Storywate Munagement Report Enclosed



Exhibit бору (statement plus annexure on cd)

## Statement of Mr Tony Martini

### **Director of Engineering, Construction &** Maintenance

## **Moreton Bay Regional Council**

### Volume 1 of 1

QFCI Im 26 09/11 Date: Exhibit Number:

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#### STATEMENT TO QLD FLOODS COMMISSION OF INQUIRY

NAME: Mr Anthony Martini

**OCCUPATION:** Director Engineering Construction and Maintenance – Moreton Bay Regional Council

DATE OF STATEMENT: 9 September 2011

I, ANTHONY MARTINI, Director Engineering Construction and Maintenance, of Moreton Bay Regional Council (MBRC), 220 Gympie Road, Strathpine, Queensland, being under oath, say as to the points raised in the letter dated 19 August 2011 – **Reference Doc 1680907**:

- 1. Details of any council infrastructure that was affected by flooding between the period 1 December 2010 and 31 January 2011.
  - 1.1 Complete Flood Event Damage Register compiled and available as Attachment 1680907-1.
- 2. Details of any flood mitigation infrastructure (for example flood detention basins, storm water culverts, back flow devices) in the Council's area including a description of the maintenance programs for such infrastructure, specific to the following areas:
  - a. Male Road and Flowers Road, Caboolture;
  - b. Dale Street, Burpengary;
  - c. Hideaway Close, Narangba and Mathew Crescent, Burpengary; and
  - d. Dux Street, Mary Street and William Street, Caboolture.
  - 2.1 Male Road and Flowers Road adjoin the King John Creek floodplain to the north-east of Caboolture. The land parcels in this area were created generally in excess of 25 years ago when development standards related to flood immunity were less stringent than today. As a consequence, a number of properties experience flood inundation in and around their dwelling more frequently than would be tolerated in a modern subdivision. There is no flood mitigation infrastructure installed with the specific purpose of reducing this flood affectation. There is a detention basin located at the intersection of Elof Road and Male Road; however this device is not for the purpose of flood mitigation but instead for control of stormwater run-off from an adjoining site that has been developed in the recent past.
  - 2.2 Council has recently investigated possible flood mitigation options for the Male Road area; however due to the observed pattern of flood behaviour in this area, it was found that there are no flood mitigation opportunities available to Council. A copy of Council's investigation report is included as Attachment 1680907-2 on CD.

- 2.3 Dale Street is a flood prone area that adjoins Burpengary Creek. The land parcels in this area were created generally in excess of 35 years ago when development standards related to flood immunity were less stringent than today. There is no flood mitigation infrastructure installed with the specific purpose of reducing this flood affectation. However Council operates a flood warning gauge in this area and at two locations upstream for the purpose of providing residents at Dale Street with improved flood warning.
- 2.4 Council has previously investigated the Dale Street flooding problem and has found that there are no viable flood mitigation opportunities available; however Council is currently evaluating some alternative options including a large detention basin on Burpengary Creek upstream of Oakey Flat Road.
- 2.5 Mathew Crescent is a flood prone area that adjoins Burpengary Creek. The land parcels in this area were created approximately 30 years ago when development standards related to flood immunity were less stringent than today. There is no flood mitigation infrastructure installed with the specific purpose of reducing this flood affectation. Council has recently installed an embankment with backflow prevention devices (flap gates) on a channel adjoining Mathew Crescent. This was installed to re-instate the natural floodplain behaviour that existed prior to the channel being excavated and should not be classified as flood mitigation infrastructure. It is nevertheless important that this device function at all times. Accordingly this device has been designed to minimise maintenance requirements.
- 2.6 Council is currently evaluating options for flood mitigation in this area. A copy of Council's draft report is included as Attachment 1680907-3 on CD.
- 2.7 Hideaway Close is a recent subdivision, approximately 5 years old, and constructed to modern design standards. However, this area experienced flooding during the 11 January flood event. Council believes the reason this occurred is because the 11 January flood event exceeded the design standard that was applied. There is no flood mitigation infrastructure installed with the specific purpose of reducing this flood affectation. Council is currently evaluating options for flood mitigation in this area as described in the report included as Attachment 1680907-3 on CD.
- 2.8 Dux Street, Mary Street and William Street are in a flood prone area that adjoins the Caboolture River. The land parcels in this area were created generally 50-100 years ago when development standards related to flood immunity were less stringent than today. There have been some new developments in Mary Street approximately 3 years ago. There is no flood mitigation infrastructure installed with the specific purpose of reducing this flood and there are no projects underway or under consideration for funding in Council's capital works program at this time for these areas.
- 2.9 There is no dedicated maintenance program to the streets/roads listed. These roads are classified within the MBRC road hierarchy as minor roads. During substantial rain events, or leading up to a forecast substantial rain event, areas which have a tendency towards local flooding are inspected by work crews to check for any obstacles in culverts and stormwater pits. During an event, these crews patrol such areas again looking for any signs of blockages or problems and look to address such matters at the time.

- 3. Details of the stormwater design capacity and urban run-off capacity, sewerage design capacity and the most recent review of these capacities including details of any plans to upgrade.
  - 3.1 Council owns and manages a vast network of stormwater drainage systems spread across the region. The network is assembled into a large number (many thousands) of discrete sub-systems having directly connected pits and pipes. The capacity of these sub-systems and their component pits and pipes will vary according to the age and the design standards applied at the time of system design.
  - 3.2 Council currently does not have any detailed program or plans to undertake a detailed review of the design capacity of the region's stormwater network. Council has a stormwater / drainage asset inspection program, principally targeted at risk assets due to their age and exposure (to sea water). These assets are inspected with CCTV equipment on a rolling 10+ year program. These asset inspections and their outcomes are fed into rolling capital works programs, based upon need and priority. Apart from this program, Council drainage engineering resources are targeted at drainage systems which have had, or are having capacity / performance concerns.
  - 3.3 In relation to the sewerage design capacity, I understand that the Queensland Flood Commission of Inquiry ('Commission') has sought information from Unitywater regarding water and sewerage infrastructure matters. Unitywater are best placed to provide information pertaining to the degree if any, of the flood affectation of these assets, as well as the capacity of such assets.

All the facts sworn to in this affidavit are true and correct to my knowledge and belief except as stated otherwise.

Sworn by ANTHONY MARTINI at Strathpine this 9<sup>th</sup> day of September 2011 before me, Angus James Conaghan: (

Solicitor			 
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Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Parks Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Davboro Road	Replace 2 x dog dispensers and bollards Replace 1 x Park Name Signage	\$1,000
Parks	Sweeney Reserve - Old Dayboro Road	Replace various informational signage destroyed by flood waters.	\$2,000
Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	Replace 1 x Kompan Swing Element Replace 3 bench seats	\$4,000
Parks	Sweeney Reserve - Old Dayboro Road	Replace roof panels from picnic shelter Renjace 1 v Komnan water activity nlav alament unabla to access until	\$5,000
Parks	Sweeney Reserve - Old Dayboro Road	trees and vegetation removed from on top of equipment	\$5,000
Parks	Sweeney Reserve - Old Davboro Road	Repair 1 x double swing gate. Unable to assess full extent of damage until trees and vegetation have been removed from on top of equipment.	\$5.000
		Canoe ramp has erosion and damage to timberwork requiring repair. Unable to assess extent of damage until trees and vegetation have been	
Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	removed from on top of infrastructure. Replace 1 x Kompan play unit.	\$5,400 \$7,000
Parks Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	2 x Playground rubberised animals washed away - to be replaced. Replace 3 water bubblers	\$7,000
Parks	Sweeney Reserve - Old Dayboro Road	Replace 3 x Kompan Spika Elements Rollards and continuous rail fancing to be replaced. Theoble to access	\$8,000
Parks	Sweenev Reserve - Old Davhoro Road	requirements until trees and vegetation have been removed from on top of infrastructure	000 01\$
Parks	Sweeney Reserve - Old Dayboro Road	Playground rubber softfall - to be replaced.	\$10,000
Parks	Sweeney Reserve - Old Dayboro Road	Removal of rubble from play area, demolition, removal and replacement of damaged infrastructure.	\$10,000
Parks	Sweeney Reserve - Old Dayboro Road	Replace 5 x 240 It gossi litter bins and concrete slabs Replace 1 x Kompan Galaxy play combo unit unable to assess until treas	\$12,500
Parks	Sweeney Reserve - Old Dayboro Road	and vegetation removed from on top of equipment	\$15,000
Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	Replace 1 x Peddle Power Velositron and surrounding fencing Playground bark softfall x 176 m3 @\$110 - to be replaced.	\$17,000 \$19,360
Parks Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	Replace 1 x Kompan double slide element Replace 1 x Kompan Multigoal	\$20,000 \$25,000
		Exercise Fauitoment - 3 x Plav rone Exercise Flements damaged and	
Parks	Sweenev Reserve - Old Davboro Road	requiring repair / replacement. Unable to assess full extent of damage until trees and vegetation have been removed from on top of equipment	\$25 000
Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	Replace timber boat and walkway/bridge.	\$30,000
20.	Owcering head ve - Old Daybord hoad	Replace 1 × promoted by Securitys Replace 1 × Corocord Net Play Element, unable to assess until trees and	000,000
Parks	Sweeney Reserve - Old Dayboro Road Sweeney Reserve - Old Dayboro Road	vegetation removed from on top of equipment Replace 4 Landmark shelters	\$35,000 \$60,000
Parks	Sweeney Reserve - Old Dayboro Road Sweeney Becerve - Old Dayboro Road	Replace 3 timber octagonal shelters	\$60,000
Parks	Sweeney Reserve - Old Dayboro Road	Replace dog off leash cyclone wire fencing - 416 lineal metres	\$70,000
Parks Parks	<u>Sweeney Reserve - Old Dayboro Road</u> Pine Rivers Park - Gympie Road	Remove fallen vegetation. 2 x bollards need reinstating	\$80,000 \$200
Parks	Pine Rivers Park - Gympie Road	10 lm of continous rail fencing needs repair at BMX jumps.	\$500
Parks	Pine Rivers Park - Gympie Road Pine Rivers Park - Gympie Road	1x 240 It gossi bins and concrete slabs damaged and washed away. Playground bark softfall to be replaced.	\$2,500 \$20,000
Parks	Pine Rivers Park - Gympie Road	Replacement of shelter.	\$15,000
Darks Darks	Prire Rivers Park - Gyrifpie Road Dine Bivers Dark - Gymnia Brad	Re-engineering of eroded bank and removal of hyacinth and other storm	000 02\$
28		Revegetation and reinstatement of eroded embankments.Rock protection, reinstating gravel carpark road and replacing bollards and other drainage	000 00 00 00 00 00 00 00 00 00 00 00 00
Parks	Bunya Crossing Reserve - Dugandan Rd	infrastructure.	\$50,000
Parks	Bunya Crossing Reserve - Dugandan Rd	Intrastructure - missing and damaged bollards, some with footings exposed. To be replaced.	\$2,000
Parks	Bunya Crossing Reserve - Dugandan Rd	River sand/rock/sludge to be removed from lower grass area of the park and car park.	\$5,000
	Mathew Hawthorne Park - Lancewood	Flying Fox Rubber softfall 210m/2 @ \$203.00. Price for replacement of entire rubber surface as decomposed granite pavement sub grade washed	
Parks Parks	Drive Stanton Reserve - Tanager St	away. Under Review Revegetation and reinstatement of eroded banks.	\$42,630
Parks	Stanton Reserve - Tanager St	Removal of trees and storm debris from parkland. Levelling of eroded sections of the park.	\$15,000
Parks	Kim Grayson Park - Country Club Drive	Removal of storm debris from grassed areas in park.	\$300
Parks	Kim Grayson Park - Country Club Drive	Removal of tree and other storm debris from creeks.	\$500
Parks	Arlington Park - Arlington Drive	<ol> <li>X Megatoy swing damaged and removed by crews. New swing needs reinstating.</li> </ol>	\$3,000
Parks Parks	Camden Park - Bringelly Street Tarnee Park - Tarnee St	Playground bark softfall x 25 m3 @\$110. Playground bark softfall x 10 m3 @\$110.	\$2,750
Parks	William Scott Park - Bunya Road	Off leash fence - intall new cable wire and general repairs.	\$4,000
Parks	William Scott Park - Bunya Road Alfredson Park - Collins Rd	Removal of trees and other storm debris from creek line. Removal of tree debris in park land.	\$1,800 \$600
L'AIRS	JOINI DIAY PARK - NEUSINGION WAY		000,2¢
Parks	Hideaway Estate - Conondale to Lindsay Rd Bill Madders Plaveround - Corvus St	Reinstate soil and mulch along pathway from Conondale to Lindsay Kd through to natural area. Re-establish10 cubic M soil & 20cubic M mulch. Playoround bark softfall x 30 m3 @\$110	\$700
Parks	Winn Rd and Old School Rd Cnr Road Reserve - Cedar Creek Rd	Removal of tree down on edge of road. Clearing tree debris from road (assisting R&D).	\$700 \$700 \$260
Parks	Andy Williams Park - Cedar Creek Rd	Removal of several trees down, approx 2hrs work for tree crew	\$1,500
Parks	Road Reserve - Thompson Rd	Removal / chipping of branches down adjacent to Dakabin Train Station .	\$200

