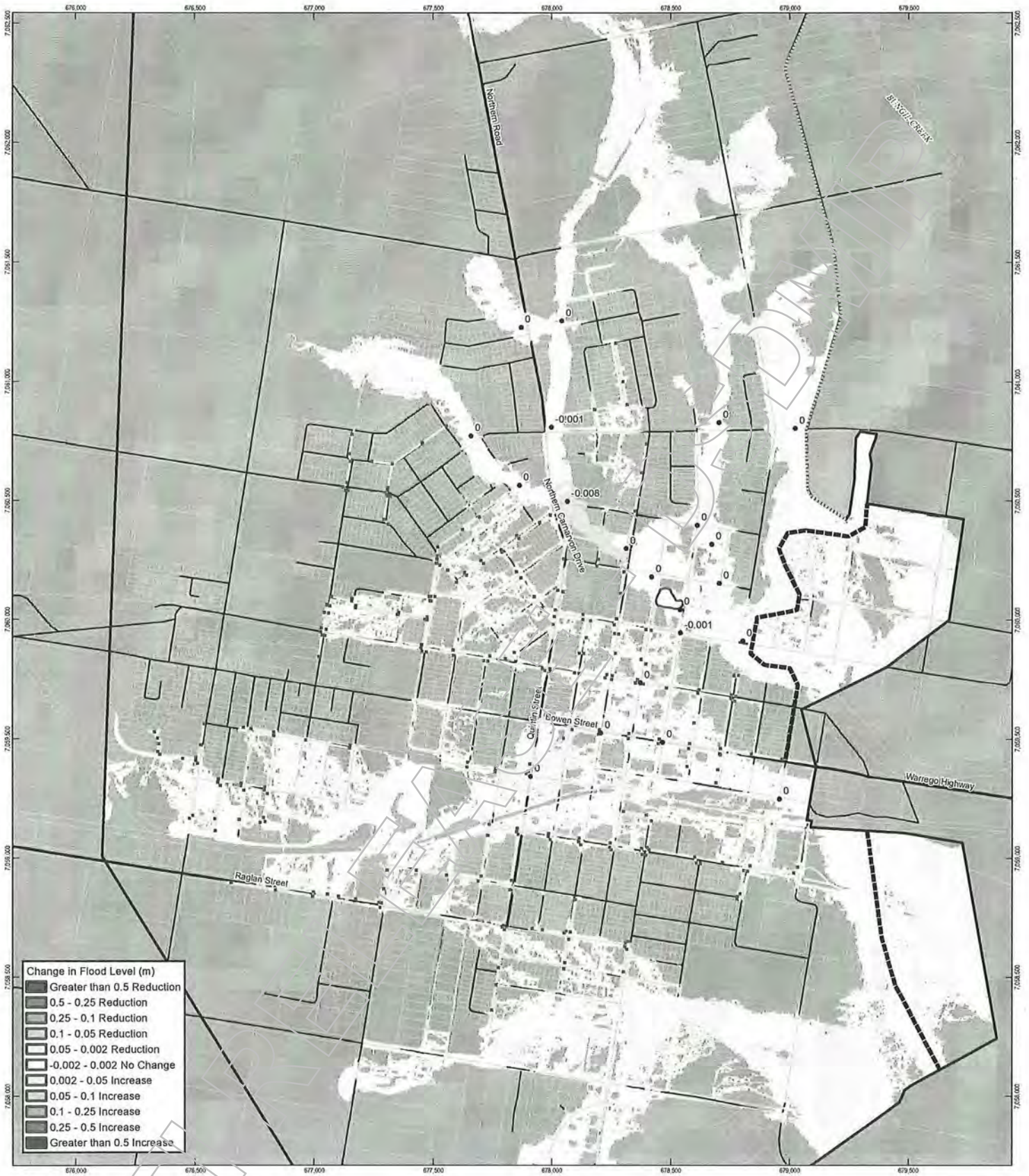
Maranoa Regional Council
Roma Flood Study

Earthworks - Arthur St and Wyndham St
100 Year ARI Flood Event Peak Afflux

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Figure A8

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Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

LEGEND

● Sample Point	■ Model'd Local Drainage FR	▬ Model'd Bridge
— Highway	▬ March 2013 Reference Design Stage 1 Levee Alignment	▬ New Bridge
— Road	▬ Model'd Culvert or Drainage Pipe	▬ Major Local Hydraulic Model Extent
— Watercourse	▬ Earthworks - Charles Street	
▬ Limit of Mapping		
▬ Cadastre		

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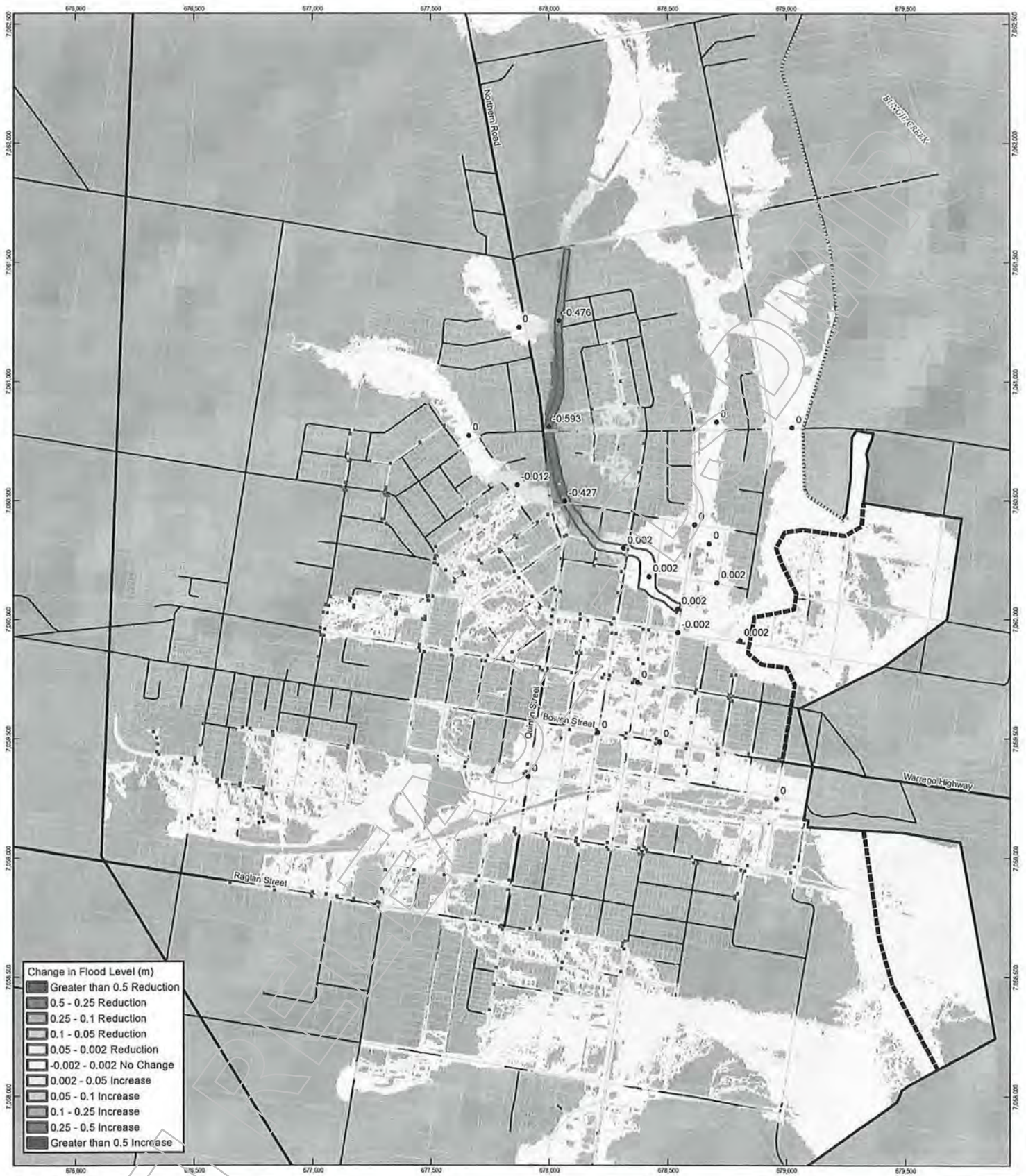


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 Roma Flood Study

Earthworks - Charles St
 100 Year ARI Flood Event Peak Afflux

Job Number 41-25323
 Revision 0
 Date 11 Oct 2013

Figure A9



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[Very Light Grey Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Very Light Grey Box]	0.002 - 0.05 Increase
[Light Grey Box]	0.05 - 0.1 Increase
[Medium-Light Grey Box]	0.1 - 0.25 Increase
[Medium-Dark Grey Box]	0.25 - 0.5 Increase
[Dark Grey Box]	Greater than 0.5 Increase

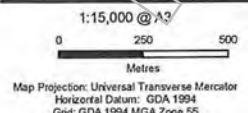
LEGEND	
●	Sample Point
■	Modelled Local Drainage Pit
—	Highway
—	Road
—	Watercourse
—	Limit of Mapping
□	Cadastre
—	Mich 2013 Reference Design Stage 1 Levee Alignment
—	Modelled Culvert or Drainage Pipe
—	Widening of Overland Flow Path - Bassett Lane to Charles Street
—	Modelled Bridge
—	New or Upgraded Bridges
—	Major Local Hydraulic Model Extent

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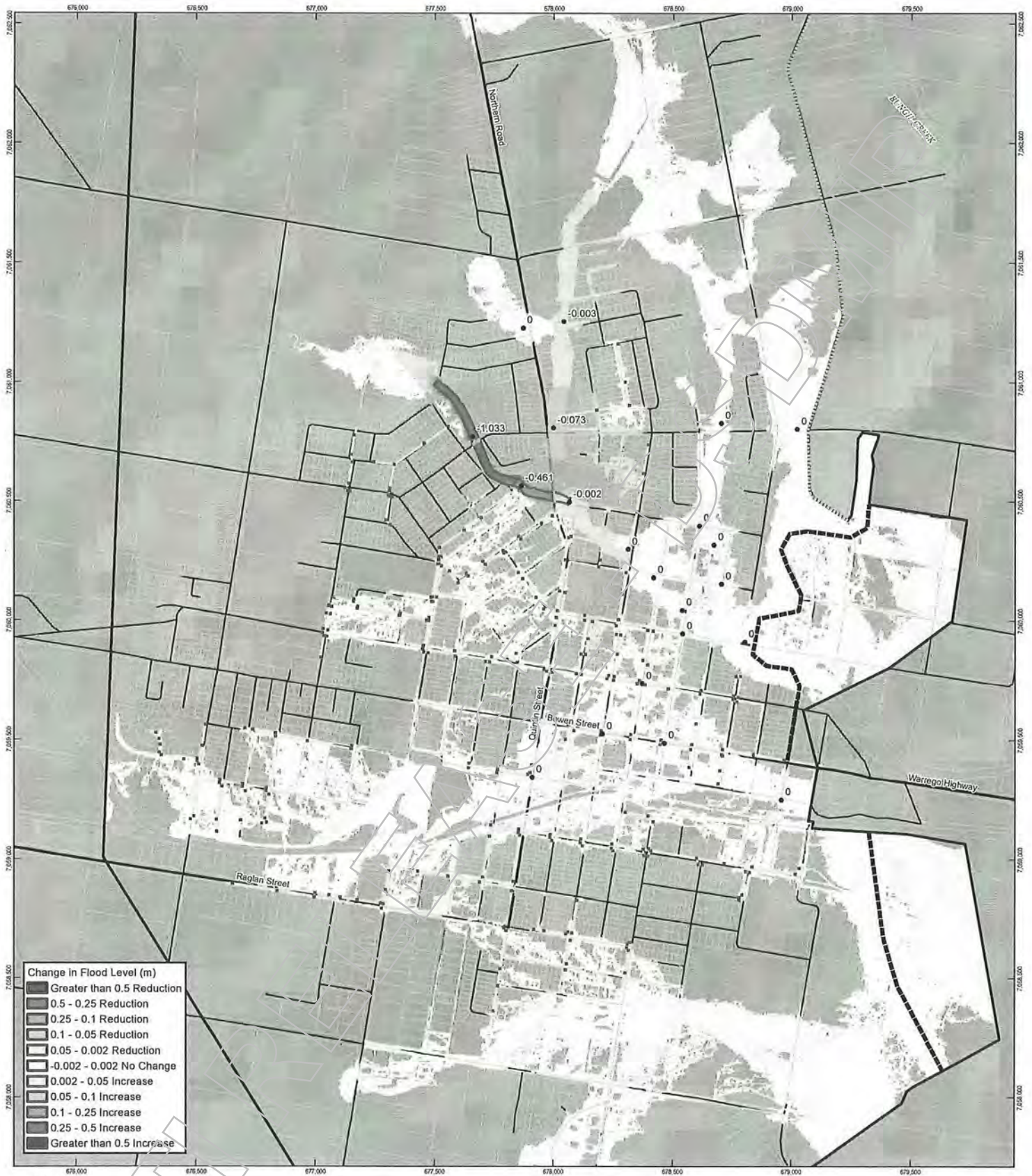
Overland Flow Path - Bassett Ln to Charles St
100 Year ARI Flood Event Peak Afflux

Figure A10

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LEGEND

- Sample Point
- Highway
- Road
- Watercourse
- Limit of Mapping
- Cadastral
- Modified Local Drainage Pit
- March 2013 Reference Design Stage 1 Levee Alignment
- Modelled Culvert or Drainage Pipe
- Widening of Overland Flow Path - Powell Street to Lovell Street
- Modelled Bridge
- New or Upgraded Bridges
- Major Local Hydraulic Model Extent

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Grid: GDA 1994 MGA Zone 55

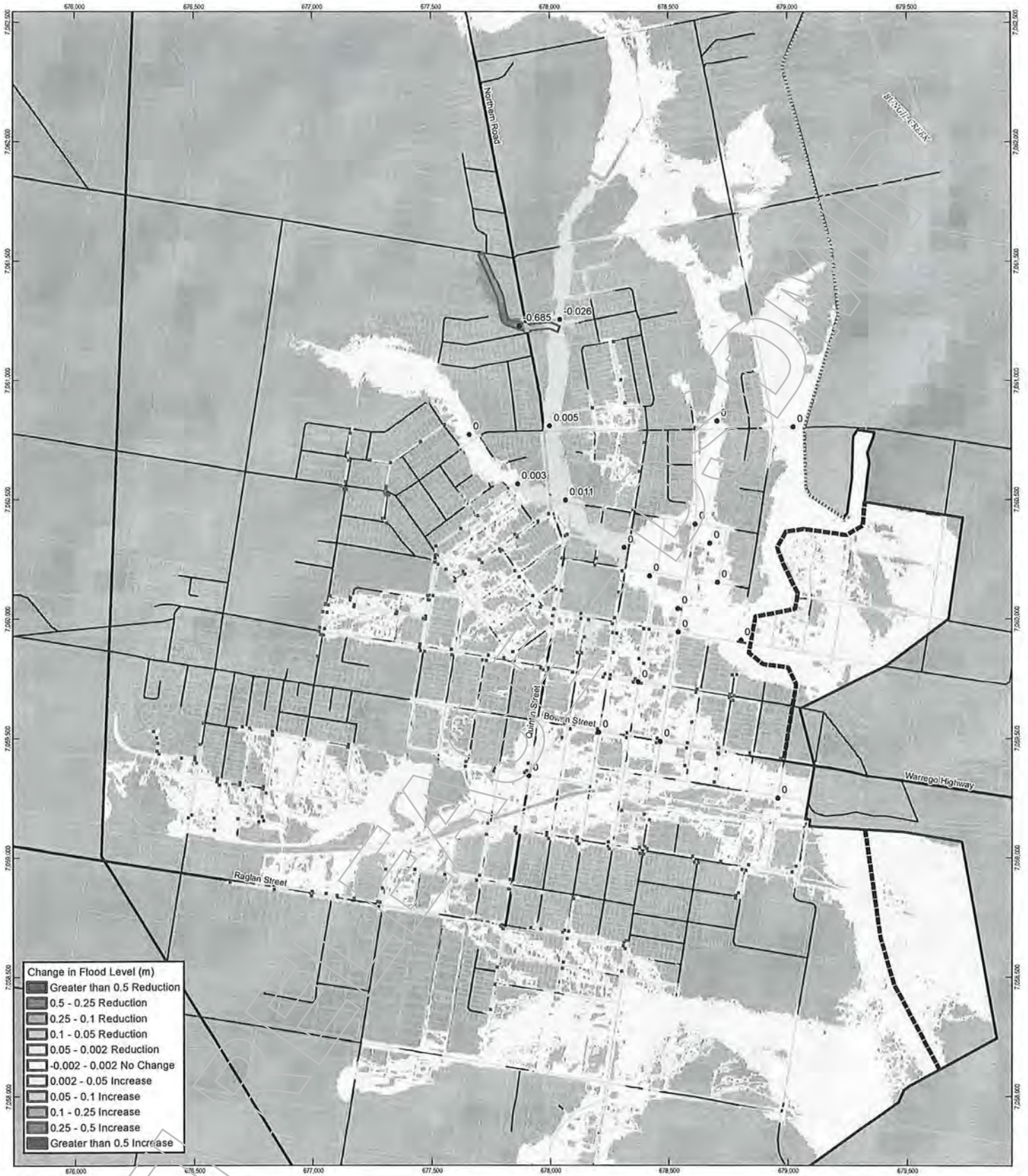


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Roma Flood Study

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Overland Flow Path - Powell St to Lovell St
100 Year ARI Flood Event Peak Afflux

Figure A11

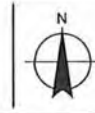


LEGEND

- Sample Point
- Modelled Local Drainage Pit
- Highway
- Road
- Watercourse
- Limit of Mapping
- Cadastre
- March 2013 Reference Design Stage 1 Levee Alignment
- Modelled Culvert or Drainage Pipe
- Widening of Overland Flow Path - Bassett Lane to Alexander Avenue
- Modelled Bridge
- New or Upgraded Bridges
- Major Local Hydraulic Model Extent

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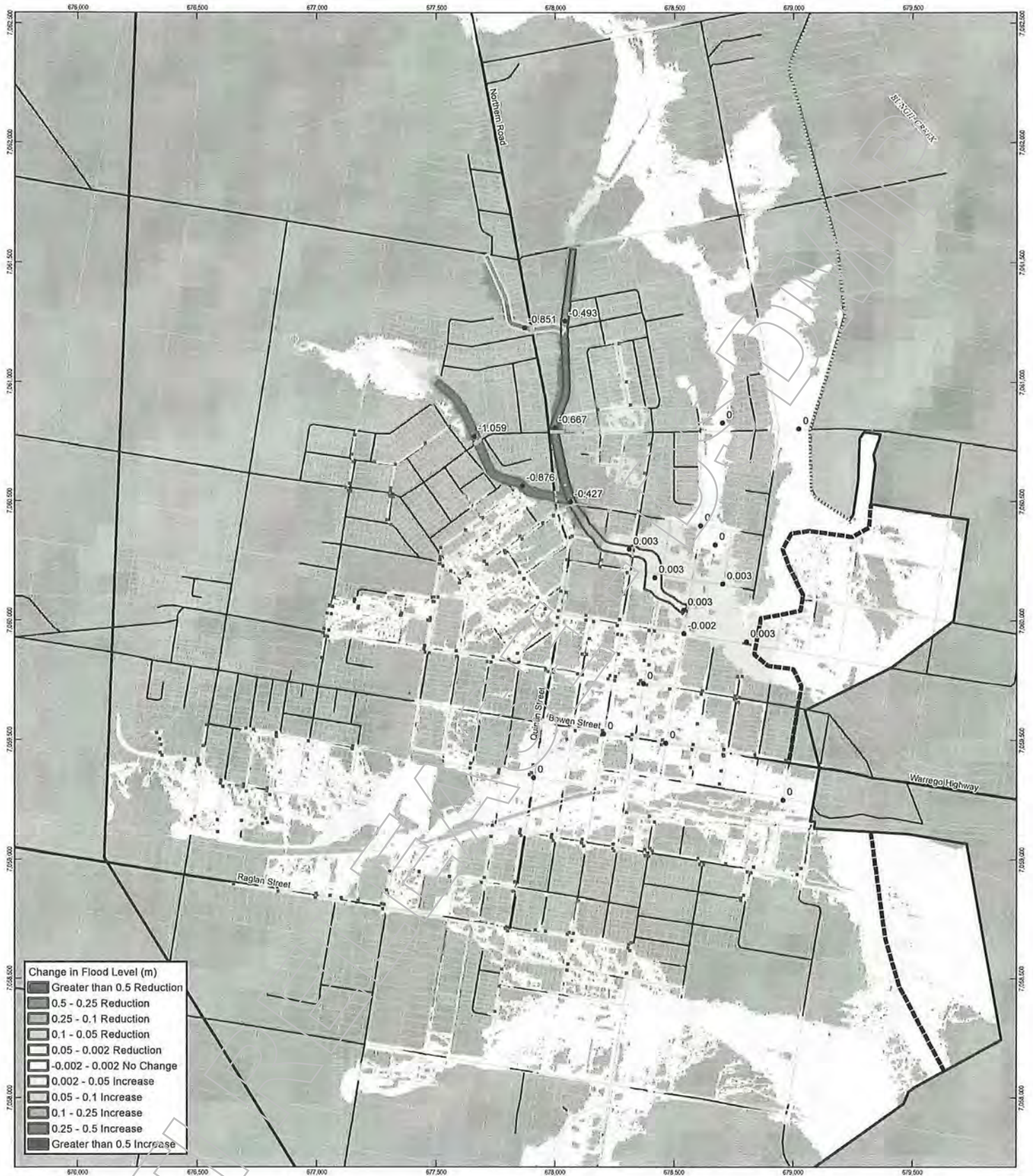
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Overland Flow Path - Bassett Ln to Alexander Ave
 100 Year ARI Flood Event Peak Afflux

Figure A12

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Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

LEGEND

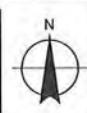
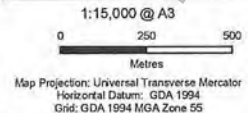
● Sample Point	● Modified Local Drainage Pit	▬ Modelled Bridge
▬ Highway	▬ March 2013 Reference Design Stage 1 Levee Alignment	▬ New or Upgraded Bridges
▬ Road	▬ Modelled Culvert or Drainage Pipe	▬ Major Local Hydraulic Model Extent
▬ Watercourse	▬ Widening of Overland Flow Path - Bassett Lane to Charles Street	
▬ Limit of Mapping	▬ Widening of Overland Flow Path - Powell Street to Lovell Street	
▬ Cadastre	▬ Widening of Overland Flow Path - Bassett Lane to Alexander Avenue	

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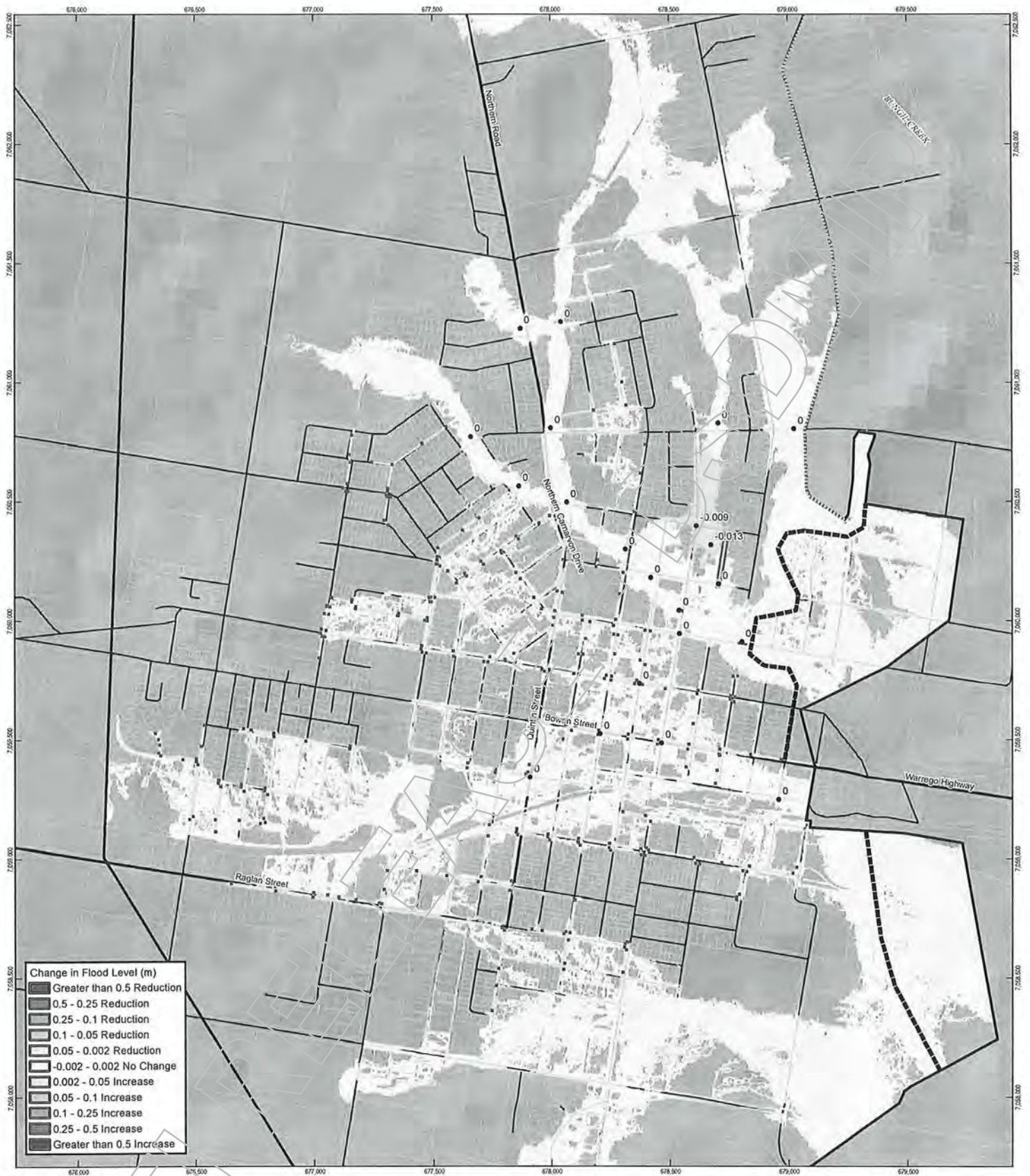


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Roma Flood Study

Job Number 41-25323
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Date 11 Oct 2013