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Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Parks Parks	Apex Park - Mt Samson Rd Apex Park - Mt Samson Rd	Shelter has gone; BBQ damaged, benches missing. To be reinstated. Removal of fallen trees and removal of storm debris in the bark.	\$20,000 \$10.000
Parks	Henry Bradley Park - Laidlaw Street	Supanova, clean and reinstate	\$700
Parks Parks	<u>Henry Bradley Park - Laidlaw Street</u> Henry Bradley Park - Laidlaw Street	Spica bearing replacement Plavaround bark softfall x 98m3@\$110	\$925 \$10.780
Parks	Henry Bradley Park - Laidlaw Street	Removal of tree and storm debris around creek area	\$500
Parks	Old Plumbers Workshop Hall - Williams Street	All softfall has been washed away - to be replaced. Pool car park has silt and debris through it - to be cleaned. Small trees uprooted and lost all mulch from gardens - debris to be removed and damaged infrastructure reinstated.	\$2 500
Parks	Dayboro - Office - Williams Street	Removal of storm debris in rear yard of property and repairs to fence damage.	\$500
Parks	Louisa Williams Park - Williams Street	Replacement of mulch washed out of garden beds.	\$500
		This park has lost a footbridge and is lodged under the other bridge - demolition and reinstatement required. An amount of debris to be	0000,1 \$
Parks	Williams Street	removed. All mulch gone from gardens and requiring replacement. Debris over parkland, park sign down, mulch gone from gardens - to be	\$6,000
Parks	Lions Park - Williams Street North Pine River - Williams Street	reinstated. Assist SES/Police with road closures (7.30am till 6.30pm). Labour and	\$500
		Removal of storm debris over parkland and adjacent culvert crossing. Repair damage to neighbouring fenceline and salvage a boat that has been	
Parks	Roderick Cruise Park	Corocord Climbing net loose at footing.	\$400
Parks Parks	Roderick Cruise Park Roderick Cruise Park	Drainage in playground needs reinstating. Rubber pad underneath swing requires replacement.	\$2,000 \$7,554
Parks Parks	Roderick Cruise Park Road Reserve - Laceys Creek	Playground bark softfall x 120m3 @\$110 Remove fallen trees and flood debris.	\$8,050
Parks	Dohles Rocks Foreshore - Dohles Rock Road	Kopper log barrier needs repair: 2 x 3.6 lm kopper log tops and 2 x posts.	\$150
Рагко Вагко	Dohles Rocks Foreshore - Dohles Rock	Aerste and sieve sand for foreign particles - Siytech	\$450
Parks	Kumbartcho CC - Bunya Pine Cout	Pressure clean and sterilise surface area covered with slime	\$3,500
Parks	Rivergum Drive Fark - Rivergum Drive Bowman Park - Lily St	Playground bark softfall × 5 m3 @\$110	\$550
Parks Parks	Mimoora Park - Basand St Murlac Park - Montague St	Playground bark softfall x 10 m3 @\$110 Playground bark softfall x 8 m3 @\$110	\$1,100 \$880
Parks	George Willmore Park - Ferny way	Playground bark softfall × 80 m3 @\$110 Disconted bork softfall × 40 m3 @\$110	\$8,800
Parks	Balstrup Park - Duffield Road	Playground bark softfall X 40 m3 @\$110	\$4,600
rarks	Kingrisner Park - Allison Urive	Playground bark sortiall X 10 m3 @\$110 Remove / chip branches down on Old Gympie Rd between Ann St and	00L.1.¢
Parks	Road Reserve - Old Gympie Rd Road Reserve - Cnr of Hipathites Rd &	Vinney Av	\$200
Parks Parks	Mount Samson Rd Road Reserve - Rasin Rd	Remove tree across road Remove / chin fallen trees and flood debris	\$17 500
Parks	Road Reserve - Dales Rd	Remove / chip fallen trees and flood debris	\$17,500
Parks	Road Reserve - Pringles Rd	Remove / chip fallen trees and flood debris	\$17,500
Parks	Mick Hanfling Park - Torrens Rd	Remove / chip branches down in Mick Hanfling Park near picnic shelters Pick up and chip branches down various locations on Narangba Rd	\$300
Parks	Koad Keserve - Narangba Kd	perween Gair Kd & Torrens Kd Repair electric pumps and replace the electronic switchboard system which	002¢
Parks	Lawnton Pocket Rd - AFL	supports pumping system. Floodwater over irrigation pumps - AFL & Junior AFL fields.	\$3,500
Parks Parks	Leis Park - Leis Parade Leis Park - Leis Parade	1 × sliprail needs repair 30 lm of plavaround concrete edding missing - to be reinstated.	\$1,550
Parks	Leis Park - Leis Parade I eis Park - I eis Parade	1 × picnic settings damaged @ \$3000 each - to be repaired. Plavoround bark softfall x 105 m3 @\$110 - to be reinstated.	\$3,000
Parks	Leis Park - Leis Parade	1 × 5 lm swing gate needs repair/replacement	\$4,000
Parks	Leis Park - Leis Parade Leis Park - Leis Parade	Prayworks vvnizzer needs repair to bearing 1 x shelter needs timber repairs	\$5,000
Parks Parks	Leis Park - Leis Parade Leis Park - Leis Parade	Playworks ski style swing damaged and needs repair 120 lm of bollards need repair and replacement	\$7,500 \$8,000
Parks	Leis Park - Leis Parade	1 × Christies BBQ damaged beyond repair - to be replaced. 360 Im of Kopper log fencing requires repair and replacment (Bollard	\$12,000
Parks	Leis Park - Leis Parade	Costing as replacement)	\$24,000
Parks	Leis Park - Leis Parade	Playworks climbing net washed out and moved off footings - to be replaced.	\$15,000
Parks	Leis Park - Leis Parade	Remove trees and storm debris from parkland. Reinstate internal roadways. Undertake bulk earthworks to return grades of the parkland.	\$100,000
Parks	Paisley Park - Gymple Kd Ron Thomason Park - Todds Rd	Remove and chip debris along school tence. Pressure clean concrete footpath covered in mud.	\$400 \$400
Parks	Stephen Lawn Park - Bray Rd Boad Besente - Britch/s I and	Remove approx.100 cubic metres soll/sand piled in park, needs to be removed, many truck loads of debris and trees to be removed. Remove and chin trees fallen across road	\$6,000
Parks	Road Reserve - Ludsty 3 Land Road Reserve - 1 indsav Road	Undertake emergency response to remove and chip tree across Road -	\$200
Parks	Road Reserve - Mt Brisbane Road	Undertake emergency response to remove and chip trees across road: 3 separate landslips.	\$600
Parks	Road Reserve - Mt Pleasant Road	Undertake emergency response to remove and chip trees across road.	\$600
Parks	Road Reserve - Brays Rd	Remove split tree on Brays Rd.	\$200

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Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Parks	Road Reserve - Ogg Rd	Undertake emergency response to remove and chip tree across road.	\$400
Parks	Road Reserve - Pine River Drive	Remove and chip branches down (near bus stop) on Pine River Dr.	\$200
Parks	Road Reserve - Pine River Drive	Attend to After Hours Call Out (assist Police) - Tree across road.	\$400
Parks	Roderick Cruice River Tce Park - Avonlea Street	Salvage shipping container in river. Heavy vehicle recovery to winch out and Council float to Burpengary depot.	\$700
Parks	Creekside Park	Alphatonia Ct to Lookout Place - Reinstate pathway edge back fill with soil. Re-mulch Gardens. Re-stake trees. Numerous trees down in water way restricting water flow. Est. 10cubic m soil & 50 cubic m mulch.	\$3,100
Parks	Creekside Park	Between Hideaway Cl & RiverOak way - Re-instate rock and geofabric cloth in drain way. Parkland from Hideaway Close along Riveroak Way.	\$450
Parks	Creekside Park	Hideaway Close - Back fill with Rock (2cubic metre) and soil (2 cubic metre) Parkland off Hideway Place Narangba. Creek bank erosion.	\$1,200
Parks	Greenways Park	Magenta Cr to Cootamundra Dr - Re-instate soil fill & mulch along path edge. 1x foot bridge edge board replace. Greenways Park Narangba Pathway MagentaCr to Cootamundra Dr.	\$150
Parks	Greenways Park	Ridgeview Dr - Re-instate fill around headwall Re-instate fill along pathway. Est. 6cubic M soil & 20cubic M mulch. 2 x photos of pathway bridge & 2 x photo of pathway behind 69 Ridgeview Dr. Narangba	\$750
Parks	MacDonald Dr Reserve - Macdonald Dr	Replace rock fill and garden edging. Parkland/Lake along Macdonald Dr Narangba.	\$260
Parks	RiverOak Way - Golden Wattle to Wanderer Ct	Re-instate soil fill and mulch pathway from golden Wattle to Wanderer Ct	\$500
Parks Parks	Koad Reserve - Oakey Flat Kd Stony Creek Reserve - Creekside Drive	Kemove tree in creek: Shultz Bridge (assisting R&D) Re-instate Garden edging and mulch Re-instate rock and GEO fab cloth. Stony Creek Reserve of Creekside Dr & Riveroak way.	\$220 \$1,200
Parks Parks	<u>Merv Ewart Reserve - Youngs Xing Rd</u> Mungarra Reserve	Remove and chip large fallen trees at the Youngs Crossing end of the Park. Affleck Crescent - 2 x picnic settings damaged @ \$3000 each	\$15,000 \$6,000
Parks	Mungarra Reserve	Affleck Crescent - 70 lm of dog off leash fencing remove and repair Affleck Crescent - 3 x bench seats need replacing around lake @1500	\$40,000
Parks	Mungarra Reserve	each	\$4,500
Parks Parks	Mungarra Reserve Mungarra Reserve	(Colby Place) - Carmody Court - Canoe ramp requires reinstating Affleck Crescent - Reinstatement of the skate ramps	\$6,000 \$8,000
Parks	Mungarra Reserve	Midson Avenue to Afflect Avenue - Collect branches & flood damaged trees on bicycle pathways	\$2,200
Parks	Mungarra Reserve	Young's Crossing to Afflect Avenue - Collect branches & flood damaged trees on bicycle pathways	\$2,200
Parks Parks	Mungarra Reserve North Pine Country Park - Dayboro Rd	Affleck Crescent - Remove and chip trees down on the entrance road and debris around the boom gate. Clear other trees down through the park. Remove and chip many trees down around the rear car park area.	\$8,000 \$30,000
Parks	Road Reserve - 17 Washbrook Cr Road Reserve - Old Gvmpie Rd	Emergency response to attend tree down (cnr of Markwell Court & Washbrook Cr) Collect branches & flood damaged trees in WWIIie Park	\$400 \$880
Parks	Wivilie Park	Exercise Equipment - Anzac Avenue - Clean service equipment and rubber	A 400
Parks	Wyllie Park	Anzac Avenue - Reinstate and repair fence along riverbank.	\$12,000
Parks	Wyllie Park	Gympie Rd - Remove and chip numerous trees down (Tree Crew). Revegetate and reinstate the river bank that has eroded. Pressure clean silt on paths and over shelters and seats, mulch gone from gardens (Wes Porter).	\$10,000
Parks	Youngs Crossing Road	Remove and chip trees fallen and damaged along this area near the crossing itself and on the embankment .	\$5,000
Parks	Uralba Park - Westwood Drive	Playground sand softfall x 10 m3 @ \$120	\$1,150
Parks	Uraiba Park - Westwood Drive	Playground infrastructure damaged and requires repair and replacement.	\$6,000
Parks	Uralba Park - Westwood Drive	Remove and dump large rocks, covered over grass surface of park.	\$2,500
Parks	Uralba Park - Westwood Drive Undambi Rotary Reserve - Mt O'Reilly	Reinstate creek line wash outs. Reinstate / revegetate bushland and creek line area small amout of	TBA
Parks	Road Indombi Potony Poconio Mt O'Boilly	trees/mulch/creek batters washed away.	\$350
Parks Parks	Undaritur Kudary Keserve - Mrt U Kelliy Road Road Reserve - Basin Rd	Repair minor wash outs in open grass area to be reinstated. Remove and chip tree down front entrance of cemetery.	\$500 \$800
Parks Parks	Bob Bell Park - Learmonth Street Odempa Park - Gray St Peter Camphell Park 2 - Ehon Count	Playground sand sof tfall to be cleaned. Playground bark softfall x 10 m3 @\$110 to be reinstated. Playground bark softfall x 50m3 @\$110 to be reinstated.	\$5,000 \$1,100 \$5,750
Parks	Pitonda Wav - Dixon Street	Repair / reinstate the concrete footpath that has fallen into river. Reinstate severe embankment erosion requires engineering solution	\$50.000
Darko	Rob Akers Reserve - Lawnton Pocket	Pressure clinical multion, covering entire area. Remove minor amounts of debris with ich trucks and a loader when drier	
Parks	Road Reserve - 11 Grant Street Relair Fetate	Collect and dispose of tree debris. Renair / reinstate 20m deco nath	\$800
Parks	Belair Estate	Reinstate / repair birdcage, footpath , and remove and chip storm fallen trees and debris	\$30,000
Parks Parks	Kendall Rd. Park - Kendall Road Moleny Pice	Sand x 10mtr Eroded areas,Remulch/Stabilise	\$1,100 \$29,000