**Overland Flow Path - Combined
100 Year ARI Flood Event Peak Afflux**

Figure A13



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[White Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Light Grey Box]	0.002 - 0.05 Increase
[Medium-Light Grey Box]	0.05 - 0.1 Increase
[Medium-Dark Grey Box]	0.1 - 0.25 Increase
[Dark Grey Box]	0.25 - 0.5 Increase
[Darkest Grey Box]	Greater than 0.5 Increase

LEGEND			
●	Sample Point	■	Modified Local Drainage Pit
—	Highway	—	March 2013 Referencing Design Stage 1 Levels Alignment
—	Road	—	Modified Culvert or Drainage Pipe
—	Watercourse	—	View Culverts
—	Limit of Mapping	—	Swales - Gregory Street
—	Cadastre	—	Modelled Bridge
—		—	Major Local Hydraulic Model Extent

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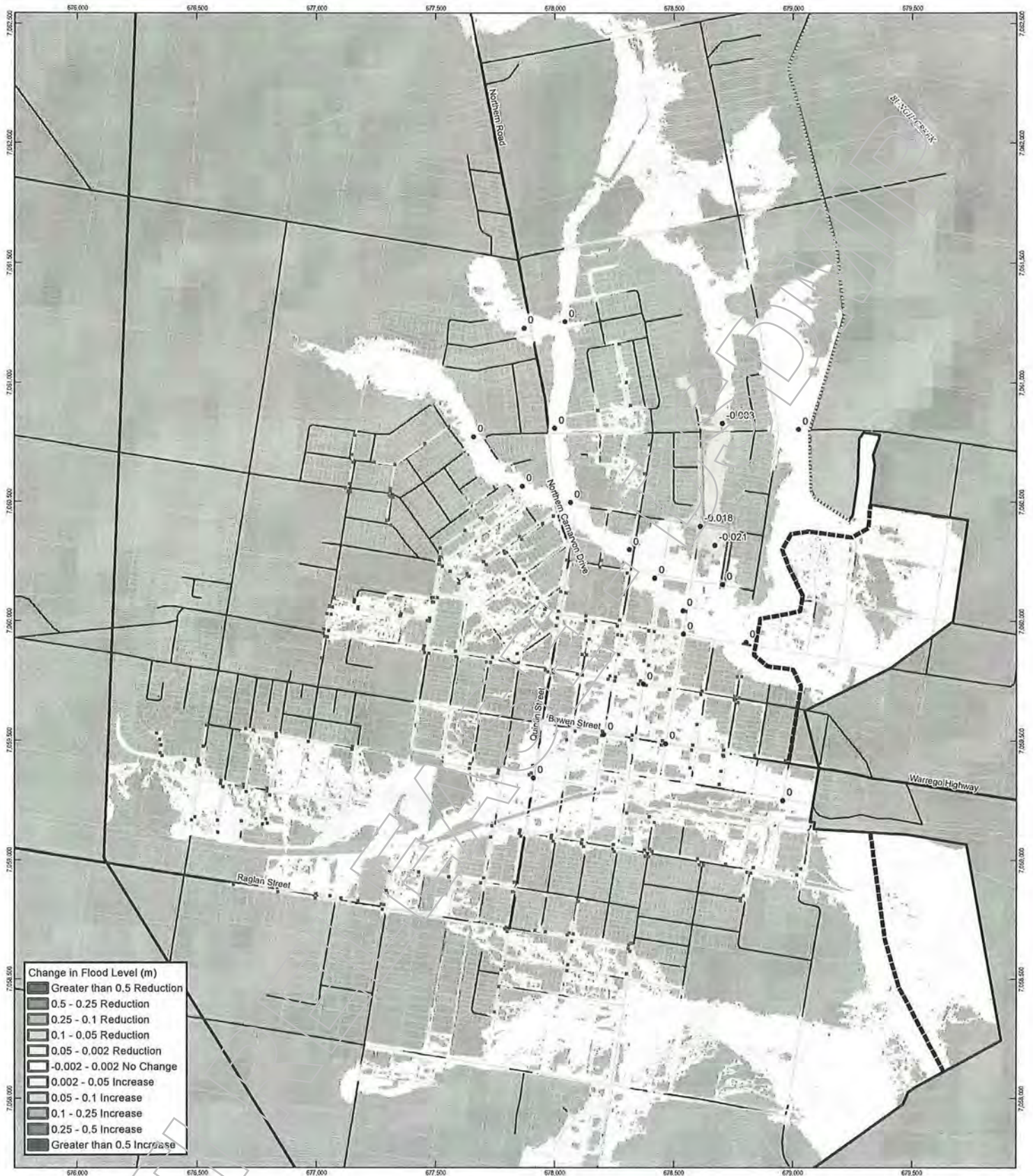
Maranoa Regional Council
 Roma Flood Study

Swales - Gregory St
 100 Year ARI Flood Event Peak Afflux

Job Number | 41-25323
 Revision | 0
 Date | 11 Oct 2013

Figure A14

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Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[Very Light Grey Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Very Light Grey Box]	0.002 - 0.05 Increase
[Light Grey Box]	0.05 - 0.1 Increase
[Medium-Light Grey Box]	0.1 - 0.25 Increase
[Medium-Dark Grey Box]	0.25 - 0.5 Increase
[Dark Grey Box]	Greater than 0.5 Increase

LEGEND	
●	Sample Point
—	Highway
—	Road
—	Watercourse
—	Limit of Mapping
—	Cadastral
●	Modified Local Drainage Pit
—	March 2013 Reference Design Stage 1 Levee Alignment
—	Modified Culvert or Drainage Pipe
—	New or Upgraded Culverts
—	Swales - Charlton Street
—	Swales - Gregory Street
—	Modified Bridge
—	Major Local Hydraulic Model Extent

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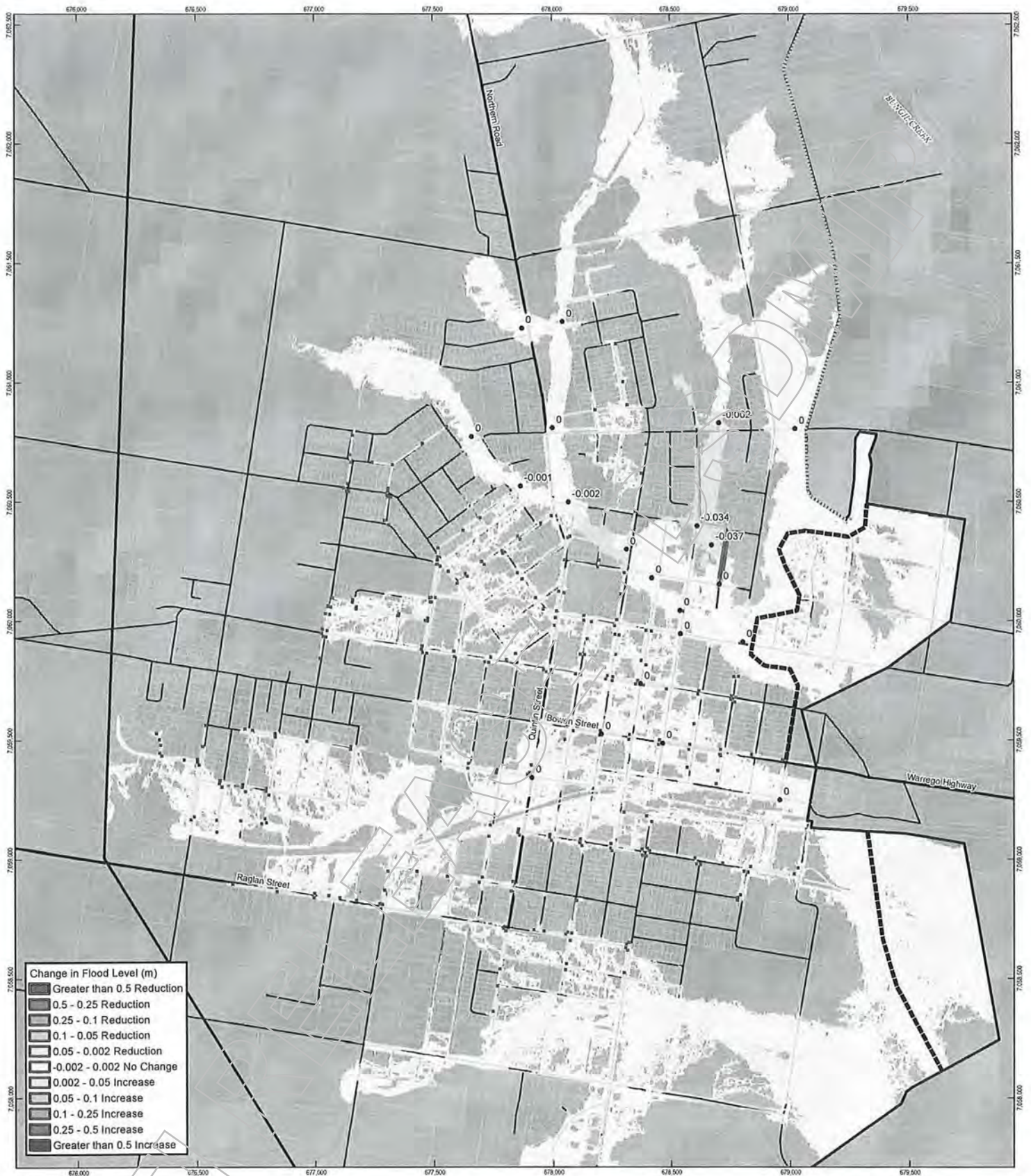


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Job Number 41-25323
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Date 11 Oct 2013

Swales - Charles St and Gregory St
100 Year ARI Flood Event Peak Afflu

Figure A15



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[White Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Light Grey Box]	0.002 - 0.05 Increase
[Medium-Light Grey Box]	0.05 - 0.1 Increase
[Medium-Dark Grey Box]	0.1 - 0.25 Increase
[Dark Grey Box]	0.25 - 0.5 Increase
[Darkest Grey Box]	Greater than 0.5 Increase

LEGEND			
●	Sample Point	■	Modelled Local Drainage Pit
—	Highway	—	Modelled Bridge
—	Road	—	March 2013 Reference Design Stage 1 Levee Alignment
—	Watercourse	—	Modelled Culvert or Drainage Pipe
—	Limit of Mapping	—	New or Upgraded Culverts
—	Cadastral	—	Gregory Street Pipe
—		—	Swales - Charles Street
—		—	Swales - Gregory Street
—		—	Major Local Hydraulic Model Extent

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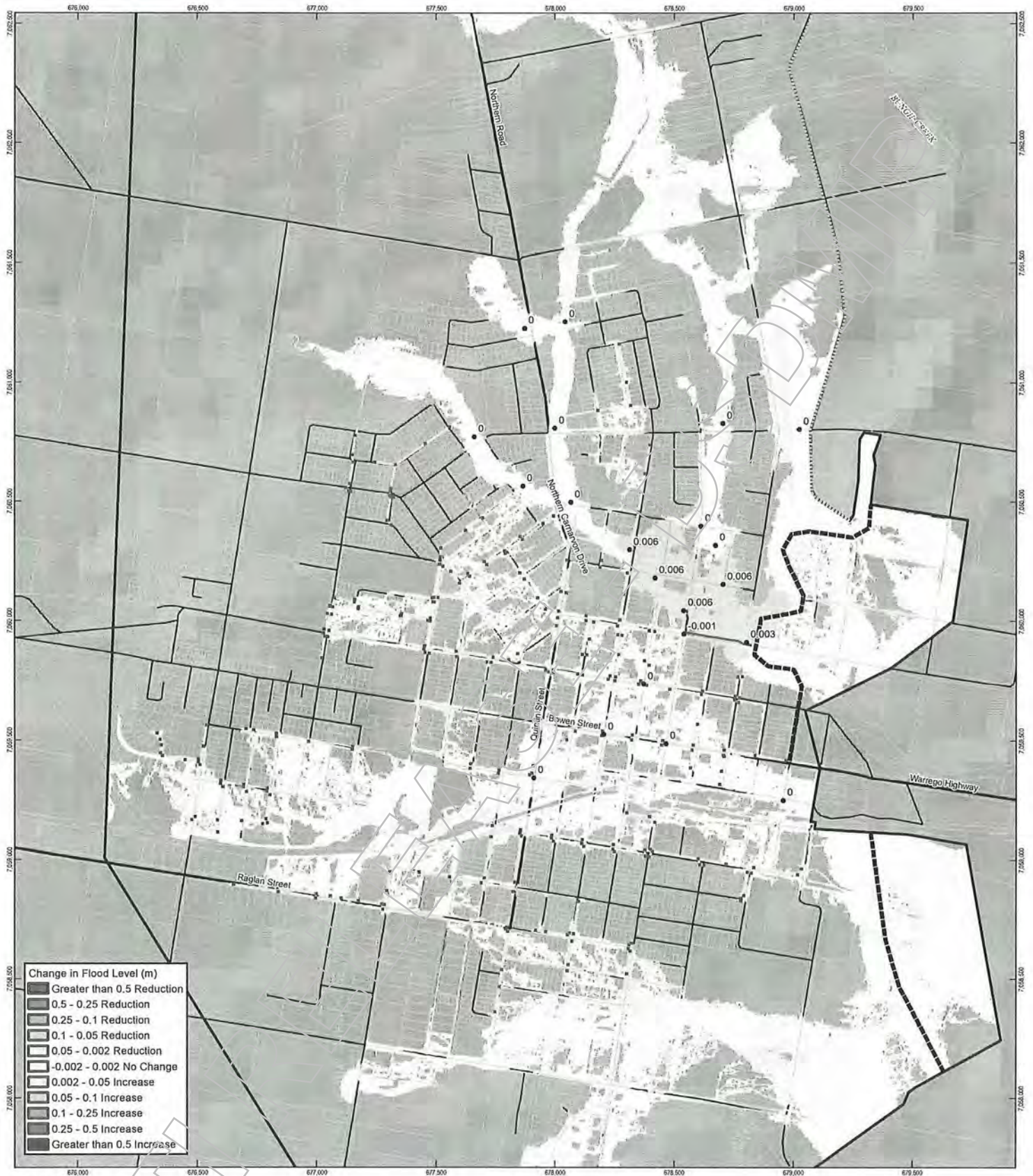