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Parks	Verge Pice Pk	Replace / repair damaged Trees	\$4,500
Parks	Arboretum Arboretum	Signs to be replaced 600m3 mulch to be replaced	\$6,000
Parks	Arboretum	Backfill electrical trench.	\$5,000
Parks	Arboretum	Remove and chip fallen trees and storm debris - open areas	\$5,000
Parks	Arboretum Arboretum	Keplace / reinstate satety tence pipe over river Renlace 100m foothridge safety rail	\$15,000 *35,000
Parks	Arboretum	Remove boat/trailer/horse float and other storm debris	\$25,000
Parks Parks	Arboretum Bert Webster Park - Park Street	Remove sitt/ debris/ trees from footpaths Replace sand x 10mtr	\$40,000 \$1,100
Parks	Centenary Lakes	Floodwaters damaged fences - Athletics - 4' high chain wire fence and aates destroved adiacent to Athletics long iump bit.	\$10,000
Parks	Centenary Lakes	Netball courts covered in a thick laver of silt and mud	\$35,000
		Little Athletics, 2 x shot put wire fences plus 152 m chain wire fence and posts plus 150 x 1 m rubber coating on track, silt to be removed, replace	
Parks	Centenary Lakes Centenary Lakes	60m3 of sand 1 000 m3 multch to replace wash away	\$40,000
Parks	Centenary Lakes	Replace flood damaged fence around veladrome	\$1,100
Parks	Centenary Lakes Centenary Lakes	Replace flood damaged fence at BMX track Eriandshin Dk Soft fall bark 20m3	\$1,700
Parks	Centenary Lakes	Replace 96mtr of fence behind netball courts	\$3,700
Parks	Centenary Lakes	Fountain pump pull out and clean river pumps, pull and clean x 3	\$4,000
Parks	Centenary Lakes	Floodwater over irrigation controllers - Rugby League - Replacement of 16 station 'scorpio' of Irrenet irrigation system need to be replaced.	\$4,700
Parks	Centenary Lakes	Floodwater over irrigation controllers -Netball - Replacement of 16 station 'scorpio' of Irrenet irrigation system need to be replaced	\$4 700
Parks	Centenary Lakes	Floodwater over irrigation controllers -Athletics - Replacement of 16 station 'scorpio' of Irrenet irrigation system need to be replaced.	\$4.700
		Floodwater over irrigation pumps - Netball - Replace damaged electric	
rarks	Centenary Lakes	pumps and replace the electronic system which supports pumping system Floodwater over irrigation pumps - Athletics - Replace damaged electric	000,6\$
Parks	Centenary Lakes	pumps and replace the electronic system which supports pumping system Replace sand 60m3 Apex Philics excertation removal and diamains of	\$5,000
Parks	Centenary Lakes	replace same softial contaminated softial	\$5,500
Parks	Centenary Lakes Centenary Lakes	Tennis Crts 20m fence , debris Elocid demore to rijhher soft fell provinci exercise conjument	\$7,000
Parks	Centenary Lanes	River pumps, pull and clean x 3	\$12,000
Parks	Centenary Lakes	Replace 485 mtr. Bollards around car parks Mud on buildings on the states many and tunnel mode on the DMY tunk	\$13,100
Parks	Centenary Lakes		\$25,000
Parks	Centenary Lakes Centenary Lakes	Reinstate the riverwalk footpath ,mud, trees, debris and infrastructure Centenery 1 stee Footnath mud to be removed	\$18,000
Parks	Centenary Lakes	Remove mud and debris from fences (pressure clean)	\$30,000
Parks	Centenary Lakes	Remove silt, replace footpath road base, 50m x 1.2m x100mm tree removal. Apex Park,	\$30,000
Parks	Centenary   akes	Replace / reinstate 110 m arc mesh fence and posts replace footpath from entrance Centenary Lake to Filiott St Takeside Moravfield Road	
Parks	Centerlary Lanes Linfield Dve Park - Linfield Drive	Silted sandpits - Replace sand x 20 mtr	\$2,200
Parks	Platypus Creek Park - Julie Drive	Bark x 60mtr plus excavation, removal and dumping of contaminated softfall	\$6,600
Parks Parks	Ruby Park - Paulsen Street Reserve adiacent to Weir	Silted sandpits - Replace sand x 10mtr Remove and chip tree and storm debris. signs.2 x 2 m rails missing	\$1,100 \$15.000
Parks	Beach Park - Beach Road	Replace mulch / bark × 20mtr	\$2,200
Parks	Twinview Park - Twinview Road	Silted sandpits - Replace sand x 5mtr	\$550
Parks	Devine Ct	Cricket & Soccer -Floodwater over Infigation pumps - Unckey Soccer - Replace damaged electric pumps and replace the electronic system which subnorts pumping system	\$5.000
Parks	Arthur Allan Park - Kirkaldy St	Repair 12m deco path Arthur Allan Pk	\$4,000
Parks	Oxley Avenue - Athletics, Cricket & school usage	Floodwater over irrigation pumps - Athletics, Cricket & school usage - Repair electric pump and replace the electronic system which supports pumping system.	\$3,500
Parks	Redcliffe beaches	Removal of storm debris deposited on Redcliffe beaches from Brisbane River	\$500,000
Parks	McGahev Street - AFL	Floodwater over irrigation pumps - AFL - Repair damaged electric pump and replace the electronic system which supports pumping system.	\$3,500
Parks	Bilinga Crt. Park - Bilinga Court	Replacement of Sand x 20mtr	\$2,200
-		Cricket/ Junior AFL - Floodwater over electronic swithboard - Cricket/ Junior AFL - Repair damaged electric swithboard which supports pumping	
Parks Parks	Bestman Rd East War Vet's Park - D'Aquilar Highway	system. IBark × 5mtr - to be reinstated.	\$1,500
Parks	Campbells Pocket Rd - Athletics, Hockev & Cricket	Replacement / repair of 100 metres of 65mm 'main pressure' main line polyethyline pipe with fittings. Pipe transversed creek from the pumping equipement to the storage tanks. Pipe has been destroved.	\$5,000
Parks	Campbells Pocket Rd - Athletics, Hockey & Cricket	2 × Bore primp switchhoardsand 2 × associated pressure tanks	\$5 900
202		Reinstate creek access point to allow crossing to service pumps and allow	0000 0000 0000
Parks	Campbells Pocket Rd - Athletics, Hockey & Cricket	tractors access to mow and maintain parkland. Replacement of 10 cubic metres of rock placement and shaping	\$10,000
Parks Parks	Ironbark Dr Park - Ironbark Drive Tilney Park - Coronation Avenue	Bark x 30m3 - to be reinstated. Sand x 10m3 - to be reinstated.	\$3,300
0 1-1-0 0		Floodwater over irrigation comtrollers - Rugby League grounds - Replacement of 16 station 'scorpio' of Irrenet irrigation system need to be	
Land	Kuyuy reayue - incurain nu	leplaceu.	>> · · · · · · · · · · · · · · · · · ·

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Parks	Touch & Cricket - Neurem Rd	Floodwater over irrigation comtrollers - Touch fields - Replacement of 16 station 'scorpio' of Irrenet irrigation system need to be replaced.	\$4,700
Parks	Rugby League - Neurem Rd	Floodwater over irrigation pumps - Rugby League grounds - Replace damaged electric pumps and replace the electronic system which supports pumping system	\$5,000
Parks	Touch & Cricket - Neurem Rd	Floodwater over irrigation pumps - Touch football Cricket grounds - Replace damaged electric pumps and replace the electronic system which supports pumping system	\$5,000
Parks	Burpengary Equestrian Centre - Rowley Rd Riding For The Disabled (MRRC)	Undertake Soil Testing for assessment of E coli levels. Plavarnund Softfall washed out 80 m3 @ \$110 _ to be realized	\$500
	Cartmill Centre of Burpengary Riding for		000'00
Parks	the Disabled Inc - Kilkenny Dve Greenways Park	Undertake Soil 1 esting for assessment of E coli levels. Removal of Flood debris from gardens and reinstate mulch	\$13.000
Parks Parks	Hedges Ave Park New Settlement Road	Reinsate flood affected gardens Reinsate flood affected gardens	\$6,500
Parks	New Octaenent 100au Sandstone Doint	Sandstone Point has a track down the escarpment to the beach. The boxed in decorposed to the boxed	
Parks	Grogan Rd Park	Repair track damage, still partly flooded, tracks have been closed needs further inspection once it dries out	
		Removal and chipping of trees over concrete pathway. Repair / reinstatement of concrete pathway. Removal of trees within planting area	
Parks Darke	Intungarra Keserve	Remove and chip fallen trees, Repair bitumen pathways and repair damage	\$35,000
Parks	Dave Burton Park	Repair Rec Trail erosion	\$6,000
Parks Darke	Laurie Smith Gardens Edward Alison Dark	Repair Rec Trail erosion Remediation of silted areas. Remove and repair damaged trees. Repair	\$6,000
		park access road also damaged. Remove and chip trees down over pathways. Remediate erosion on Rec	\$8,000
Parks Parks	Doug Stevens Park Sargents Reserve	Trail (blue metal and approaches to boardwalks) Trees down on causeways, erosion to approaches to causeways	\$10,000 \$10,000
Parks	Bunya Riverside	Repair erosion of pathway, remove water over rec trail and remove and chip trees and logs over recreation trail.	\$20.000
Parks	Samford - CSIRO	Repair / reinstate pathway erosion.	\$12,000
Parks	i renuram Fark Domrow Rd - North	Grading and slashing of blue literal Track Repair / remediation of erosion of Blue metal and pathway	009'/\$ 20'2
Parks	Pony Club Rec Trail	Repairs to slope and erosion on hills	\$7,500
Parks	Mt Mee Rd Rec Trail Under bridge	Repairs / remediation of erosion. Repairs to erosion caused on causeway.	\$10,000
Parks	Rush Creek Bridge	Undertake desilting and erosion control on possible missing part of trail	\$30,000
Parks	Layboro - Layboro Ka Kec Irali near Forbes Creek	Grading and drainage of blue metal track.	\$8,000
Parks	Days Rd Rec Trail	erosion	\$20,000
Parks	Sheep Station Ck Con Park	Removal and chipping of trees down and repairs to track damage	\$20,000
Parks	Apex Park - Mt Samson Rd	Repairs to track damage, replanting of areas damaged by overland flow.	\$17,000
Parks	Neilson Road Rec Trail	Remove and chipping of fallen trees. Repairs / remediation of eroded recreation trails.	\$15,000
Parks	Gympie Rd -Bald Hills Flats	Reinstallation of mulch on large garden area along the Bald Hills Flats.	\$16,885
Parks	Old Northern Kd - Keong Kd	Reinstatement of mulch into garden beds and levelling of turred areas.	\$8,250
r rarks	Greenways Park	Remove and reinstate damaged section of footpath and bridge	000,84
Parks	Dayboro Mount Pleasant	Repairs to tencing surrounding perimeter of soccer fields Fire Trail damage 3 x crossings, major concrete, pipe or rock needed.	\$50,000
Parks	Townsend Rd Reserve	Fire Trail damage 1 x crossings, pipe or rock needed, erosion on trail.	\$15,000
Parks	brian burke keserve Dean Drive Reserve	Fire Trail damage 5 × crossings, pipe of rock needed, erosion of trail. Fire Trail damage 3 × crossings, pipe or rock needed, erosion on trail.	\$30,000
Parks Parks	Retreat Court Reserve Yarral - Yarral Reserve	Fire Trail damage 1 x crossings, pipe or rock needed, erosion on trail. Fire Trail damage 1 x crossings, pipe or rock needed, erosion on trail.	\$3,000 \$10,000
Parks	Dawn Road Reserve	Fire Trail damage 2 x crossings, pipe or rock needed, erosion on trail.	\$20,000
Parks	Hepatitis Road Reserve	Fire Trail damage 2 x crossings, pipe or rock needed, erosion on trail.	\$10,000
Parks	Eatons Crossing Rd Rec Trail	Rec Trail erosion, grading needed. Domoval of traa dobrie – reinstatement of Cashe Crossing Dec Trail	\$6,050
Parks	Journ Fille Nu Neserve Youngs Crossing Reserve	Replace cultural heritage interpretive marker.	096\$
Parks	Mt Glorious Rd Rec Trail opp Sunset Grove	Rec trail - repair/ construction creek crossing with pipes, headwalls & erosion.	\$7,390
Parks	Mt Glorious Rd Rec Trail	3x creek crossings Rec trail - renair/ construction creek crossing with pines, headwalls &	\$7,000
Parks	Valray Place Rec trail	erosion. Denair 24 annociment	\$7,210 \$10 802
Parks	Jagerra Сги пшь гес тташ Greggs Rd Rec Trail	repair zx crossings Repair rec trail & 3x crossings	2000,6\$
Parks	Glorious Drive Rec Trail	Trail bog spots & erosion Eico troit orocion	\$4,000
	Dayboro - Dayboro Rd - Rd Rec Trail		000.00
Parks	various spots Narandba Road Reserve	Bog spots & erosion Fire trail erosion	\$3,000
Parks	Gibson Court Reserve Rec Trail	Large section of trail washed away	\$20,000
Darks	Railing Giourus - Shurt St Macharitan Dark	Priaygrounu - renomy washeu away * zonn Disvoronind hark cofffall Y 15 m3 @\$110 - reinstate	\$1.650
Parks	Beech Drive Park	Playground bark softfall x 36m3 @\$110 - reinstate	\$3,960
Parks	Henry Clench Park	Forpark slide damaged with large log on top of element	\$1,500