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 Roma Flood Study

Job Number 41-25323
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 Date 11 Oct 2013

Swales - Charles St; Gregory St with Pipe
 100 Year ARI Flood Event Peak Afflux

Figure A16



Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

LEGEND

● Sample Point	■ Modified Local Drainage Pit	▬ Modelled Bridge
— Highway	— March 2013 Reference Design Stage 1 Levee Alignment	▬ Major Local Hydraulic Model Extent
— Road	— Modelled Culvert or Drainage Pipe	
— Watercourse	— Shady's Lagoon Levee	
▬ Limit of Mapping		
▬ Cadastre		

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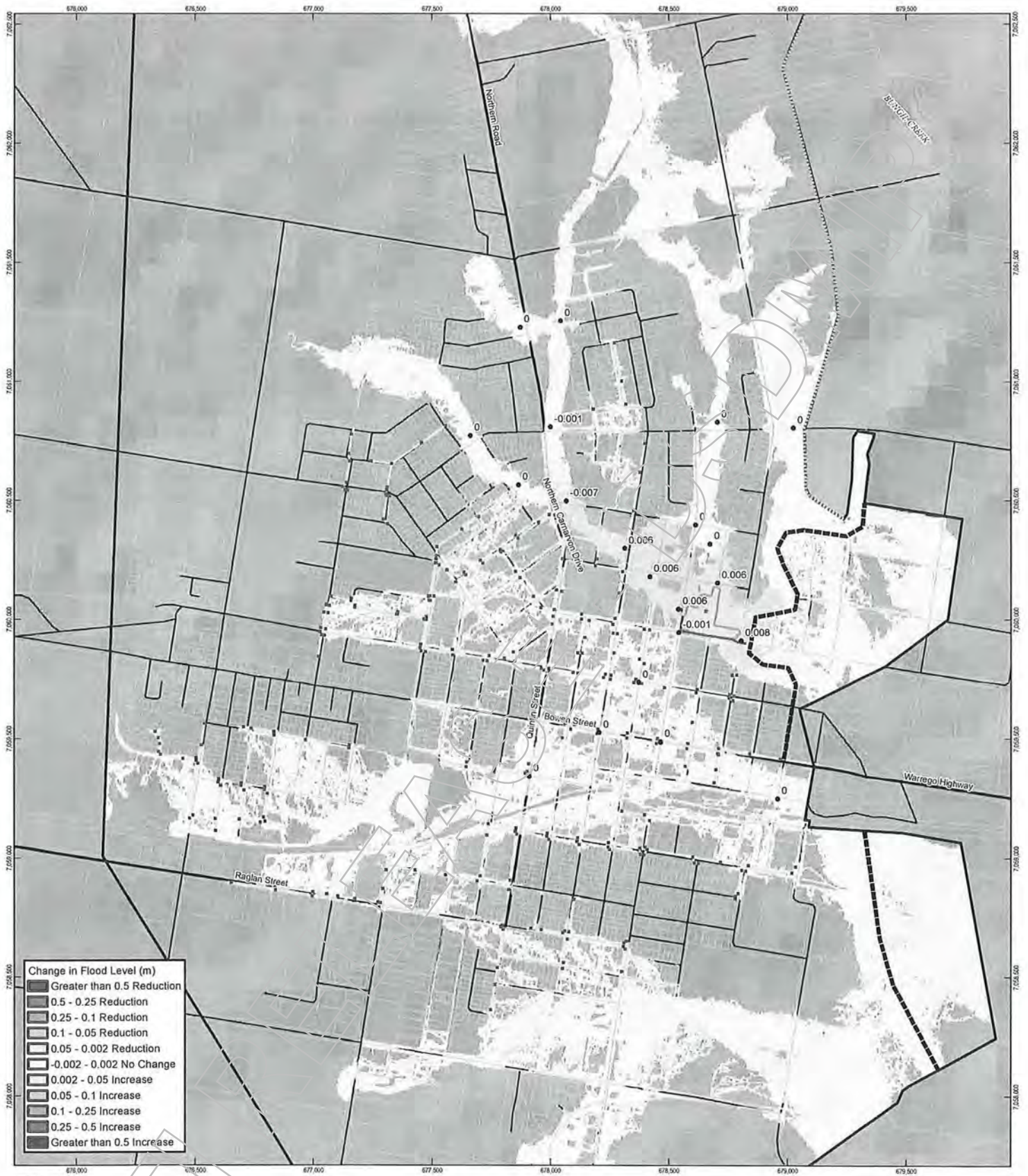


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Job Number 41-25323
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Date 11 Oct 2013

Shady's Lagoon Levee
100 Year ARI Flood Event Peak Afflux

Figure A17



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[Very Light Grey Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Lightest Grey Box]	0.002 - 0.05 Increase
[Light Grey Box]	0.05 - 0.1 Increase
[Medium-Light Grey Box]	0.1 - 0.25 Increase
[Medium-Dark Grey Box]	0.25 - 0.5 Increase
[Dark Grey Box]	Greater than 0.5 Increase

LEGEND		
●	Sample Point	▣
—	Highway	▣
—	Road	▣
—	Watercourse	▣
—	Limit of Marling	▣
▣	Cadastre	▣
▣	Modelled Local Drainage Pt	▣
▣	Mirich 2013 Reference Design Stage 1 Levee Alignment	▣
▣	Modelled Culvert (or Drainage) Pipe	▣
▣	Shady's Lagoon Levee	▣
▣	Shady's Lagoon Extension	▣
▣	Modelled Bridge	▣
▣	Upgrade Charles St Bridge	▣
▣	Major Local Hydraulic Model Extent	▣

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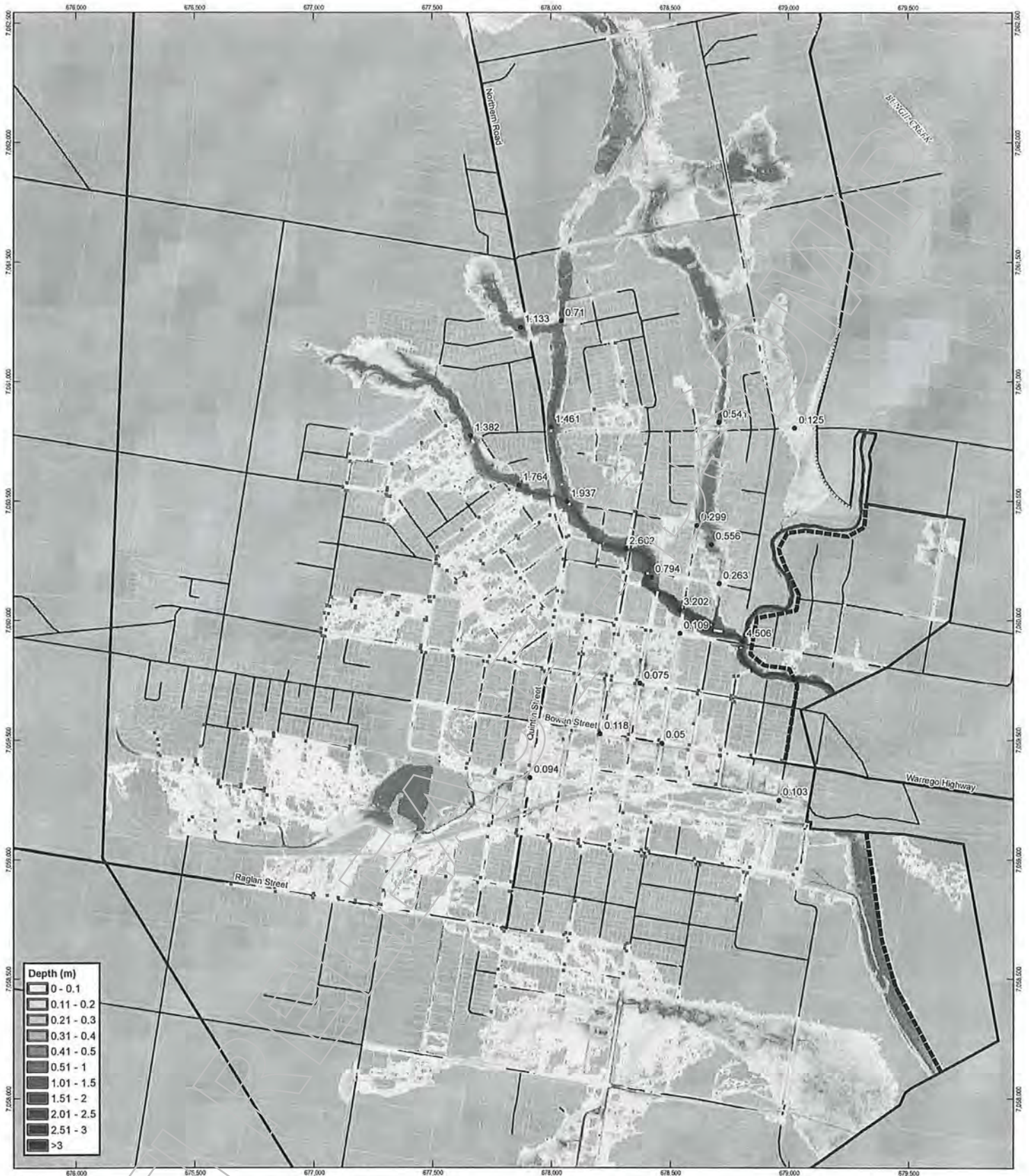
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Date	11 Oct 2013

Shady's Lagoon Levee with Basin Extension
 100 Year ARI Flood Event Peak Afflux

Figure A18

Appendix B – Major Local Hydraulic Model Results with Stage 2 Regional Flood Mitigation Works

RTI RELEASE - DSDMIP



Depth (m)	
[Lightest Gray Box]	0 - 0.1
[Light Gray Box]	0.11 - 0.2
[Medium-Light Gray Box]	0.21 - 0.3
[Medium Gray Box]	0.31 - 0.4
[Medium-Dark Gray Box]	0.41 - 0.5
[Dark Gray Box]	0.51 - 1
[Very Dark Gray Box]	1.01 - 1.5
[Darkest Gray Box]	1.51 - 2
[Black Box]	2.01 - 2.5
[Black Box]	2.51 - 3
[Black Box]	>3

- LEGEND**
- Sample Point
 - Modelled Local Drainage Pit
 - ▬ Highway
 - ▬ Road
 - ▬ Watercourse
 - ▬ Limit of Mapping
 - ▬ Carastre
 - ▬ Modelled Bridge
 - ▬ Modelled Culvert or Drainage Pipe
 - ▬ Major Local Hydraulic Model Extent
 - ▬ July 2013 Reference Design Stage 1 Levee Alignment

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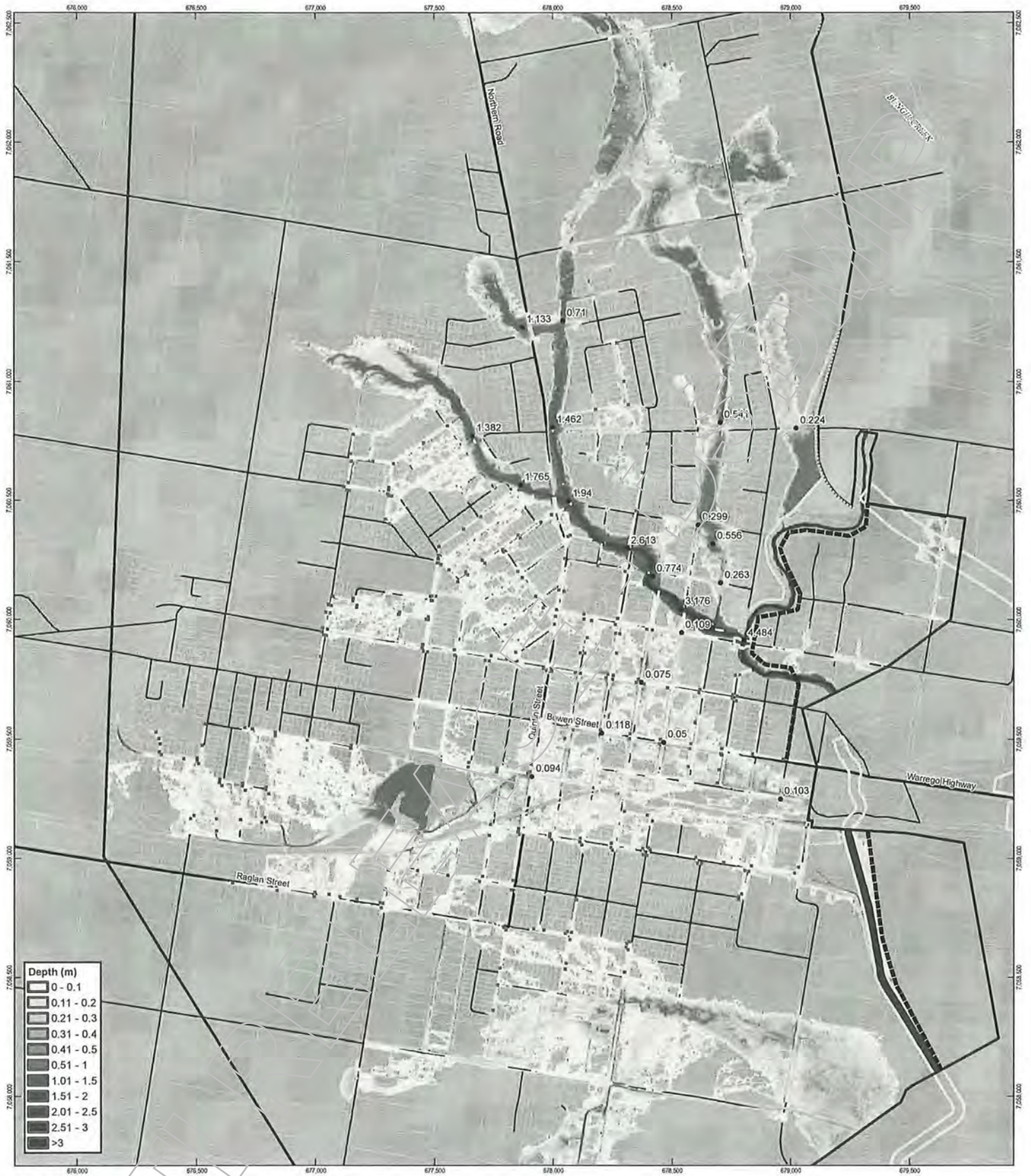
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Stage 1 Levee Only
 100 Year ARI Flood Event Peak Depth