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Parks Parks	Brian Daley Park Douglas Franklin Reserve	Repair trail & creek crossings x 2 Rec trail erosion & subsidence	\$14,945 \$20,000
Roads	Leis Park - road to boat ramp	Replace/ repair	\$30,000
Roads	Laidiaw Ro Ladies Rd	Pavement Pails - 41mz Shoulder slip	\$40,000
Roads	Cedar Creek Rd - near 202 Cedar Creek Rd - opposite 760	Slip previously part of Cedar Creek Rectification 7022307W Slip previously part of Cedar Creek Rectification 7022307W	\$60,000
Roads Roads	Cedar Creek Rd - near 703 Wirth Rd - 7th Crossing	Slip previously part of Cedar Creek Rectification 7022307W Causeway washed away.	\$10,000 \$40.000
Roads	Wirth Rd - 8th Crossing	Causeway washed away.	\$40,000
Roads	Wirth Rd - 9th Crossing	Causeway washed away.	\$40,000
Roads	Robbs Rd - 5 sites	Pavement Fails - 1 otal 3990m2 - 240m2 + 636m2 + 672m2 + 624m2 + 1818m2	\$179,550
Roads Roads	Clark Rd - 1 site Bleakley Park East - Sandy Cr - off Strathford Ave	Pavement Fails - 360m2 Rock protection around bridge abutment slipped away from main bank leaving a gap of about .5m	\$300,000 \$15,000
Roads	Laceys Creek Rd - 1220	Crossing washed away - filled with gravel for resident's access.	\$70,000
Roads	Lawnton Pocket Rd	Stabilisation Programme - 600lm	\$180,000
Buildings	Buchanans Park	BBQ - Single Plate: Repair - Wash Out and Clean Control Boxes, element and plate. Spray all components with Electraclean & CRC. Power up and Test. Replace Faulty Components as required.	\$3,000
Buildings	Buchanans Park	Electrical Switchboards(2): Repair: - Wash Out and Spray all components with Solvent& CRC. Power Up and Test. Replace Circuit Breakers with new as necessary	\$3,500
Buildings	Riding For The Disabled (MBRC)	Toilets: Remove Mud and Sludge, Replace cisterns and components as required. All Buildings, Switchboards - Wash Out and Spray all components with Solvent& CRC. Power Up and Test. Replace Circuit Breakers with new as necessary. Sewerage Pumping Station: Clean and remove debris. Repair / replace electronic components for telematry. Power up and Test.	\$11,051
Buildings	Station Street - #184 - MBRC	Roof Leaks - Remove sheets, Application of sealants replace sheets: , A/C Duct - Remove and replace wet sections - (Tenanted Leased Premises)	\$4,600
Buildings	Centenary Lakes	Hexagon toilets: remove mud and sludge; replace cisterns and components as required. All building switchboards: wash out and spray all components with Solvent & CRC. Power up and test. Replace circuit breakers with new as necessarv.	\$4,000
Buildings	Centenary Lakes	Tennis Club - Toilets: Remove Mud and Sludge, Replace cisterns and components as required. All Buildings, Switchboards - Wash Out and Spray all components with Solvent& CRC. Power Up and Test. Replace Circuit Breakers with new as necessary.	\$5,000
Buildings	Caboolture	Caboolture Rugby League Football Club - Repair field lighting: wash out and clean control box. Wash out and clean (6) poles. Spray all components with solvent and CRC. Power up and test. Replace faulty items as necessary.	000 \$\$
Buildings	Centenary Lakes	Sewer pump station (SPS)(2): remove and clean debris . Repair and replace electronic components and telematry as necessary. Power up and test.	000'6\$
Buildings	Centenary Lakes	Caboolture Netball Association - Replacement of Internal cupboards / fittings.	\$10,000
Buildings	Centenary Lakes	Tennis Club - Replacement of internal cupboards / fittings.	\$10,000
Buildings	Centenary Lakes	Electrical pumps (River / Fountain / Circulation). Wash out and clean control boxes. Spray all components with solvent & CRC. Power up and test. Replace faulty items as required.	\$10,000
Buildings	Centenary Lakes	Little Athletics - Replacement of Internal cupboards / fittings.	\$12,000
Buildings	Centenary Lakes	of pressure cleaners	\$0
Buildings	Centenary Lakes	Little Attriettes - Bundring Attriated of Shidde - Mind by use of pressure cleaners RMY Child - Britiding - Bernoval of Shidde - Mind by use of pressure	\$0
Buildings	Centenary Lakes	Divis Outo - Duiluing - Isenioval of Studge - Mud by use of pressure cleaners Transis Clith - Building Demoval of Studge - Mud by use of pressure	\$0
Buildings	Centenary Lakes	Lettins Club - building Retrioval of Sludge - Muu by use of pressure cleaners - Excluding the Tennis Courts Little Athletics - Electrical Switchboards, Field Poles and Canteen. Wash	\$0
Buildings	Centenary Lakes	out and clean Control Boxes (8) Wash out and Clean Switchboard in Canteen. Spray with Solvent and CRC. Power and Test. Replace Faulty Components	\$
Buildings	Centenary Lakes	BMX Club - Electical Switchboards: Wash and Clean Switchboards. Wash and clean sub-boards. Wash and clean Pole Control Boxes. Spray all components with Solvents and CRC. Power up and Test. Replace Faulty Items as required.	\$
Buildings	: Centenary Lakes	Tennis Club - Electical Switchboards: Wash and Clean Switchboard. Wash and clean poles. Spray all components with CRC. Power up and Test. Replace Faulty Items as required.	\$0
Buildings	s Centenary Lakes	Electical Switchboards: Wash and Clean Switchboards. Spray all components with Solvents and CRC. Power up and Test. Replace Faulty Items as required.	\$0
Buildings	centenary Lakes	BMX Club - Toilets - Remove Mud and Sludge, Replace cisterns and components as required. All Buildings, Switchboards - Wash Out and Spray all components with Solvent& CRC. Power Up and Test. Replace Circuit Breakers with new as necessary.	000'6\$

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Buildings	Centenary Lakes	BBQ Double Plates (5) Wash Out and Clean Control Boxes, elements and plates. Spray all components with Electraclean & CRC. Power up and Test. Replace Faulty Components as required.	\$15,000
Buildings	Centenary Lakes	Main Electrical Switchboard: Wash out and clean Switchboard, Srpay board with solvent. Spray components with CRC. Remove all components and Soak in Solvent. Test all Components. Reinstall all components which pass. Replace Faulty Items. Power up and Test. Replace electrical Faulty Items.	\$100,000
Buildings	Centenary Lakes	BMX Club - Replacement of Internal cupboards / fittings.	\$12,000
Buildings	Centenary Lakes	Southbound side of road oppos entry to Apex Park - Signage frame and skin - permanent sign to promote Urban Country Music Festival plus various banners	\$6.000
Buildings	Caboolture Pool	Replacement & repair of damaged shade sails.	\$5,200
Buildings	Caboolture Pool	Water quality: back wash as necessary. Add chemicals as required to obtain set levels.	\$3,000
Buildings	Depot Park	Toilets: remove mud and sludge, replace cisterns and components as required. All building switchboards: wash out and spray all components with Solvent & CRC. Power up and test. Replace circuit breakers with new as necessary.	8400 8400
Buildings	Sheepstation Creek	Toilets: Clean pipework free of sludge. Apply Solvents to valves. Reset and replace as necessary.	\$650
Buildings	Devine Ct	Dog Obedience - (MBRC) - Electrical swichboards, light tower control gear. Wash out and clean control boxes; wash out and clean switchboards. Spray with Solvent and CRC. Power and test. Replace faulty components.	\$225
Buildings	Toorbul Caravan Park	Sewerage treatment farm (EPA). Remove excess sludge and effluent. Test for quality. Adjust as necessary. Test pump for serviceability. Wash and clean switchboards, replace indicator lights as necessary. Power up and test.	\$3,000
Buildings	Cruice Park	Toilets & hydraulics; remove excess effluent and sludge . Pressure clean facility. Wash and clean electrical pumps and switchboards. Spray with solvents and CRC. Power up and test. Replace faulty components as necessary.	\$2,500
Buildings	Woodford Showgrounds	BBQ - Single plate (2): wash wut and clean control boxes, elements and plates. Spray all components with Electraclean & CRC. Power up and test. Replace faulty components as required.	\$3,400
Buildings	Woodford Showgrounds	Toilets, all buildings, switchboards, lighting control gear. Wash and clean switchboards. Wash and clean sub-boards. Wash and clean pole control boxes. Spray all components with Solvents and CRC. Power up and test. Replace faulty items as required. Check all cisterns and test. Replace items as necessary. Pressure clean buildings.	\$31,200
Buildings	Archer Street	TOILETS: Presure clean to remove mud and sludge	\$700
Buildings	Saleyards (MBRC)	Toilets Presure clean to remove mud and sludge	\$700
Buildings	Sweeney Reserve - Old Dayboro Road	Removal of sludge from building. Mud to be removed from all park Buildings & Facilities' assets.	\$5,000
Buildings	Sweeney Reserve - Old Dayboro Road	Two Toilet blocks - one with minor damage & one major damage requiring - REBUILD TOILET BLOCK - Replace roof structure /side screens doors/partitions/toilets.	\$50,000
Buildings	Sweeney Reserve - Old Dayboro Road	Repair damaged shelters throughout park.	\$60,000
Buildings	Sweeney Reserve - Old Dayboro Road	BBQ'S - replace single plate.	\$3,000
Buildings	Sweeney Reserve - Old Dayboro Road	BBQ'S - three (3) double plates to be replaced.	\$4,000
Buildings	Leis Pde - Park	Building Removal of Sludge - Mud to all park B&F assets	\$1,000
Buildings	Leis Pde - Park	Septic system	\$2,000
Buildings	Leis Pde - Park	BBQ'S - Double Plate	\$8,000
Buildings Buildings	Leis Pde - Park Leis Pde - Park	REBUILD TOILET BLOCK - Replace brick side screen/ door/partition/toilet Shelter to BBQ area	\$10,000 \$4,000
Buildings	Pine Rivers Park	Toilets & sewer pump station to be repaired.	\$1,200
Buildings	Pine Rivers Park	Building: removal of mud	\$5,000
Buildings	Pine Rivers Park	Main swichboard to stage area / lighting structures / bollards	\$55,000
Buildings	Dayboro - Pool	Pool plant room to be checked and repaired as needed.	\$2,000
Buildings	Dayboro - Pool	25 metre pool concourse	\$2,000
Buildings	Dayboro - Pool	25 metre pool concourse	\$5,000
Buildings	Dayboro - Pool	25 metre and toddler pools to be repaired.	\$6,000
Buildings	Dayboro - Pool	Replacement of Heating units	\$100,000
Buildings	Dayboro - Pool	Heating units to be repaired / replaced.	\$4,000
Buildings	Dayboro - Art Gailery	External wall sheeting to be repaired and repainted.	\$600

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Buildings	Dayboro - Art Gallery	External footpath to be repaired.	\$1,000
Buildings	Dayboro - Credit Union	Office / meeting room carpet to be replaced.	\$6,000
Buildings	Dayboro - Council Assets	Electrical testing at Dayboro Poo I / Council Depot / Credit Union building / Hay Cottage / Tourist info building / Art Gallery to check damage after inundation.	\$3,000
Buildings	Mt Glorious Rd	LED early warning sign to be replaced.	\$2,000
Buildings	Morayfield Sports and Leisure Centre	Repair roof leaks: remove roof sheeting, application of sealants, replace roofing screws.	\$2,600
Buildinas	Woodford Community Hall	Repair Roof Leaks: Remove roof sheeting, application of sealants, replace	
Buildings	Hasking Street #2 and King Street #33	Repairs to roof leaks, vent awnings, box gutters, window seals. Replace window seals.	\$12,000
Buildings	Woodford Touch Football Club	Electrical swichboards, light tower control gear; wash out and clean switchboards, sub boards and control boxes. Spray with solvents and CRC. Power up and test. Replace Items as necessary.	\$8,000
Buildings	Roxberg Toilet Block	Toilets - repair. pressure clean to remove sludge. Replace damaged	2000 1200
Buildings	Beachmere Activity Centre	Repairs to tiled roof - water leaks: replace damaged tiles and flashings. Repair damaged downnines	
Buildinas	Bribie Island Recreation Ground,156- 206 First Street	Flood waters undermined irrigation pump house slab resulting in shed slipping down bank & pump house unsafe to enter. Inlet pipe broken &	85 200
Buildings	Banner Poles Opposite Centenary Lakes		\$5.201
	Overtime for call centre operators because of the emergency		\$100,000
	Recovery Taskforce Operations - see F0381		\$15,000
Roads	Kerbside Cleanup	Kerbside cleanup throughout the shire. (First two days was under 7022548W)	\$75,000
		rec train damage	\$30,000
Roads	Jimna Court	Rectification of road and retaining wall. 7023733W	\$1,750,000
Roads	Mt Nebo Rd - Two upslope slip sites - Waste Transfer Stn & Jolly's Lookout	remove raiien and loose rock and stabilise batters using compination of rock bolts, shotcrete and rockfall mesh and anchors. Engage consultants PB, call design & construct tender, award contractor - remedial works to both sites Complimentary Works also proposed.	\$550,000
Roads	beiltriorpe Kange Ka - Bri 35 Kunning Creek NO2 US	Debris against guardrails, damaged section of asphait surface zmz . Remove by machine , traffic control. Was 7023629W	\$3,000
Roads	Belithorpe Range Rd	Engineering consultancy investigation & design, major clearing, rock gabion walls, reinstatement of drainage, pavement & guardrail to be replaced. Proj# 41096 was 7022471W	\$4,200,000
Roads	Emergency Operations	General Flood number for all at initial event	\$100,000
Roads	Bridge - Laceys Creek Rd - bridge over North Pine River	Short term work to make trafficable and safe: place approx 1,000m3 rock in total. Approx 200m3 needed for eastern bridge abutment, 400m3 along 100m length of western approach where shoulder has scoured away, and 200m3 adjacent to western abutment.	\$220,000
Roads	Laceys Creek Rd O'Brien Rd	Repair gravel causeways, repair scours, remove slips. Reinstate gravel pavement on bridge.	\$160,000 \$36.064
Roads	W James Rd	Reinstate causeway and road Complimentary Works also proposed.	\$132,000
Roads	Mt Nebo Rd - Slip below Waste Transfer Station	Emergency work, remove rockfall, install barriers, close lane, engage consultants for geotechnical investigation and report.	\$120,000
Roads	Cedar Creek Rd - (Recification Maintenance) -Stabilisation sites 7 - Parsons Brinckeroff engaged to provide geotech designs 23/06.	Asphalt recification, pipe replacement and maintenance, pavement maintenance, scour protection, landslippage. Guardrail bridge on- approcheds- does not include bridges Complimentary Works also proposed.	\$1,500,000
Roads	Belithorpe Range Rd wn <del>Brispane Rd - Dringe Over Nonn Pine</del>	Geotechnical advice on stability. Clear debris to allow access on 18/01/11. 7022308W / & Project # 41096	\$100,000
Roads	River	Remove logs, patch road, remove slips.	\$30,000
Roads	J Lindsay Rd - Stabilisation sites 1	Gravel - Repair washed out crossings - make safe works started on 19/01/11- pavement repairs required.	\$188,000
Roads Roads	Old North Rd Morayfield Rd - near skate bowl	Rock / asphalt (AC) protection to crossings, Armco guardrail replacement - made safe. Quote for reinstatement works to follow. Replace damaged fence - quotation accepted.	\$20,000 \$450
Roads	Delaney Creek Rd	Gravel - Rock/AC protection to crossings, slip repairs started on 14/01/11.	\$87,500
Roads	Mt Nebo Rď - Slip near Jollys Lookout	Emergency work, remove rockfall, install barriers, close lane, engage consultants for geotechnical investigation and report.	\$200,000
Roads	Newman Lane	Rock/AC pavement protection to crossings, medium slip repairs - made safe on 13/01/11.	\$50,000
Roads	Rose Creek Rd	Pavement replacement - works started on 14/01/11, completed 17/01/11. RC	\$8,000
Roads	Old Gympie Rd	Gravel - Made safe then replace pavement and rock protection. Vvork started on 13/01/11.	\$19,905
Roads	Hamilton Rd	Repair pipes - sink nole. Works started on 13/01/11 completed 1 //01/11. RC	\$3,000
Roads	Visentin Rd	Fence replacement - quote received. Work started on 20/01/11. RC	\$6,000

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Roads	Brown Rd	Repair major pavement failure - further investigation required. Made safe on 13/01/11. WOR	000.06\$
Roads	Stanton Rd - Stabilisation sites 3	<u> Major pavement failure - make safe works started on 13/01/11.</u>	\$450,000
Roads	Rasmussen Rd - Stabilisation sites 2	Gravel - Pavement/drainage replacement - works started on. 14/01/11	\$180,000
Roads	Dewhurts Rd	Gravel - Crossings/pavement repairs - works started on 13/01/11.	\$13,100
Roads	Perkins Rd	Gravel - Crossing/pavement repairs - works started on start 20/01/11.	\$11,278
Roads	Fletcher Rd - Stabilisations sites 2	Major pavement reconstruction - make safe works started on 13/01/11.	\$148.000
Roads	Newlands Rd - 1,000m2	Pavement/crossings repair - reinstatement works started on 14/01/11.	\$100,000
Roads	W Lindsay Rd	Gravel - Pavement replacement - started 14/01/11.	\$12,640
Roads	Basin Rd Derrick Rd	Rock/gravel to 5 crossings to allow access. Reinstate - 2x750 pipes. Erosion behind headwall. To be repaired.	\$80,000
Roads	Cove Rd	Gravel - Pavement/drainage/AC pavement repairs - work started on 14/01/11.	\$12,000
Roads	Theodore Rd	Reinstate causeway and road surface.	\$19,972
Roads	Kobble Creek Rd - Stabilisation sites 1 Pringles Rd	Reinstate causeways and road. Reinstate road	\$80,000
Roads	McNamara Rd - (Browns Crossing)	Repair concrete causeway and adjacent road surface	\$23.341
Roads	Wirth Rd - 1st Crossing	Has been made trafficable to 2nd crossing but will need more permanent repairs. Repair concrete crossing	\$70.000
Roads	Wirth Rd - 3rd Crossing	Half the concrete crossing is missing but has been made safe and trafficable. Crossing to be reinstated.	\$15.000
Roads	Wirth Rd - 5th Crossing	Concrete crossing completely washed away. Has been made safe and trafficable. Crossing to be replaced.	\$25,000
Roads	Wirth Rd - 6th Crossing	Approach to crossing partly washed away. Has been made safe and trafficable but still needs some scour protection. Crossing to be repaired.	\$10,000
Roads	Wt Pleasant Rd Mt Pleasant Rd	Repair road surface: 396m2. Repair slip adiacent to bridge near Henzell Rd.	\$41,585 \$8.000
Roads	Mt Samson Rd	Repair water damaged pavement, scoured shoulders, repair slips, +PF -	
Roads	Dayboro Streets	Repair road pavement surface that was washed away.	\$30,000
Roads	Sweeney Reserve - Old Dayboro Road	Reinstate pavement and asphalt surfacing.	\$70,000
Roads	Gravel Roads	Individual roads repaired - Elizabeth Rd, Bray's Rd, Junction Rd, Wagner Rd - Griffin; Theodore Rd, Neilson Rd, Cooper Rd - Kurwongbah; Bond Rd - King Scrub; Brockhurst Rd - Ocean View; Austin Rd - Mt Mee; Rahes Rd, Charles Rd, Stratton Rd, Sorder's Dvwy, Mt Brisbane Rd - Mt Pleasant; Farrow Rd - Samsonvale; Baker Rd, Wirth Rd, Rowe Rd - Laceys Creek.	\$228,000
Roads Roads	Goat Track Broads Rd	Highvale - Mt Nebo - Geotechnical advice and work arising from geotechrical advice including removal and stabilisation of slips, stabilsation of road batters, reinstatement of road pavement and bridge approaches. Reinstate water damaged and scoured pavement.	\$500,000 \$40,000
Roads	Gravel Roads	Grading gravel roads - Hammermister Rd, Brown's Rd - Mt Glorious; Foggs Rd, Basin Rd, Nixon Rd - Mt Samson; Burns Rd - Samford Valley; Scheldt Rd Wights Mt; Branch Creek Rd - Clear Mt; Old School Rd - Cashmere.	\$180,000
Roads	Leis Pde - with Rehab job	Design, repair road and concrete barriers.	\$60,000
Parks	Queens Beach North and South, Suttons Beach, Margate Beach, Scotts Point Woodv Point	Removal of flood debris from shoreline. Also see Redcliffe Beaches 30664 099	\$50 000
Roads	Old Cove Rd Whiteside Rd	Pavement/drainage/AC pavement repairs. Works started 14/01/11. Renair water damaged bavement	\$5,000
Roads	Blackburn Road	Reinstatement of material permits curvent neadwalls. Make sale works carried out on 14/01/11.	\$3,200
Roads	Neurum Rd	Reinstatement of material behind culvert headwalls. Reinstatement of material behind culvert headwall. Make safe works cerried out on 14/01/11	\$3,000
Roads Roads	Carmichael Court King Rd	Reinstatement of pavement and bitumen seal.	\$1,144 \$15.000
Roads	Dances Rd Mt Nebo Rd - Slip near Jollvs Lookout	Reinstatement of pavement and bitumen seal. RC	\$5,000
Roads Roads	Stage 1 Old North Rd	Water filled barriers, warning signs. Do not touch slope debris. Replacement of damaged guardrail.	\$10,000 \$28,462
Roads	Caboolture River Rd	Reinstatement of pavement and bitumen seal. +PF 135m2 complete	\$10,000
Roads	Gap Rd Booroobin	Engineering consultancy, major embankment shoring and reinstatement of pavement & bitumen seal. Investigation, geotechnical advice & design options & costings pending. #41027 was 7022470W	\$1,000,000
Roads	Sellin Rd	Reinstatement of pavement and bitumen seal; repair land slip. Reinstatement work started on 18/01/11.	\$8,049

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
		Scour around steel pipe to be repaired. Geotechnical advice required. Corrugated steel culvert needs assessment for structural adequacy, soluble soils around pipe culvert have subsidied leaving severe cracking to road	
Roads	Del Roso Rd	paverirent & sunace Complimentary works also proposed. Drainage repairs required. Make safe works commenced on 14/01/11.	\$3,000
Roads	Morayfield Rd	Replace damaged fence - Centenary Lakes - make safe works complete on 14/01/11. Quote for reinstatement works to follow.	\$5,000
Roads	Caboolture river pathway	Caboolture Sth - Arboretum - Repair damaged fencing to walkway - made safe on 13/01/11. Quote for reinstatement work to follow.	\$10,000
Roads	Railway Pde - pathway (under QR)	Replace damaged/washed out pathway. Quotation for reinstatement works accepted. RC	\$6,237
Roads Roads	Glanville Rd English St	Pavement/drainage/AC pavement repairs - made safe on 13/01/11. Drainage repairs to headwall - made safe on 13/01/11.	\$4,000 \$4,000
Roads	Campbells Pocket Rd	Slip/drainage repairs - works started on 14/01/11.	\$15,750
Roads	Neurum rd - Stabilisation sites 1	Repair failed pavement - near new bridge near Woodford Showground. Quotes called.	\$80,000
Roads	Greens Rd	Repair damaged headwall. Made safe on 14/01/11.	\$3,761
Roads	Central Ave McClintock Rd	Repair damaged pavement. Made safe on 14/01/11. Backfill to washed headwall. Made safe on 14/01/11.	\$2,250
Roads	Alexandra Pde	Backfill to headwall, stabilise fence footings. Made safe on 13/01/11.	\$3,600
Roads	Batchelor Rd	Graver - Reinstate washen out pavenent. Reinstatement works commenced on 19/01/11.	\$6,000
Roads	Ipswich City Streets	Ipswich City Council flood relief assistance	\$9,000
Roads	Youngs Crossing Rd	Flood damage to road culverts / footpaths - Young's Crossing Road & gates. Required works by contractors - guardrail Only. Design, supply & fit new guardrail to meet current standards to protect pedestrians on bridge footpath from oncoming traffic. Petrie	\$120,000
		Reinstate pavement & drainage- complete. Landslip subject to	
Roads	Mayfield Rd	geotechnical advice. Estimate dependent on result.	\$180,000
Roads	Gleeson Rd / Adsett Rd	Reconstruction of pavement and repair damage to culverts. Gravel repair to washed out shoulders. Make safe works completed on	\$307,934
Roads	Neurum Rd	17/01/11.	\$5,000
Roads	O'Shea Rd	Repair damaged headwalls and rock stabilisation. Made safe on 19/01/11.	\$3,000
Roads	Poweir Ru Homestead Court Edmond Ct	Graver - repracement to washed out causeway. Reinstatement of pavement and bitumen seal. Reinstatement of pavement and bitumen seal.	\$1,709 \$5,000 \$5,000
6		Reinstatement of material behind culvert headwalls and minor pavement	
Roads	WIT BITSDARE KO - (REAL FREGERICK UT)	repair.	000,000
Roads	Mt Brisbane Rd - #454 (near Graham Ct)	Reinstatement of material behind culvert headwalls and minor pavement repair. (Mt Brisbane Rd)	\$8,000
Roads	Mt Brisbane Rd - (near House 179)	Reinstatement of material behind culvert headwalls and minor pavement repair.	\$5,000
Roads	Mt Brisbane Rd - (near House 112)	Reinstatement of material behind culvert headwalls and minor pavement repair.	\$5,000
Roads	Mt Pleasant Rd - (near Henzell Rd)	Reinstatement of material behind culvert headwalls and minor pavement repair. (Mt Pleasant Rd)	\$7,081
Roads	Mt Pleasant Rd - (near House 526)	Reinstatement of material behind culvert headwalls and minor pavement repair.	\$8,000
Roads	Mt Pleasant Rd - (near Clifford Rd)	Reinstatement of material behind culvert headwalls and minor pavement repair.	\$5,000 \$10 807
20aus			\$ 17'0'
Roads	Gympie Rd	Dept of Transport & Main Koads- AJ Wyllie Bridge - Supply traffic control & Variable Message Signs to assist Transport and Main Roads. Ongoing. Invoices sent to TMR for reimbursement	\$21,669
Roads	Bellbird Court / Masseys Court	Reinstatement of drains, pavement and bitumen seal.	\$30,000
Roads	Flooded Roads in Central Area	Replacement of missing signs.	\$6,000