Figure B1

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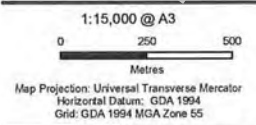


- LEGEND**
- Sample Point
 - Highway
 - Road
 - Watercourse
 - Limit of Mapping
 - ▭ Cadastre
 - * Modelled Local Drainage Pit
 - Modelled Culvert or Drainage Pipe
 - July 2013 Reference Design
 - Stage 1 Levee Alignment
 - Stage 2 Regional Combination 6 Works
 - ▭ Modelled Bridge
 - ▭ Major Local Hydraulic Model Extent

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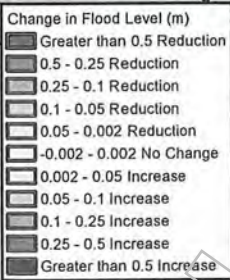
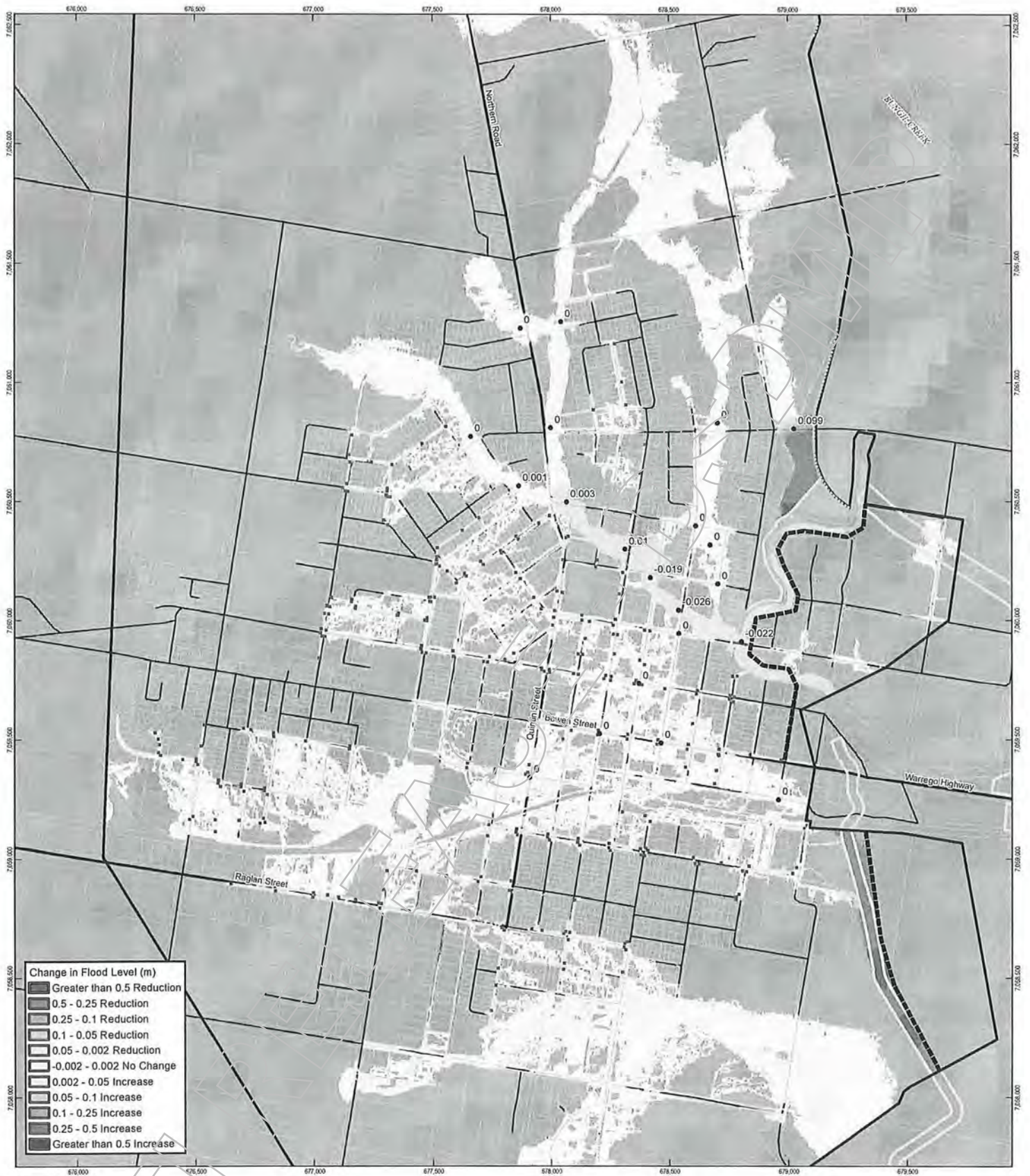
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Date 11 Oct 2013

Base Case 2: Stage 1 Levee and Regional Combination 6
100 Year ARI Flood Event Peak Depth

Figure B2

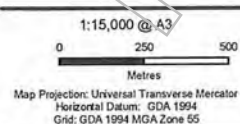
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- LEGEND**
- Sample Point
 - Highway
 - Road
 - Watercourse
 - Limit of Mapping
 - Cadastre
 - Modelled Local Drainage
 - Modelled Culvert or Drainage Pipe
 - July 2013 Reference Design Stage 1 Levee Alignment
 - Combination 6
 - Modelled Bridge
 - Major Local Hydraulic Model Extent

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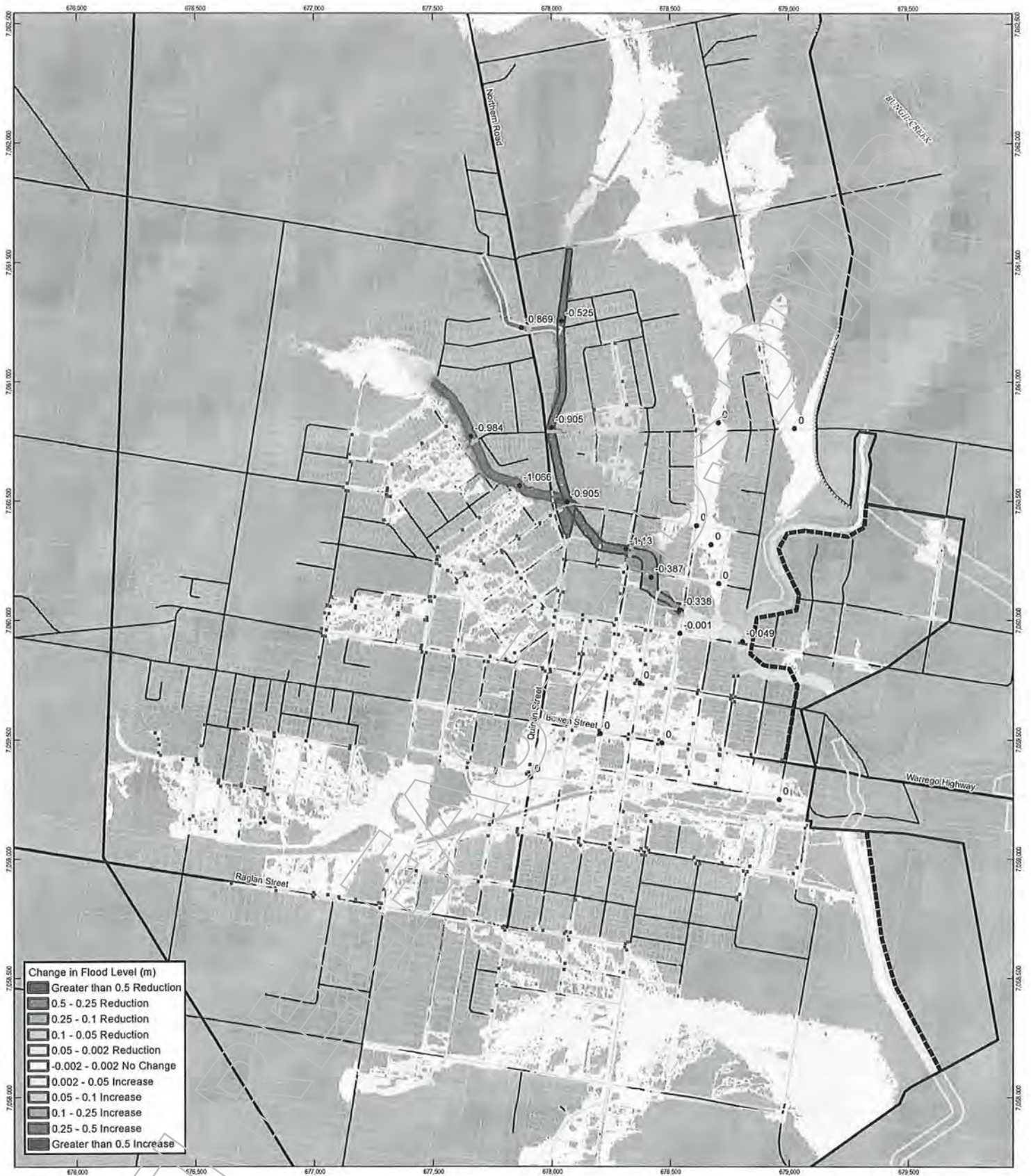
Base Case 2 versus Stage 1 Levee Only
 100 Year ARI Flood Event Peak Afflux

Figure B3

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Appendix C – Major Local Hydraulic Model Afflux Results – Combination Options

RTI RELEASE - DSDMIP



Change in Flood Level (m)

Greater than 0.5 Reduction
0.5 - 0.25 Reduction
0.25 - 0.1 Reduction
0.1 - 0.05 Reduction
0.05 - 0.002 Reduction
-0.002 - 0.002 No Change
0.002 - 0.05 Increase
0.05 - 0.1 Increase
0.1 - 0.25 Increase
0.25 - 0.5 Increase
Greater than 0.5 Increase

LEGEND

● Sample Point	■ Modelled Local Drainage Pit	— Widening of Overland Flow Path - Bassett Lane to Charles Street
— Highway	— July 2013 Reference Design Stage 1 Levee Alignment	— Widening of Overland Flow Path - Powell Street to Lovell Street
— Road	— Modelled Culvert or Drainage Pipe	— Widening of Overland Flow Path - Bassett Lane to Alexander Avenue
— Watercourse	— Earthworks - Cammeron Highway and Lovell Street Intersection	— Stage 2 Regional Combination 6 Works
— Limit of Mapping	— Earthworks - Arthur Street and Wyndham Street	■ Modelled Bridge
— Cadastre	— Earthworks - Charles Street	■ New or Upgraded Bridges
		■ Major Local Hydraulic Model Extent

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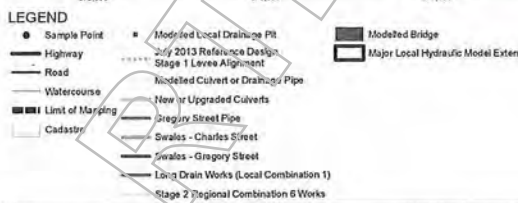
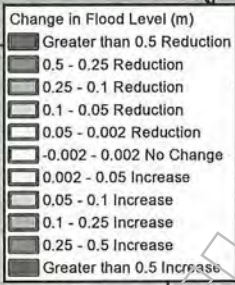
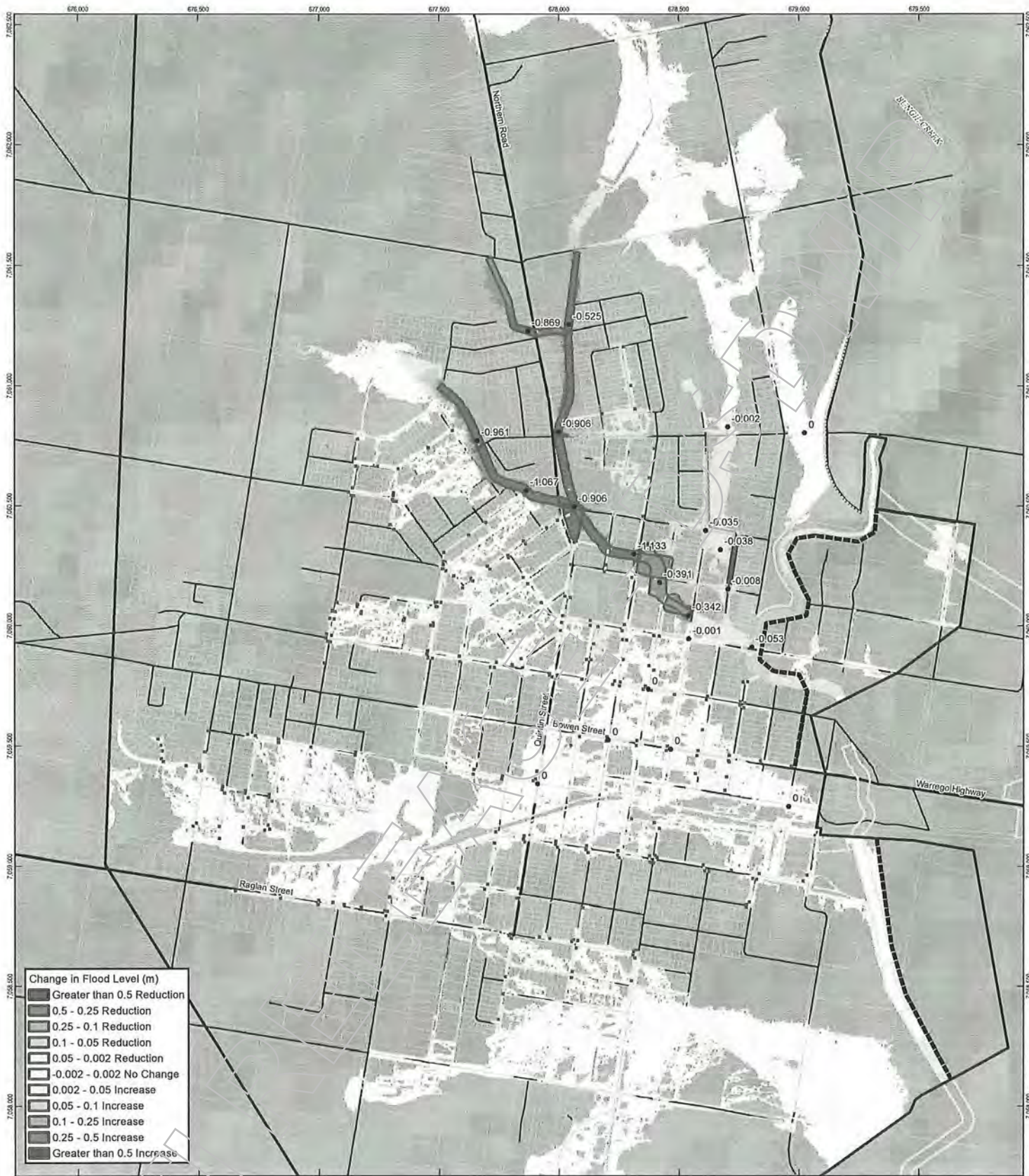


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Local Combination 1
 100 Year ARI Flood Event Peak Afflux

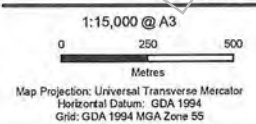
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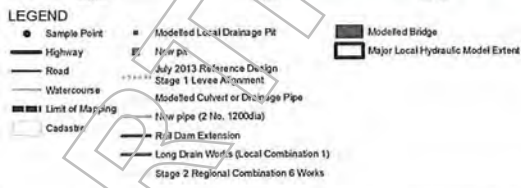
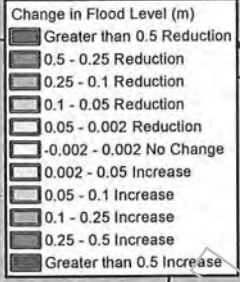
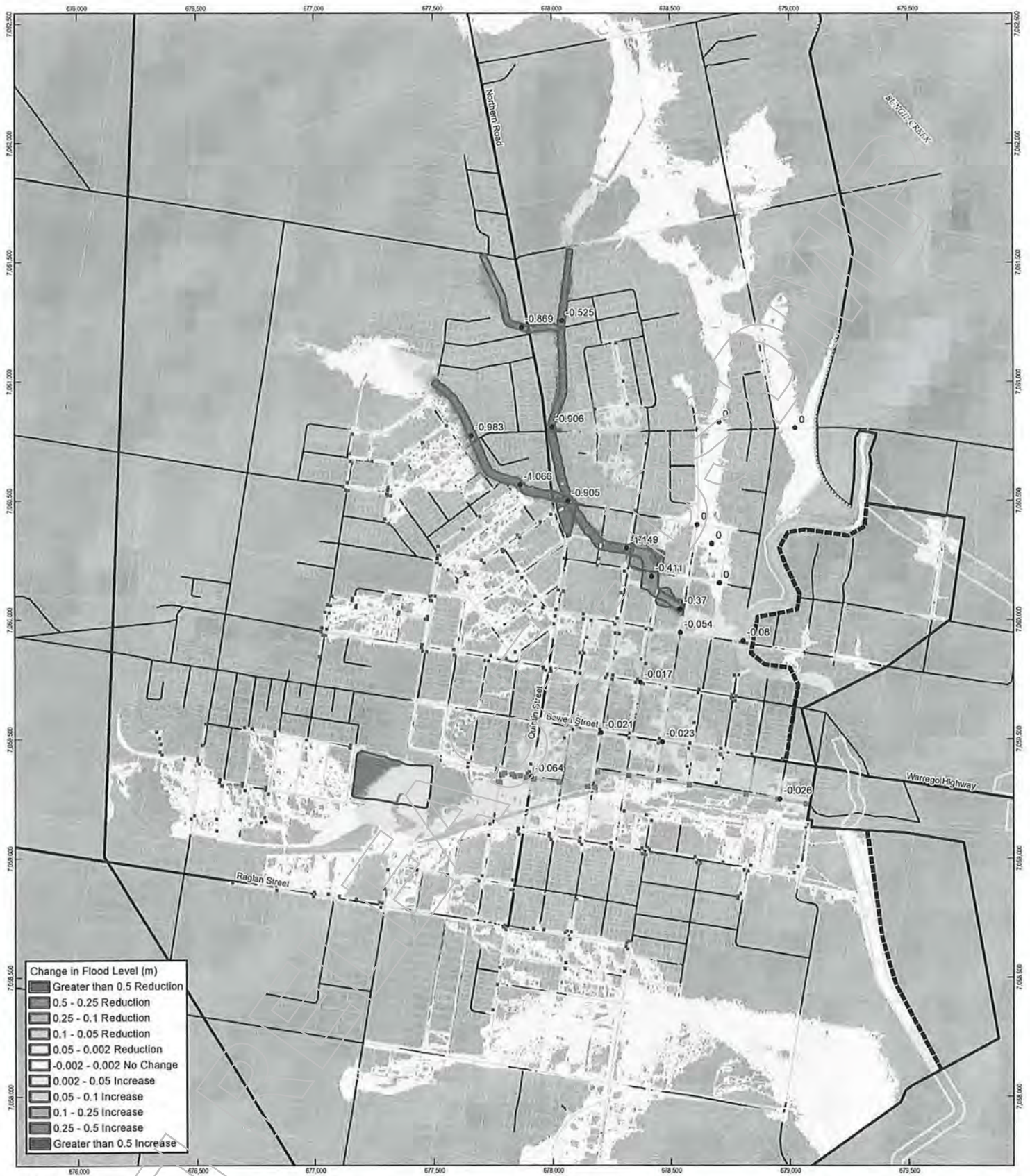


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Local Combination 2
100 Year ARI Flood Event Peak Afflux

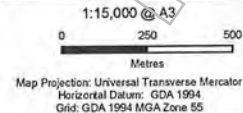
Figure C2



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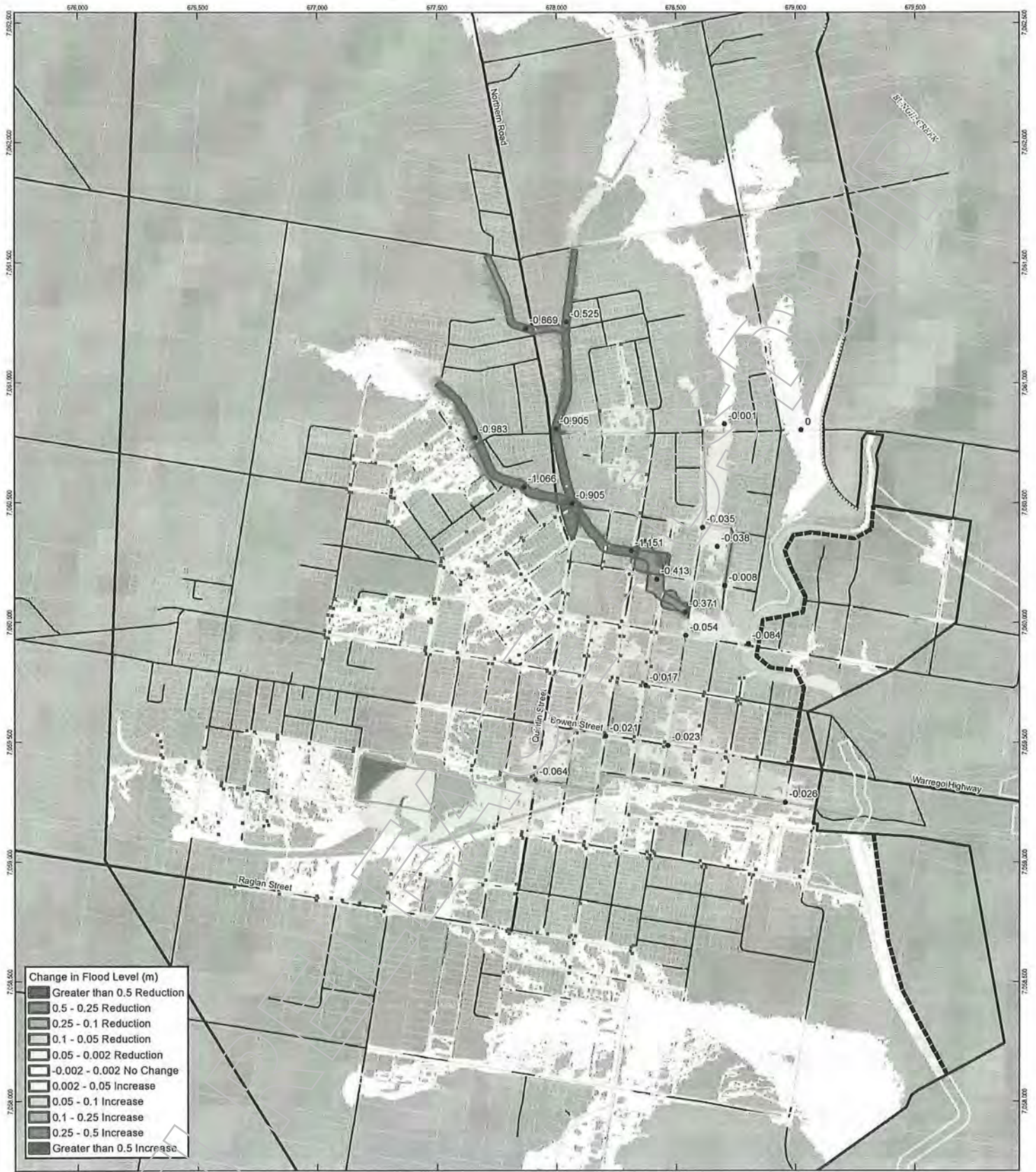
Local Combination 3
100 Year ARI Flood Event Peak Afflux

Figure C3

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Data Source: ©Commonwealth of Australia (Geoscience Australia), Watercourses/2007, DNRM, Locality, Roads/2010, Cadastre, River/2012, GHD Flood Surfaces, Sample Points, Levee/2013, USGS, Relief/2009. Created By: LS

Level 9, 145 Ann Street Brisbane QLD 4000 Australia T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com W www.ghd.com



Change in Flood Level (m)	
[Dark Grey Box]	Greater than 0.5 Reduction
[Medium-Dark Grey Box]	0.5 - 0.25 Reduction
[Medium-Light Grey Box]	0.25 - 0.1 Reduction
[Light Grey Box]	0.1 - 0.05 Reduction
[Very Light Grey Box]	0.05 - 0.002 Reduction
[White Box]	-0.002 - 0.002 No Change
[Very Light Grey Box]	0.002 - 0.05 Increase
[Light Grey Box]	0.05 - 0.1 Increase
[Medium-Light Grey Box]	0.1 - 0.25 Increase
[Medium-Dark Grey Box]	0.25 - 0.5 Increase
[Dark Grey Box]	Greater than 0.5 Increase

LEGEND	
●	Sample Point
—	Highway
—	Road
—	Watercourse
—	Limit of Marging
□	Cadastral
■	Modified Local Drainage Pit
—	July 2013 Reference Design Stage 1 Levee Alignment
—	Modified Culvert or Drainage Pipe
—	Long Drain Works (Local Combination 1)
—	Regency Street Drainage
—	Rail Dam Extension with Station Street Pipe
—	Stage 2 Regional Combination 6 Works
—	Modified Bridge
—	Major Local Hydraulic Model Extent

Department of Natural Resources and Mines (DNRM) makes no representations or warranties about the accuracy, reliability, completeness, or suitability for any particular purpose of the data. By using the data you agree that DNRM is under no liability for any loss or damage (including consequential damage) that you may suffer from use of data. Further, you agree to continually indemnify the State of Queensland, DNRM and their officers and employees against any loss, cost, expense, damage and liability of any kind (including consequential damage) arising directly or indirectly from or related to any claim relating to your use of the data or any product made from the data.