	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Roads	Flooded Roads in Southern Area	Replacement of missing signs - south area.	\$6,000
Roads	Forbes Rd	Bitumen and pavement washed away - to be replaced. +PF - 199m2 Bitumen and pavement washed awav - to be replaced. New work should	\$21,597
Roads	McLoughlin Rd	strengthen structure +PF 202m2	\$36,000
Roads	Juffs Rd West - Stabilisation sites 1	Repair water damage to pavement. Reinstate Armco railing	\$40,000
Roads	Graham Court	Repair water damage to pavement. Reinstate guardrail.	\$1,304
Roads	Boyd St Dayboro - Floodmarkers, signs and	Remove debris from beach/foreshore & transfer to Caboolture landfill. Flood markers, signs and guideposts washed away adjacent to creek	\$10,000
Roads	guideposts in the Dayboro area	crossings - to be replaced.	\$10,000
Roads	Leis Park	Reinstate road, turnaround and signage in park.	\$30,000
Roads	Tosca St - #55	Reinstate drain, culvert end walls and cutoff walls.	\$26,000
r Soad Soad Soad Soad Soad Soad Soad Soad		Pavement remains required due to inundation of bavement	\$ 447.000
20aus		Lavenient repairs required due to intribution of pavenient. Landslip - investigate and repair (CR 977626). <b>Required works by</b>	440,000
Roads	Mt Samson Rd - #1335	contract. Repairs to slips on LHS & RHS of pavement at 1335 Mt Samson Road, Mt Samson. Approximately 280m2 to be concrete sprayed using F72 mesh reinforcing.	\$150,000
Loans			000,004
Roads	Laceys Creek Rd	Work arising from geotechnical advice to stabilise slips. 2 slips	\$200,000
Roads	Mt Brisbane Rd	Clear slips.	\$20,000
Roads	Hawkins Rd	Repair eroded section of road over pipe crossing.	\$40,000
Roads	Fingerboard Rd	Repair eroded section of road over pipe crossing.	\$30,000
Roads	Normanby Way - footpath near Dixon St	Footpath under-cut by North Pine River. Realign footpath and move seat. <b>Required works by contract.</b> Riverbank scour - supply rock protection work to scoured river bank: approx 25m3 of rock & geofabric to be placed.	000'02\$
Roads	Farrow Rd - Site 1	Road slipped away around pipe crossings. Reinstatement of road batter and roadwav.	\$60.000
Roads	Raaen Rd	Road slipped away around pipe crossings. Reinstatement of road batter and roadway.	\$30,000
Roads	Farrow Rd - Site 2	Road slipped away around pipe crossings. Reinstatement of road batter and roadwav.	\$60.000
		Reinstate asphait causeway with concrete due to failures caused by flood	
Roads	Maryvale St Grant St _ Drain	inundation of pavement. + PF Remove flood debris blocking drain	\$60,000
Roads	Homestead Court	Repairs to road and stormwater infrastructure.	\$22,000
Roads	Hawkins Rd - #88	Repair river crossing damaged during flood.	\$4,000
Roads	Church Kd Jullyan St	Kepair tiood damaged culvert pipe and nead wall. Repairs to storm water drain system.	\$10,000
	Norto I Alono Norto	Elood mitication structure . Dam snillwav damagad To ha ranairad	00 00 82 0
20aus	Att Nucleur Lane Spillway.	Slope failure. Make safe work included installation of water filled barriers	000
Roads	INIT NEDO KG - Slip below vvaste I ransrer Station Stage 1	and warning signs. Do not touch slope depris. Slope stabilisation works required.	\$10,000
Roads	Laceys Creek Rd - before 576	Reinstatement of culvert apron .	\$12,000
Roads	Dayboro Streets	Repairs to bitumen road surface (pot holes).Dayboro, Laceys Creek, Kobble Creek	\$10,000

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
		Gravel - Grade and gravel track from Stony Creek Rd through forestry to	
Roads	Stony Creek Rd Mt Brisbane Rd - Doc's driveway	allow access. Works commenced on 14/01/11. Repair 100 metre long slip on edge of road.	\$200,000 \$30,000
Roads	Baker Road Crossing	Repair washed away rock protection area around culvert.	\$10,000
Roads	Brays and Cairns Rd cnr	Pavement repairs / reinstatement.	\$22,000
Roads	Caboolture River Rd and Virginia Rd	Pavement repairs / reinstatement.	\$9,000
Roads	Harold McDonald Place	Mud slide. Consultancy costs only. No operational work by Council.	\$5,636
Roads	Footpaths various Mimoara Reserve	Clean footpaths of debris and mud left over from flooding. Repair footpaths railings and hoard walks damaged from flooding	\$10,000
Roads	Morrison Rd	Undermining of concrete protection on bridge; remove / replace rock gabions; reinstate drain; and pavement repairs.	\$43,500
Koads	Ucean View Rd	Remove slips. Flood markers, lateral shift markers, warning signs and guide posts washed away from creek crossings and adjacent to creek crossings - to be	\$7,000
Roads	Rocksberg area	replaced. Road slipped away around pipe crossings. Reinstatement of road batter	\$10,000
Roads	Farrow Rd - Site 3	and roadway. Road slipped away around pipe crossings. Reinstatement of road batter	\$60,000
Roads Roads	Farrow Rd - Site 4 Assessment of Six bridge for abutment damage per list	and roadway. Scoured abutments require armour protection. Technical advice required from bridge specialists: Tasman & Assoc.	\$60,000 \$12.000
Roads	Bridge - 8 Cedar Creek Bridge Structural Damage	Repair scour damage to abutments; damaged approache; and pipe outlets.	\$30,500
Roads	Bridge - 10 Gordons Road	Repair scour damage to abutments; damaged approaches; damaged signage.	\$4,000
Roads	Bridge - (11) Bunya Road	Removal of fallen trees from bridge abutments.	\$3,000
Roads	Bridge - (16) Mt Samson Rd	Scour damage to bridge abutments - replace rock protection.	\$10,000
Roads	Bridge - (18) Mt Brisbane Rd	Concrete supporting walls to the bridge abutment have subsided leaving a gap. Professional engineering advice sought. Proposed concrete pressure pumping to repair voids.	\$6,000
Roads	Bridge -161 Nelson Rd Res	Approach on the west side requires reconstructing: 40 LM × 8LM × 1.2M deep - rock / road base / CTB & geofabric membrane. Bridge rails require replacement.	\$15,000
Roads	Wirth Rd - 4th Crossing	Concrete crossing completely washed away. Has been made safe and trafficable. To be reinstated.	\$25,000
Roads	Stonv Creek Reserve - Creekside Drive	Stony Creek Reserve of Creekside Dr & Riveroak Way: bridge and storm water pipe footings require repair. Bridge approaches require repair. Reinstate garden edging and mulch and reinstate rock and geofabric protection Reconstruction of concrete spillway to prevent further scour	000 6\$
Roads	Bridge - 2 Mt Samson Road - North Pine River	Repair scour to bridge abutments. Requires installation of rock > 400mm nominal size.	\$10.000
Roads	Bridge - 3 Mt Samson Rd - Over Cedar Creek	Repair scour to bridge abutments. Requires installation of rock > 400mm nominal size.	\$10,000
Roads	Bridge - (4) Delaney Creek Road Over Bungo Creek	Severe damage to the bridge abutment. Specialiest technical advice required to determine reinstatement requirements. Access track required to facilitate reinstatement works.	\$200,000
Roads	Bridge - (18) Commissioners Flat Road over Stanley River	Scour to bridge abutments. Requires installation of rock > 400mm nominal size. / Pavement repair.	\$70,000
Roads	Bridge - (28) O'Brien Road over Burpengary Creek	Require a revetment mattress or construction of shotcrete wall and foundation. Specialist design required. Reconstruction of 240m length of pavement and 40mm AC pavement overlay. Reinstall guardrail.	\$35,000
Roads	Costello Rd Mt Brichand Bd - Stuthlinge Crossing	Approach to crossing washed away. Has been made safe and trafficable. Reinstatement to include scour protection.	\$15,000
	Stony Creek Rd - culvert Bri 20		
Roads	Mountoor oreek Eaton Lane - culvert Bri 23 Mary Smokes Creek	Wing waii southern side scoured. Required spray concrete repairs. Wing wall southern side scoured. Required spray concrete adjustment. Seal each and of hridge	\$23 000
Roads	Basin Rd Mt Samson Rd - opposite intersection	Repair slips 150m and 200m from end of asphalt.	\$150,000
Roads	with Kobble Creek Rd	Repair slip and reinstate road batter.	\$20,000

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Roads	Bridge - (22) Campbells Pocket Rd Waraba Creek	Scour to abutment southwest side & under headstock, debris under bridge and water main. Under bridge unit required for detailed investigation. Traffic control required during this inspeciton. Repairs required to minor subsidence under relieving slab.	\$7,000
Roads	Bridge - (29) Campbells Pocket Road Caboolture River	Spraycrete has been undermined. Construct concrete footing toe wall and pump concrete into scoured foundation. Works will require traffic control.	\$5,000
Roads	NOT DS	Gravel - Debris against guardrail. Removal by machine under traffic control.	\$2,000
Roads	Bellmere Rd	Debris on roadway and bridge to be removed. Traffic control during water blasting. RC	\$4,000
Roads	Curtis Rd - Stabilisation sites 1	Stabilisation programme - pavement from Cedar Creek Road to the end (750m2). (To be carried out with Cedar Creek Road Project.)	\$54,000
Roads	Kirk Rd	Restoration of end wall and surrounds and pavement.	\$2,000
Roads	Bridge - (15) Mt O'Reilly Road Morrisons Crossing over South Pine River	Repair guardrails. Possible scour to abutments to be checked.	\$2,000
Roads	Bridge - 6 Cedar Creek Road Andy Williams Park	Repair various types of damage to road, bridge and guardrail. Storm debris to be cleared to bridge control point. Road has scoured at the	\$150,000
Roads	Rusty Lane Bri 36 Gregors Creek	approaches - 5m2.	\$3,000
Roads	Gordons Crossing Rd - Job 1 - Chandler Reserve CSR 993674	Bridge and drainage outlet scour protecton. Installation of rock scour protection to bridge abutment and reconstruct central pier rock armour. Installation of scour protection around outlet to 1050 dia pipe culvert.	\$15,000
Roads	Gordons Crossing Rd - Job 2 - Chandler Reserve CSR 993674	At One Mile Creek - approximately 3m high embankment scour. Unstable embankment requires stablisation. Construction of a 1.5m gabion wall approximately 30m in length. Batter embankment 1 in 4 batter. \$35,000 DERM approvals required. Geotechnical advice required.	\$35,000
Roads	Delanev Creek Rd	Scour to road surface and pavement. Reconstruct 80m2 pavement and a 40mm AC pavement overlav.	\$5.000
Roads Roads	Wightman Reserve bikeway exit to Alan Court Yingally Drive (behind 5 Allan Crt) Campbell Parade	Flood damaged timber walkway - unsafe for pedestrians and cyclists near bikeway exit to Alan Court. 30LM is severely buckled. Board walk closed & detour signs erected. Broken pipe in Cabbage Tree Creek also needs to be replaced. Severe damage to pavement - requires rehabilitation. WOR	\$9,000
Roads	Kropp Rd	Removal of debris and replace reflectors.	\$1,000
Roads	VVIGILIS INLERU Bridre - Neurum Rd Bri 21	Bridge deck heavily silted. To be removed with bobcat and broom attachment: traffic control remuted	\$3 000
Roads	Litherland Rd Culvert	Minor scour to the road surface. Reconstruction with cement modified roadbase and compact.	\$3,000
Roads	Boongala Court	Repair 100 metres of road shoulder washed away 100 from the end of the bitumen.	\$12,000
A C C C C C C C C C C C C C C C C C C C	Boondala Court	Two road batter slips 150 metres and 200 metres from the end of the bitumen	000 09\$
Roads	Various Roads throughout Council	Emergency repairs to bitumen roads - potholes etc.	\$142,000
Roads	Raynbird Creek Rd	Drainage & road scour. Three (3) pipe crossings need repair. Several trees down, approximately 1hr work for tree crew. Stabilise pavement from Cedar Creek Road to 50m past bridge (750m2 ). Redefine	\$62,500
Roads	Gordons Rd - Stabilisation sites 1	table drain full length. (To be carried out with Cedar Creek Road project.)	\$76,000
Roads	Huntley St	Repair seawall to stabilise wall & pathway.	\$3,864
Roads Roads	Various areas in Shire Dales Rd Shepherds Crossing	Sandbagging various areas within the Region. Gravel road needs grading.	\$12,000 \$80,000
Roads	Armstrong Creek Road - Stabilisation sites 1	Repairs to pavement failure.	\$60,000
Roads	Basin Rd - Stabilisation sites 4	Repairs to pavement failure.	\$80,000
Roads	Old Toorbul Point Rd	Pavement ~ 1300m x 6.0m in width = 7800m2 damaged from major increase in traffic due to Bribie Island Road closure thus only access in & out of Bribie Is, Ningi, Sandstone Point & parts of Beachmere.	000'00\$

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Roads	Maba Court culvert over Kedron Brook, Intersection Maba Court & Cribb Ave Oxford Park	Downstream rock pitched protection severely undermined leading to collapse. To be reinstated.	\$65,000
Roads Roads	Aman Court - #11 Forestry Rd	Repair sinkhole & damage to stormwater drainage & infrastructure Replace 2x end pipe & repair headwall (pipe diameters ~375 & 450).	\$22,300 \$10.000
Roads	Camp Mountain Rd	Slip made safe; slip material in table drain approx 100m3 to be removed from batter.	\$16,000
Roads	Mondial Dve River Crossing for YMCA to access Old Petrie Town from Carno Marrawee	Scour - requiring rock armour & redefine drain. Damare to concrete crossing - scour To be reinstand	\$25,000
Roads	Kobble Lane Kobble Creek Bridge - Antibidawa Creek Bridge - Cambells Pocket Road	Scour to road surface Reinstatement of pavement, culvert - scour damage from overtopped	\$20,000 \$20,000 \$114 000
Roads	Mt Pleasant Rd	Replace land slip against edge of roadway 100m up hill from main bridge	\$30,000
Roads	Morrison Rd - Park	Reinstate damaged pipenead Damaged fencing surrounding Morrison Rd Park Road slipped away around bipe crossings Reinstatement of road hatter	\$4,420
Roads	Farrow Rd - Site 6 Gvmbie Rd - (between Leis Pde & A.I	and roadway.	\$30,000
Roads Roads	Wyllie Bridge Sowley Rd	Replace embankment to footpath, remove & replace fence & vegetation. Scour to bridge abutments & spraycreting scoured.	\$23,000 \$50,000
Roads	Endwood Crt	Drainage & pathway erosion repairs	\$5,900
Roads Roads	Lawson Creek Kd Farrow Rd - Site 5	Repairs to erosion to road reserve Road slipped away around pipe crossings. Reinstate road batter and roadway.	\$7,500 \$60,000
Roads	Stony Creek Rd - Stabilisation sites 2	Missing & failed section of various locations from causeway to gravel road.	\$500,000
Roads Poods	Cederton Rd Board walk behind 39 Olympus Ct - approx 100m NVV of Cashs Crossing	Failed section of roadway.	\$11,000
Roads	Leis Park	Relocate cuí de sac & install bollards	\$45.000
Roads	Gibbons Rd	Pavement Fails	\$20.000
Roads	Lees Crossing Rd	Pavement Fails	\$20,000
Roads	McKenzie St	Pavement Fails	\$20,000
Roads	George St - Stabilisation sites 1	Pavement Fails - 600m2	\$300,000
Roads	Golf Course Rd - Stabilisation sites 1	Pavement Fails - 500m2	\$42,500
Roads	Walkers Lane - Stabilisation sites 3	Pavement Fails - 800m2	\$300,000
Roads	Pates Rd - 4 sites	Pavement Fails -Total 1151m2 - 259m2 + 72m2 + 473m2 + 347m2	\$51,795
Roads	Donnybrook Rd - Stabilisation sites 1	Pavement Fails - 500m2 RC	\$160,000
Roads	Goodwin Dr	Pavement Fails - 400m2	\$34,000
Roads	Eucalypt St	Pavement Fails - 120m2	\$19,000
Roads	Verdoni St	Pavement Fails - 100m2	\$13,900
Roads Roads	Patane St - 5 sites Williams Rd - 5 sites	Pavement Fails -Total 1006m2 - 599m2 + 99m2 + 90m2 + 20m2 + 198m2 Pavement Fails - Total - Total 1529m2 - 440m2 + 110m2 + 110m2 + 352m2 + 517m2	\$45,270 \$67,005
Roads	Fahey Rd - Stabilisation sites 1	Pavement Fails	\$150,000
Roads	Kremzow Rd - Stabilisation sites 1	Stabilisation Programme - 350lm	\$100,000
Roads	F Lindsay Rd - Stabilisation sites 2	Pavement fails & potholes - 500m in 2 locations - Customer complaint 1024609 Road has fallen below an acceptable standard of service with numerous failures and potholes over its entire length - needs staged construction - tyne, reshape, compact, 150mm gravel seal, etc	\$40,000

Service Type	Road, Park or Building Location	Details of Defect / Work Required	Estimated Cost
Roads	Moorina Rd - Stabilisation sites 1	Insitu stabilisation - Severe scour of road along embankment of creek. Crossing needs to be investigated. Causeway needs to be restored. Verbal customer request for reestablishment of the road over the last 2.9km of the road, (from Haywood Road). Potentially needs road to be relocated away from the creek over a distance of about 700m or have the road embankment reconstructed with suitably sized rock. The rest of the road needs reconstruction Complimentary Works also proposed.	\$310,000
Roads	Old North Rd - Stabilisation sites 2	Part of stabilisation programme.	\$100,000
Roads	Sunnise Drive	Pavement Fails - plus landslip to Geotech & legal for advice. Costs to be advised.	\$20,000
Roads	Neurum Rd near Somerset Council boundary - Stabilisation site 1	Approaches to bridge - pavement lifted from saturation - about to breakup & disintegrate	\$45,000
Roads	Old Gympie Rd - Stabilisation sites 1	Gravel - Stabilisation programe	\$450,000
Roads	Nonmus Rd - Stabilisation sites 2	Road replacement - Gravel - Stabilisation programe	\$460,000
Roads	Kropp Rd - Stabilisation sites 1	Stabilisation programme	\$50,000
Roads	Youngs Crossing Rd - Stabilisation sites 2	Stabilisation programme	\$80,000
Roads	Bullock Creek Rd - Stabilisation sites 1	Stabilisation programme	\$260,000
Roads	Duke St - Stabilisation sites 1	Stabilisation programme	\$104,000
Roads	Meldale Rd - Stabilisation sites 1	Stabilisation programme RC	\$80,000
Roads	Winn Rd & Tom Schmidt Court - 3 sites	Pavement Fails - Total 98m2 - 16m2 + 56m2 + 26m2	\$4,410
Roads	Bells Pocket Rd & Lawnton Pocket Rds	Pavement Fails - Total 294m2 -140m2 + 154m2	\$13,230
Roads	Warner Rd - outside 87 - 2 sites	Pavement Fails - Total 960m2 - 360m2 + 600m2	\$43,200
Roads	Leitchs Rd (2 sites) - 50m nth & sth of Davis Lane (1 site)	Part of stabilisation programme - Pavement Fails - Total 1251 - Total for Leitchs 1107m2 (933m2 + 174m2) + Davis Lane 144m2	\$56,295
Roads	Browns Rd - 3 sites + intersections- Moore + with McCormack Rd	Pavement Fails - Total 1722m2 - 252m2 + 330m2 + 840m2 + 300ms	\$120,870
Roads	Kurrajong Rd	Pavement Fails - 20m2	\$2,060
Roads	Mountain View Rd -Stabilisation sites 1	Stabilisation programme - 8400m2	\$420,000
Roads	Haywood Rd - Stabilisation sites 1	Stabilisation programme - 11200m2	\$560,000
Roads	Mt Nebo Rd - 84 sites	Pavement Fails - 2,847m2	\$256,230
Roads	Benson Rd - outside #19	Pavement Fails - 15m2	\$3,190
Roads	Upper Wights Mtn Rd - outside 35 & 126	Pavement Fails - 25m2, 10m2	\$4,378
Roads	Upper Camp Mtn Rd - outside299	Pavement Fails - 50m2	\$5,445

\$100,000		
2000m2 + stabilisation		Not to be added
Clarks Rd - 1 site	ount	Baxters Greek Rd
Roads	Total Co	Reads

|--|--|--|





### Moreton Bay Regional Council Male Road, Caboolture Flooding Assessment September 2011



### Male Road, Caboolture

### **Flooding Assessment**

#### September 2011

#### Notice

This document and its contents have been prepared and are intended solely for Moreton Bay Regional Council for its internal purposes.

#### **Document History**

JOB NUMBER:			DOCUMENT REF: Male Road Flooding Report - Second Draft				
		$\bigcirc$					
2 <sup>nd</sup> Draft	Internal Review	SG	SR	LM	DM		
1 <sup>st</sup> Draft	Internal Review	SG	SR	SR	LM	24/06/11	
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date	

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### 1. Introduction

#### 1.1 Background

Male Road is situated in northern Caboolture adjacent to King John Creek. Properties of Male Road which adjoin the creek are subject to regular flooding. This report has been undertaken to assess the flooding and to identify whether there are any possible mitigation measures to alleviate flooding in the vicinity of Male Road.

This report will assess the following with respect to flooding:

- The generalised flooding pattern at Male Road
- The impact of the Bruce Highway
- The impact of increasing / decreasing the hydraulic efficiency of King John Creek
- The impact and sensitivity to catchment development, and
- Minor local drainage issues

For the purposes of this report a "large flooding event" is of the order of a 50-yr to 100-yr Average Recurrence Interval (ARI) event and an "extreme flooding event" is of the order of the Probable Maximum Flood (PMF). A "large to extreme flooding event" is of the order of a 1000-yr Average Recurrence Interval (ARI) event. A large flooding event has an annual chance of occurrence of 1 to 2%. The PMF is statistically the largest flooding event which could occur.

#### 1.2 Limitations

A broad scale Tuflow 2-dimensional hydraulic model was created for the Caboolture River (and tributaries) for Stage 1 of the ongoing Regional Flood Database (RFD) project. This un-calibrated preliminary model was truncated and utilised to simulate both large and extreme flooding events for the purposes of this assessment. Design hydrology for the Stage 1 RFD modelling was only available for the 100-yr ARI and PMF events.

As part of Stage 2 of the (RFD) project a detailed hydraulic model of King John Creek is currently being built. At the time of writing this report, this model is yet to be completed and thus some of the estimates in this report may be subject to change.

Smaller frequent flooding events were not simulated as part of this investigation, as the design hydrology for these events was not available as part of the Stage 1 RFD modelling. Also, surveyed levels of the habitable floors for the flood affected Male Road properties were not available. Therefore, it has not been possible to ascertain the standard of flood protection (flood immunity) with respect to habitable floor flooding for each of the flood affected properties. However, it is not likely to alter the conclusions / recommendations of this report.

### 2. General Flooding Pattern at Male Road

Male Road and adjoining properties to the north are largely within the floodplain of King John Creek and have been subject to flooding on numerous occasions in the past. King John Creek is a major tributary of the Caboolture River and flows within private property between Male Road and Flowers Road, upstream of the Bruce Highway. Figure 2.1 indicates the location of Male Road with respect to the creek, floodplain and Bruce Highway. The floodplain extent is defined by the inundation extents of the PMF, as indicated in blue.

At the Bruce Highway, the contributing catchment area of King John Creek is approximately 19.2 km<sup>2</sup> and the upstream creek length is over 10 km. Lagoon Creek joins King John Creek approximately 1.5 km downstream of the Bruce Highway and the catchment area of Lagoon Creek is approximately 45 km<sup>2</sup>.

From review of the results of the Tuflow modelling the following could be ascertained:

- Upstream of the Bruce Highway in the vicinity of Male Road, the floodplain of King John Creek (as defined by the PMF) is up to approximately 800 m wide and inundates areas outside of Male Road and Flowers Road. These extents are based on the most recent aerial survey circa 2009; therefore any recent topographic changes (e.g. development south of Male Road) may not be fully reflected.
- Downstream of the Bruce Highway to the confluence with Lagoon Creek, the flooding extent in a large flooding event (~50 to 100-yr ARI) is up to approximately 600 m wide.
- There is little difference in flood level between the downstream of the Bruce Highway to the confluence with Lagoon Creek. This would indicate that the geometry of the channel / floodplain at the confluence with Lagoon Creek is the limiting factor (hydraulic control) on flood levels in this reach.
- In the flooding events modelled, the much larger flow in Lagoon Creek would appear to be responsible for producing backwater from the confluence up to the downstream side of the Bruce Highway.
- Upstream of the Bruce Highway there is little change in flood level for approximately 1 km upstream. The impact of the Bruce Highway is discussed further in Section 3.
- In the flooding events modelled, there is flow transfer from the Lagoon Creek Catchment to the King John Creek Catchment upstream of the Bruce Highway.
- The detention basin serving the new development (opposite 94 Male Road) would become significantly inundated by floodwater backing up from King John Creek in a large flooding event.



• It is estimated that the critical duration for the storm event which produces the highest flood levels at Male Road is of the order of 3 to 6 hours. This will be confirmed in the RFD Stage 2 modelling.

### 3. Impact of the Bruce Highway

A hydraulic investigation was undertaken for the Bruce Highway waterway crossing of King John Creek to ascertain whether the Bruce Highway was contributing to the flooding of properties at Male Road. Figure 3.1 indicates the upstream face of the northbound bridge.



Figure 3.1 – Upstream Face of the Bruce Highway Bridge

The figure indicates that there are some minor trees immediately upstream of the bridge face. This vegetation could potentially increase the potential for blockages and as such should be removed as part of routine maintenance by the Department of Transport and Main Roads (DTMR).

Design drawings for the Bruce Highway construction were sourced from DTMR. Currently, the Bruce Highway is a dual carriageway with the northbound carriageway approximately 1.2 m higher than the southbound carriageway at the creek centreline. The lower southbound carriageway was constructed prior to the northbound carriageway circa 1968. The northbound carriageway was subsequently constructed circa 1980. Both bridges are approximately the same span (~35 m); however the southbound bridge has three sets of piers whereas the northbound has only two sets of piers. The northbound carriageway embankment is up to 2.75 m above the ground level and the southbound carriageway embankment is up to 1.5 m above the floodplain.