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The Commonwealth gives no warranty regarding the Data's accuracy, completeness, currency or suitability for any particular purpose.

1:15,000 @ A3
0 250 500
Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55



Maranoa Regional Council
Roma Flood Study

Local Combination 4
100 Year ARI Flood Event Peak Afflux

Job Number | 41-25323
Revision | 0
Date | 11 Oct 2013

Figure C4

Appendix D – CAPEX

RTI RELEASE - DSDMIP

ROMA FLOOD MITIGATION STUDY
STAGE 2 OPTIONS - DRAFT

PRELIMINARY DETAILED COST ESTIMATE - MAJOR LOCAL - OPTION 1

Item	Description	Unit	Quantity	Rate	Amount	Remarks
1	Preliminary Items					60% of total stage 1 smec costs
1	Survey setout	Item	1	12,000	12,000	
2	Mobilisation to Site (labour, plant and equipment) & site facilities	Item	1	90,000	90,000	additional due to multiple locations/distance between them
3	Construction Management & Supervision	Item	1	1,074,000	1,074,000	
4	Site Support Services (testing, training, HSEQ, etc.)	Item	1	141,000	141,000	
5	Project management plans plus other plans	Item	1	18,000	18,000	
6	Erosion management plan	Item	1	42,000	42,000	
7	De-mobilisation	Item	1	27,000	27,000	
				Sub Total	1,404,000	
2	Local Creek - Charles St to Bassett Lane (1.80km)					12 properties affected
1	Clearing and grubbing of drain footprint	m2	52,400	0.80	41,920	used stage 1 smec costs
2	Earthworks - cut to fill (stockpile within 1km)	m3	34,580	6.50	224,770	70% of total volume
3	Earthworks - cut to spoil	m3	14,820	5.00	74,100	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	10,520	5.40	56,808	used stage 1 smec costs
5	Hydromulch	m2	52,600	1.30	68,380	used stage 1 smec costs
6	Charles St RCBC reconstruction	Item	1	630,000	630,000	35m long 12m wide
7	Arthur St RCBC reconstruction	Item	1	630,000	630,000	30m long 12m wide
8	Lovell St RCBC reconstruction (includes area of widening)	Item	1	2,840,000	2,840,000	90m long 12m wide
9	Miscamble St RCBC reconstruction	Item	1	630,000	630,000	30m long 12m wide
10	Driveway reconstruction (unsealed)	Item	2	5,000	10,000	
11	Footpath reconstruction (420m)	Item	1	65,000	65,000	3m wide
12	Wyndham St Local drainage connection	Item	1	5,000	5,000	
13	Hawthorne St Local drainage connection	Item	1	5,000	5,000	
14	Miscamble St/Carnarvon Hwy Local drainage connection	Item	1	15,000	15,000	
				Sub Total	5,295,078	
3	Local Creek West - Lovell St to Powell St (0.81km)					1 property affected
1	Clearing and grubbing of drain footprint	m2	25,100	0.80	20,080	
2	Earthworks - cut to fill (stockpile within 1km)	m3	16,380	6.50	106,470	70% of total volume
3	Earthworks - cut to spoil	m3	7,020	5.00	35,100	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	5,060	5.40	27,324	
5	Hydromulch	m2	25,300	1.30	32,890	
6	Carnarvon Highway RCBC reconstruction	Item	1	630,000	630,000	25m long 12m wide
7	Miscamble St RCBC reconstruction	Item	1	630,000	630,000	25m long 15m wide
8	Badgery St Local drainage connection	Item	1	5,000	5,000	
9	Bond St Local drainage connection	Item	1	5,000	5,000	
10	Elmer St Local drainage connection	Item	1	5,000	5,000	
				Sub Total	1,458,864	
4	Local Creek West - Alexander Ave to Bassett Lane (0.53km)					5 properties affected
1	Clearing and grubbing of drain footprint	m2	13,600	0.80	10,880	
2	Earthworks - cut to fill (stockpile within 1km)	m3	5,740	6.50	37,310	70% of total volume
3	Earthworks - cut to spoil	m3	2,460	5.00	12,300	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	2,700	5.40	14,580	
5	Hydromulch	m2	13,500	1.30	17,550	
6	Carnarvon Highway RCBC reconstruction	Item	1	630,000	630,000	30m long 12m wide
7	Driveway reconstruction (unsealed)	Item	1	5,000	5,000	
8	Carnarvon Hwy Local drainage connection	Item	1	10,000	10,000	
				Sub Total	737,620	
5	Widening at Shadys Lagoon					No properties affected
1	Clearing and grubbing of basin footprint	m2	24,500	0.60	14,700	
2	Earthworks - cut to fill (stockpile within 1km)	m3	33,350	6.50	217,035	70% of total volume
3	Earthworks - cut to spoil	m3	14,310	5.00	71,550	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	4,840	5.40	26,076	
5	Hydromulch	m2	24,700	1.30	32,110	
6	Landscaping	Item	1	15,000	15,000	
7	Erosion protection at Bungil Creek Junction	m2	300	40	12,000	
8	Footpath reconstruction (270m)	Item	1	40,000	40,000	3m wide
				Sub Total	433,971	
6	Widening between Charles St and Wyndham St					No properties affected
1	Clearing and grubbing of basin footprint	m2	4,200	0.80	3,360	
2	Earthworks - cut to fill (stockpile within 1km)	m3	3,570	6.50	23,205	70% of total volume
3	Earthworks - cut to spoil	m3	1,530	5.00	7,650	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	860	5.40	4,644	
5	Hydromulch	m2	4,380	1.30	5,694	
6	Landscaping	Item	1	5,000	5,000	
				Sub Total	49,449	
7	Widening between Wyndham St and Arthur St					No properties affected
1	Clearing and grubbing of drain footprint	m2	11,300	0.80	9,040	
2	Earthworks - cut to fill (stockpile within 1km)	m3	11,620	6.50	75,530	70% of total volume
3	Earthworks - cut to spoil	m3	4,980	5.00	24,900	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	2,280	5.40	12,312	
5	Hydromulch	m2	11,400	1.30	14,820	
6	Landscaping	Item	1	5,000	5,000	
				Sub Total	141,602	
8	Widening at Lovell St /Carnarvon Highway					No properties affected
1	Removal of park equipment	Item	1	5,000	5,000	
2	Clearing and grubbing of drain footprint	m2	7,500	0.80	6,000	
3	Earthworks - cut to fill (stockpile within 1km)	m3	9,380	6.50	60,970	70% of total volume
4	Earthworks - cut to spoil	m3	4,020	5.00	20,100	30% of total volume
5	Earthworks - spread topsoil to 200 mm depth	m3	1,520	5.40	8,208	
6	Hydromulch	m2	7,600	1.30	9,880	
7	Landscaping	Item	1	5,000	5,000	
8	Footpath reconstruction	Item	1	5,000	5,000	
9	Lovell St Local drainage connection	Item	1	15,000	15,000	
				Sub Total	135,158	
9	Railway Dam widening					1 property affected
1	Clearing and grubbing of drain footprint	m2	29,000	-	-	
2	Earthworks - cut to fill (stockpile within 1km)	m3	40,250	-	-	70% of total volume
3	Earthworks - cut to spoil	m3	17,250	-	-	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	5,800	-	-	
5	Hydromulch	m2	29,000	-	-	
6	Landscaping	Item	1	-	-	
				Sub Total	-	
10	Mayne St / Station St drainage (1.50km)					No properties affected
1	Reconstruct road pavement (AC surfacing)	m2	8,000	-	-	assume 5m wide
1	Reconstruct kerb & gutter/ road furniture	Item	1	-	-	assume 5m wide
2	Pipework (twin 1200dia) excavate, lay & backfill	m	1,800	-	-	
3	Pipeheadwalls	Item	18	-	-	
				Sub Total	-	
11	Miscellaneous					
1	Fencing	Item	30	2,000	60,000	fencelines to affected/adjacent properties
2	Establishment of easements over affected properties including easement documents and plan lodging	Item	19	1,000	19,000	Provisional sum
3	Survey - as constructed	Item	1	50,000	50,000	Provisional sum
				Sub Total	129,000	
12	Additional Oncost					
1	Detailed design	LS	6%	-	505,179	6% on Direct Job Costs
2	Contingencies	LS	30%	-	2,525,893	30% on Direct Job Costs & Preliminary based on class 4 estimate
				Sub Total	3,031,071	
13	Owner Costs					
1	Owner Costs and Project Management Fee	LS	10%	-	-	Power link connection, geotech report, project management services
2	Allowance for rehabilitation and compensation	LS	5%	-	-	Noted this is a D&C contract, allow 5% due to unforeseen land access issues.
				Sub Total	-	
				GRAND TOTAL	12,854,713	

ROMA FLOOD MITIGATION STUDY
STAGE 2 OPTIONS - DRAFT

PRELIMINARY DETAILED COST ESTIMATE - MAJOR LOCAL - OPTION 3

Item	Description	Unit	Quantity	Rate	Amount	Remarks
1	Preliminary Items					60% of total stage 1 smec costs
1	Survey setout	Item	1	12,000	12,000	
2	Mobilisation to Site (labour, plant and equipment) & site facilities	Item	1	90,000	90,000	additional due to multiple locations/distance between them
3	Construction Management & Supervision	Item	1	1,074,000	1,074,000	
4	Site Support Services (testing, training, HSEQ, etc.)	Item	1	141,000	141,000	
5	Project management plans plus other plans	Item	1	18,000	18,000	
6	Erosion management plan	Item	1	42,000	42,000	
7	De-mobilisation	Item	1	27,000	27,000	
					Sub Total	1,404,000
2	Local Creek - Charles St to Bassett Lane (1.80km)					12 properties affected
1	Clearing and grubbing of drain footprint	m2	52,400	0.80	41,920	used stage 1 smec costs
2	Earthworks - cut to fill (stockpile within 1km)	m3	34,590	6.50	224,770	70% of total volume
3	Earthworks - cut to spoil	m3	14,820	5.00	74,100	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	10,520	5.40	56,808	used stage 1 smec costs
5	Hydromulch	m2	52,600	1.30	68,380	used stage 1 smec costs
6	Charles St RCBC reconstruction	Item	1	630,000	630,000	35m long 12m wide
7	Arthur St RCBC reconstruction	Item	1	630,000	630,000	30m long 12m wide
8	Lovell St RCBC reconstruction (includes area of widening)	Item	1	2,840,000	2,840,000	90m long 12m wide
9	Miscamble St RCBC reconstruction	Item	1	630,000	630,000	30m long 12m wide
10	Driveway reconstruction (unsealed)	Item	2	5,000	10,000	
11	Footpath reconstruction (420m)	Item	1	65,000	65,000	3m wide
12	Wyndham St Local drainage connection	Item	1	5,000	5,000	
13	Hawthorne St Local drainage connection	Item	1	5,000	5,000	7,530,462
14	Miscamble St/Carnarvon Hwy Local drainage connection	Item	1	15,000	15,000	760,180
					Sub Total	5,295,978
3	Local Creek West - Lovell St to Powell St (0.81km)					1 property affected
1	Clearing and grubbing of drain footprint	m2	25,100	0.80	20,080	
2	Earthworks - cut to fill (stockpile within 1km)	m3	16,380	6.50	106,470	70% of total volume
3	Earthworks - cut to spoil	m3	7,020	5.00	35,100	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	5,060	5.40	27,324	
5	Hydromulch	m2	25,300	1.30	32,890	
6	Carnarvon Highway RCBC reconstruction	Item	1	630,000	630,000	25m long 12m wide
7	Miscamble St RCBC reconstruction	Item	1	630,000	630,000	25m long 15m wide
8	Badgery St Local drainage connection	Item	1	5,000	5,000	
9	Bond St Local drainage connection	Item	1	5,000	5,000	
10	Elmer St Local drainage connection	Item	1	5,000	5,000	
					Sub Total	1,496,564
4	Local Creek West - Alexander Ave to Bassett Lane (0.53km)					5 properties affected
1	Clearing and grubbing of drain footprint	m2	13,600	0.80	10,880	
2	Earthworks - cut to fill (stockpile within 1km)	m3	5,740	6.50	37,310	70% of total volume
3	Earthworks - cut to spoil	m3	2,460	5.00	12,300	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	2,700	5.40	14,580	
5	Hydromulch	m2	13,500	1.30	17,550	
6	Carnarvon Highway RCBC reconstruction	Item	1	630,000	630,000	30m long 12m wide
7	Driveway reconstruction (unsealed)	Item	1	5,000	5,000	
8	Carnarvon Hwy Local drainage connection	Item	1	10,000	10,000	
					Sub Total	737,620
5	Widening at Shadys Lagoon					No properties affected
1	Clearing and grubbing of basin footprint	m2	24,590	0.80	19,680	
2	Earthworks - cut to fill (stockpile within 1km)	m3	33,390	6.50	217,035	70% of total volume
3	Earthworks - cut to spoil	m3	14,310	5.00	71,550	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	4,940	5.40	26,676	
5	Hydromulch	m2	24,700	1.30	32,110	
6	Landscaping	Item	1	15,000	15,000	
7	Erosion protection at Bungli Creek Junction	m2	300	40	12,000	
8	Footpath reconstruction (270m)	Item	1	40,000	40,000	3m wide
					Sub Total	433,971
6	Widening between Charles St and Wyndham St					No properties affected
1	Clearing and grubbing of basin footprint	m2	4,200	0.80	3,360	
2	Earthworks - cut to fill (stockpile within 1km)	m3	3,570	6.50	23,205	70% of total volume
3	Earthworks - cut to spoil	m3	1,530	5.00	7,650	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	860	5.40	4,644	
5	Hydromulch	m2	4,300	1.30	5,590	
6	Landscaping	Item	1	5,000	5,000	
					Sub Total	49,449
7	Widening between Wyndham St and Arthur St					No properties affected
1	Clearing and grubbing of drain footprint	m2	11,300	0.80	9,040	
2	Earthworks - cut to fill (stockpile within 1km)	m3	11,620	6.50	75,530	70% of total volume
3	Earthworks - cut to spoil	m3	4,980	5.00	24,900	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	2,280	5.40	12,312	
5	Hydromulch	m2	11,400	1.30	14,820	
6	Landscaping	Item	1	5,000	5,000	
					Sub Total	141,602
8	Widening at Lovell St /Carnarvon Highway					No properties affected
1	Removal of park equipment	Item	1	5,000	5,000	
2	Clearing and grubbing of drain footprint	m2	7,500	0.80	6,000	
3	Earthworks - cut to fill (stockpile within 1km)	m3	9,300	6.50	60,970	70% of total volume
4	Earthworks - cut to spoil	m3	4,020	5.00	20,100	30% of total volume
5	Earthworks - spread topsoil to 200 mm depth	m3	1,520	5.40	8,208	
6	Hydromulch	m2	7,600	1.30	9,880	
7	Landscaping	Item	1	5,000	5,000	
8	Footpath reconstruction	Item	1	5,000	5,000	
9	Lovell St Local drainage connection	Item	1	15,000	15,000	
					Sub Total	135,158
9	Railway Dam widening					1 property affected
1	Clearing and grubbing of drain footprint	m2	29,000	0.80	23,200	
2	Earthworks - cut to fill (stockpile within 1km)	m3	40,250	6.50	261,625	70% of total volume
3	Earthworks - cut to spoil	m3	17,250	5.00	86,250	30% of total volume
4	Earthworks - spread topsoil to 200 mm depth	m3	5,800	5.40	31,320	
5	Hydromulch	m2	29,000	1.30	37,700	
6	Landscaping	Item	1	5,000	5,000	
					Sub Total	445,095
10	Mayne St /Station St drainage (1.60km)					No properties affected
1	Reconstruct road pavement (AC surfacing)	m2	8,000	65	520,000	assume 5m wide
1	Reconstruct curb & gutter/road furniture	Item	1	3,000	3,000	assume 5m wide
2	Pipework (twin 1200dia) excavate, lay & backfill	m	1,600	3,200	5,120,000	
3	Pits/headwalls	Item	18	3,500	63,000	
					Sub Total	5,706,000
11	Miscellaneous					
1	Fencing	Item	30	2,000	60,000	fencelines to affected/adjacent properties
2	Establishment of easements over affected properties including easement documents and plan lodging.	Item	19	1,000	19,000	Provisional sum
3	Survey - as constructed	Item	1	50,000	50,000	Provisional sum
					Sub Total	129,000
12	Additional Oncost					
1	Detailed design	LS	6%		874,244.22	6% on Direct Job Costs
2	Contingencies	LS	30%		4,371,221.10	30% on Direct Job Costs & Preliminary based on class 4 estimate
					Sub Total	5,245,465
13	Owner Costs					
1	Owner Costs and Project Management Fee	LS	10%		-	Power link connection, geotech report, project management services
2	Allowance for rehabilitation and compensation	LS	5%		-	Noted this is a D&C contract, allow 5% due to unforeseen land access issues.
					Sub Total	-
					GRAND TOTAL	21,220,202

Appendix E – Concept Drawings

RTI RELEASE - DSDMIP



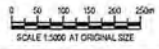
DMIP

PLAN
SCALE 1:5000

NOTES:
1. REFER TO DRGS 41-25323-SK 101-SK107 FOR REGIONAL OPTIONS.

PRELIMINARY

No.	Revision	Date	Author	Check	Project Director
A	PRELIMINARY	02.12.13	LSM	MH*	JP*

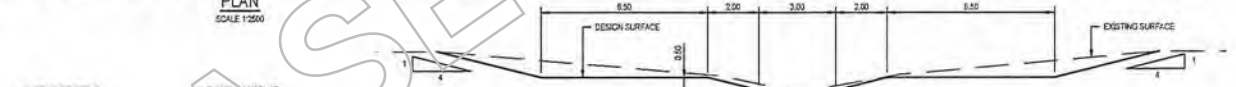


DO NOT SCALE	Drawn: L.MARTIN	Designer: L.MARTIN
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	Approved: (Project Director)	Check:
	Date:	
Scale: AS SHOWN	<small>This Drawing must not be used for Construction unless signed off Approved</small>	

Client:	MARANOA REGIONAL COUNCIL
Project:	ROMA FLOOD STUDY
Title:	PROPOSED STAGE 2 MAJOR LOCAL OPTIONS OVERALL PLAN
Drawn:	A1
Design No.:	41-25323-SK110
Rev.:	A



PLAN
SCALE 1:2500



TYPICAL SECTION
SCALE 1:100

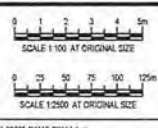


LONGITUDINAL SECTION - LOCAL CREEK
HORIZONTAL SCALE 1:2500 VERTICAL SCALE 1:100

LEVEL DIFFERENCE CUT - FILL +	DESIGN LEVEL	EXISTING SURFACE LEVEL	CHANGAGE
-1	291	290	0
-0.818	297.72	298.54	80
-1.14	307.83	308.97	200
-1.13	297.95	299.08	300
-1.115	299.83	300.95	400
-1.84	299.83	301.67	500
-1.516	296.26	297.78	600
-1.135	298.36	299.50	687.14
-0.91	299.63	300.54	700
-1.307	297.71	299.02	800
-2.01	296.45	298.46	900
-1.116	298.11	299.23	1000
-1.407	294.91	296.32	1083.15
-1.824	294.83	296.66	1200
-1.308	295.52	296.83	1300
-1.209	294.23	295.44	1400
-1.06	293.14	294.20	1500
-2.66	293.63	296.29	1600
-1.31	293.88	295.19	1700
-0.883	293.97	294.85	1800
-0.343	293.91	294.25	1883.92

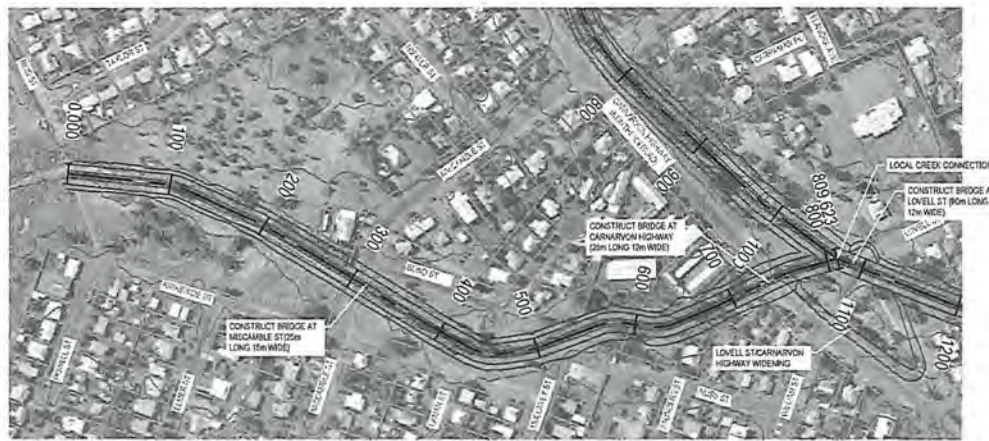
PRELIMINARY

No	Revision	Note	Drawn	Checked	Project Director	Date
A	PRELIMINARY		LSM	MH*	JP*	02.12.13



DO NOT SCALE	Drawn	Designer	Client
Conditions of Use: This document may only be used by GHD's client (and any other person who GHD has agreed can use this document) for the purpose for which it was prepared and must not be used by any other person or for any other purpose.	L.MARTIN	L.MARTIN	MARANOA REGIONAL COUNCIL
	Drafting Check	Design Check	ROMA FLOOD STUDY
	Approved (Project Director)	Date	PROPOSED STAGE 2 MAJOR LOCAL OPTIONS
	Scale: AS SHOWN	This Drawing must not be used for Construction unless signed as Approved	LOCAL CREEK - DETAILS

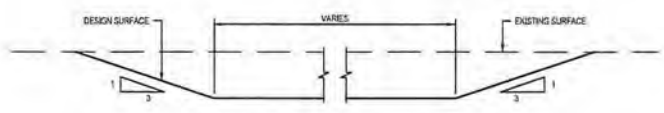
Original Size	Drawing No:	Rev:
A1	41-25323-SK111	A



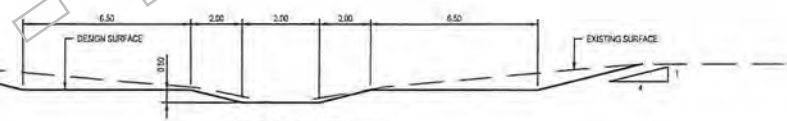
PLAN
SCALE 1:2500



PLAN
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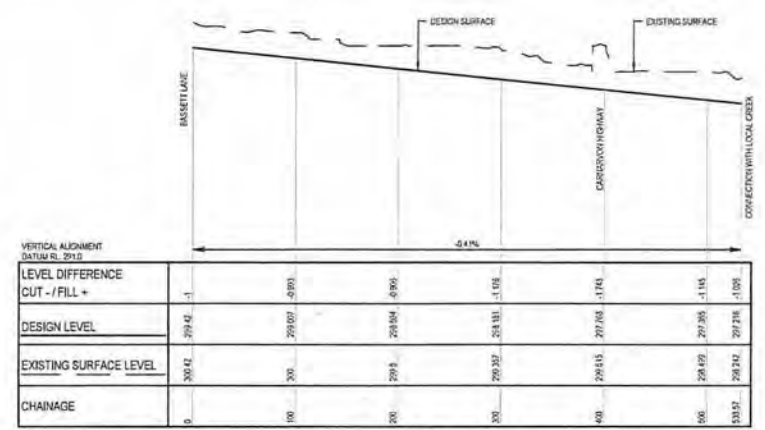
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SCALE 1:100



TYPICAL SECTION
SCALE 1:100



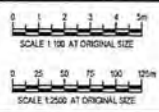
LONGITUDINAL SECTION - LOCAL CREEK WEST
HORIZONTAL SCALE 1:2500 VERTICAL SCALE 1:100



LONGITUDINAL SECTION - LOCAL CREEK WEST
HORIZONTAL SCALE 1:2500 VERTICAL SCALE 1:100

PRELIMINARY

Revision	Notes	Drawn	Checked	Approved	Date
A	PRELIMINARY	LSM	MP*	JP*	02.12.13



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Drafting	Check	Design	Check
Approved	(Project Director)	Date	
Scale	AS SHOWN	This Drawing must not be used for Construction unless agreed as Approved	

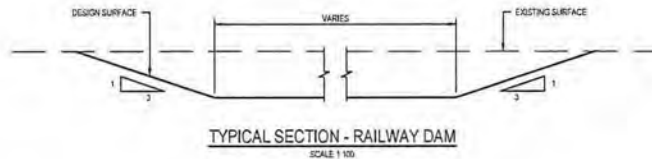
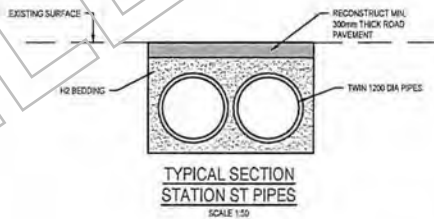
Client	MARANOA REGIONAL COUNCIL	Project	ROMA FLOOD STUDY
Title	PROPOSED STAGE 2 MAJOR LOCAL OPTIONS	Drawing No:	41-25323-SK112
Scale	A1	Rev:	A



PLAN
SCALE 1:2500

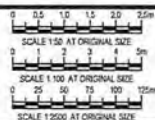


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PRELIMINARY

No.	Revision	100	Initial signature on original issue of drawing or list revision of drawing	LSM	MH*	JP*	02.12.13
A		PRELIMINARY					



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Approved (Project Director)		Date	
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Client	MARANOA REGIONAL COUNCIL
Project	ROMA FLOOD STUDY
Title	PROPOSED STAGE 2 MAJOR LOCAL OPTIONS RAILWAY DAM & STATION ST DRAINAGE - DETAILS
Sheet No.	A1
Drawing No.	41-25323-SK114
Rev.	A

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	L. Macadam M. Kan	M. Holcomb		J. Postlethwaite		03/09/2013
0	L. Macadam M. Kan	M. Holcomb		J. Postlethwaite		02/12/2013

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