Hydraulic modelling of the waterway crossing was undertaken using the HEC-RAS software with boundary conditions taken from the preliminary Stage 1 RFD Tuflow model. Modelling of the large to extreme event (~1000-yr ARI) required interpolation between the 100-yr ARI and PMF to obtain a flow rate and downstream boundary condition and therefore should be regarded as approximate only. Bridge details and carriageway levels were taken from the DTMR drawings. The creek cross-section geometry was taken from the DTMR drawings and the floodplain geometry from MBRC Airborne Laser Scanning (ALS) data.

Results indicate that in a large flooding event (~50 to 100-yr ARI) the impact of the Bruce Highway is to increase upstream flood levels in the order of 0.27 m. This difference is indicated by the red and red-dashed lines in Figure 3.2. In a large to extreme flooding event (~1000-yr ARI) this increases to approximately 0.56 m. This difference is indicated by the blue and blue-dashed lines in Figure 3.2. This results in increases in flood level at Male Road of the order of 0.3 m and 0.6 m respectively for these flooding events. However, as these results are preliminary (based on un-calibrated Stage 1 RFD model) and because of the lack of surveyed habitable floor levels, it is not possible to report with any certainty how this increase impacts on dwelling flooding at Male Road.

DTMR are currently in the consultation phase for the upgrade of the Bruce Highway in the vicinity of King John Creek. In correspondence with DTMR, they have indicated that they are intending to upgrade the southbound lane in the future. However, other projects will take precedence and these works will not be undertaken before 2019.

In the event that DTMR raised the level of the southbound carriageway to match the northbound carriageway (and duplicated the northbound bridge); current modelling indicates that this would reduce levels in a large flooding event (~50 to 100-yr ARI) by 0.13 m. In a large to extreme flooding event (~1000-yr ARI) this would increase flood levels by 0.03 m.

In the event that DTMR raised the level of the southbound carriageway to match the northbound carriageway (and upgraded both bridges to say 60 m span), current modelling indicates that this would reduce levels in a large flooding event (~50 to 100-yr ARI) by 0.24 m. In a large to extreme flooding event (~1000-yr ARI) this would reduce flood levels by 0.49 m.

A blockage analysis for the existing bridge(s) was not undertaken for this report; however it would be expected that flood levels at Male Road would be sensitive to any major blockages of the Bruce Highway bridge(s). Therefore, it is important maintenance activities are continued to ensure debris in close proximity to the bridge, such as large dead trees are removed routinely.



Figure 3.2 – Long Section through Bruce Highway Crossing

## 4. Impact of Increasing / Decreasing the Conveyance of the Creek

An analysis was undertaken using the broad scale Tuflow hydraulic model to determine the impact on flood levels at Male Road to increasing / decreasing the conveyance of King John Creek in the Male Road reach. The simulation was undertaken for a large flooding event (~50 to 100-yr ARI) to assess whether this was an effective option for reducing flood levels at Male Road.

To simulate the increase in conveyance, the hydraulic roughness was decreased from a Manning's 'n' roughness value of 0.06 to 0.015 in the channel / floodplain. Figure 4.1 indicates the modified area, which is over 1.2 km in length and has an average width of 150 m. A Manning's 'n' value of 0.015 would be typical of rough finished concrete and is a hypothetical scenario to demonstrate the hydraulic impact of significantly increasing the creek conveyance.

To simulate the decrease in creek conveyance, the hydraulic roughness was increased from a Manning's 'n' roughness value of 0.06 to 0.15 over the same modified area as indicated in Figure 4.1. A Manning's 'n' value of 0.15 would constitute extremely dense vegetation comprising of large trees (1 m spacing), fallen trees, dense shrubs, low branches which would be difficult and slow to walk through. This is a hypothetical scenario as the roughness in this reach would never reach this value over this entire width.

Terreren Arteren Arter	(Environmente)				
Sconario	Change from Existing Flood Level (m)				
	80 Male Road	110 Male Road	140 Male Road		
Significantly Increasing Creek Conveyance at Male Road	-0.05	-0.05	-0.08		
Significantly Decreasing Creek Conveyance at Male Road	0.12	0.14	0.17		

Table 4.1 – Impact of Creek Roughness

The results in Table 4.1 indicate that in a large flooding event (~50 to 100-yr ARI) the impact of significantly increasing the creek capacity is very small. Therefore, a potential flood mitigation option of increasing the creek size and removing trees from the riparian zone of the creek / floodplain would show very limited benefit. This is expected as the two main hydraulic controls are the (i) Bruce Highway and / or (ii) the channel / floodplain capacity in the vicinity of the confluence with Lagoon Creek, as noted previously.

The results also indicate that in a large flooding event (~50 to 100-yr ARI) the impact of significantly reducing the creek conveyance is to slightly increase flood levels at Male Road. As the scenario modelled is extreme and totally hypothetical it can be deduced from the results that flooding in Male Road is not sensitive to roughness increases in the creek due to limited maintenance, debris accumulation, minor siltation, in the channel / floodplain.



## 5. Impact of Development in the Catchment

### 5.1 General

It is the opinion of the residents of Male Road that recent development within the King John Creek Catchment has resulted in more severe flooding of their properties, with particular reference to the recent flooding events of May 2009 and January 2011. To assess this claim an analysis of the historic rainfall and flood level records has been undertaken. Also, hydraulic modelling has been undertaken to assess the sensitivity of flood levels at Male Road with respect to increased impervious area within the King John Creek and Lagoon Creek Catchments.

Increases in impervious areas such as buildings, roads, footpaths, etc through catchment development will generally increase flood impacts within the catchment, unless controlled. Uncontrolled development will generally increase flood discharges, flood volumes, flood velocities, catchment response time, etc.

Development within the Moreton Bay Regional Council (Caboolture District) area is controlled by development policy. The policy requires that the stormwater runoff rates from newly developed areas does not exceed the pre-developed runoff rates and has been in effect for more than 20 years. This is primarily achieved by providing storage facilities such as detention / retention basins and also through the use of infiltration devices to limit the discharge to the pre-developed rate. These control devices are designed for flows up to the 100-yr ARI event in most cases. This is standard stormwater design practice in Australia and developed countries throughout the world.

For events greater than the 100-yr ARI, there may be some uncontrolled discharges as the capacity of stormwater attenuation devices is exceeded. However, this is not likely to result in increased flood risk as the flood sensitivity to impervious cover declines dramatically due to the large degree of catchment saturation in these extreme events.

### 5.2 Historic Flooding at Male Road

Historical flood data exists for five flooding events, of which the source and quality of this data varies. Table 5.1 indicates the source of this data as well as an opinion as to whether the data is suitable for the purpose of this analysis.

The available rainfall records for the April 1988 and April 1989 events are limited. Therefore it was necessary to source the data from rainfall stations a considerable distance from the King John Creek Catchment. There was no continuous rainfall (pluviograph) data available at locations within the catchment or nearby during these events. The rainfall data used in this analysis has been averaged from stations at Samford, Ferny Hills, Caloundra, Mt Glorious, Dayboro, Margate and Landsborough and as such could be considerably different to what the catchment experienced.

Nonetheless, it was important in this analysis to at least make a coarse estimate of the size of these two storm events.

	Historic Rai	nfall Record	Historic Flood Mark		
Flooding Event	Source	Appropriate for Purpose	Source	Appropriate for Purpose	
April 1988	MBRC records	No, but limited alternative data available	MBRC records	Yes	
April 1989	MBRC records	No, but limited alternative data available	MBRC records	Yes	
February 1999	MBRC records	Yes	MBRC records	Yes	
May 2009	Floodwise database	Yes	Resident photos	Yes	
January 2011	Floodwise database	Yes	MBRC records	Yes	

Table 5.1 – Historic flooding data

The historic flood levels have been surveyed from debris marks after the flooding event had passed. Therefore, they would be considered representative, but not of extreme accuracy due to the nature of establishing the flood level from a debris mark, which may or may not be clearly defined. MBRC did not have flood level records for the 2009 event, so the levels were estimated from photos provided by the resident of 110 Male Road.

Some characteristics of the rainfall events are as follows:

### 5.2.1 3<sup>rd</sup> to 7<sup>th</sup> April 1988

This event occurred for around 4 to 6 days with on average approximately 300 to 400 mm of rain falling in the region. The gauge readings varied from 200 to 440 mm total rainfall depth. There doesn't appear to be any significant rainfall events in the preceding weeks leading up to the event. However, because of the long length of the storm event it is likely that the catchment was very saturated when the rainfall burst that produced the flood peak occurred.

Within the regional area, the ARI for all durations during this event was determined as approximately 1 to 2 years. However, because this rainfall analysis is not based on any gauges close to the catchment, the actually storm ARI on the King John Creek Catchment could vary significantly and in this case would appear to be greater than 1 to 2 years.

#### 5.2.2 1<sup>st</sup> to 4<sup>th</sup> April 1989

This event occurred for around 3 days with on average approximately 350 to 400 mm of rain falling over the King John Creek Catchment. There appears to be significant rainfall experienced approximately 10 days prior to the event.

Within the regional area, the 12 to 24 hour durations for this event were the most intense with an estimated ARI of 10 years. The ARI for the critical duration was approximately 2 to 10 years. However, because this is rainfall analysis is not based on any gauges close to the catchment, the actually storm ARI on the King John Creek Catchment could vary.

### 5.2.3 7<sup>th</sup> to 10<sup>th</sup> February 1999

This event occurred over 2.5 days with on average approximately 250 to 300 mm of rain falling over the King John Creek Catchment. There was significant rainfall in the week preceding the event, meaning the catchment would have been quite saturated prior to the onset of the event.

Within the King John Creek Catchment, the most intense rainfall was over approximately 24 hours and was between 5 and 10-yr ARI. The ARI for the critical duration was approximately 1 to 2 years.

#### 5.2.4 18<sup>th</sup> to 21<sup>st</sup> May 2009

This event occurred over 2.5 to 3.5 days with on average approximately 350 to 450 mm of rain falling over the King John Creek Catchment. The most intense rainfall which produced the flood peak occurred on the 19<sup>th</sup> and 20<sup>th</sup> May, meaning the catchment would have been fully saturated at the onset of this burst.

Within the Upper King John Creek Catchment, the most intense rainfall was over approximately 24 hours and was close to a 20-yr ARI. The ARI for the critical duration was approximately 5 years.

### 5.2.5 9<sup>th</sup> to 11<sup>th</sup> January 2011

This event occurred over approximately 2.5 days from the 9<sup>th</sup> to the 11<sup>th</sup> January. Over 400 mm of rain fell over this period with the most intense rainfall burst which produced the flood peak occurring on the morning of the 11<sup>th</sup> January. There was significant rainfall in the weeks preceding the event, meaning that the catchment would have been fully saturated prior to the storm event. Within the Upper King John Creek Catchment, the most intense burst was over approximately 6 hours and was close to a 100-yr ARI.

for the storm durations shown.

Table 5.2 – Comparison between Historic Flood Level and Estimated ARI						
Location	Historic Flood Level (m AHD)					
Location	April-88	April-89	Feb-99	May-09	Jan-11	
Pumicestone Rd Bridge	-	7.29	-	-	8.20	
255 Pumicestone Rd	7.49	-	-	-	-	
132 Male Rd	7.18	-		-	7.50	
50 Flowers Rd	7.23	-	6.94	-	-	
98 Flowers Rd	-	7.15	-	7.2 - 7.25	-	
80 Male Rd	7.10	7.00	6.83	7.2 - 7.25	7.65	
Upstream Bruce Highway	7.11	6.77	6.76	-	-	
Downstream Bruce Highway	-	6.66	-	-	-	
RANKING	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	
Storm Duration	Estimated ARI (years)					
Storm Duration	April-88	April-89	Feb-99	May-09	Jan-11	
3-hour	1 to 2	2 to 5	< 1 to 2	~ 5	15 to 100+	
6-hour	1 to 2	5 to 10	< 1 to 2	~ 5	94 to 100+	
12-hour	1 to 2	~ 10	2 to 5	10 to 20	31 to 100+	
18-hour	1 to 2	~ 10	5 to 10	10 to 20	14 to 100+	
24-hour	1 to 2	~ 10	5 to 10	~ 20	8 to 72	
RANKING	5 <sup>th</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	2 <sup>nd</sup>	1 <sup>st</sup>	

Table 5.2 indicates a comparison between the historic flood levels and the estimated ARI

The surveyed flood level records rank the flooding events from most severe to least severe as: (1) January 2011; (2) May 2009; (3) April 1988; (4) April 1989 and (5) February 1999.

The rainfall analysis ranks the storm events from most intense to least intense with respect to producing flooding at Male Road as: (1) January 2011; (2) May 2009; (3) April 1989; (4) February 1999 and (5) April 1988.

The only anomaly with respect to these rankings is the April 1988 event which would appear larger than the rainfall analysis predicts (as noted previously). This is most likely because the rainfall analysis was undertaken on regional rain gauges, rather than rain gauges within the catchment or close by, due to limited rainfall data available.

Apart from this anomaly the results appear as expected and there is correlation between the rainfall ARI and the flood magnitude. The January 2011 and May 2009 events

comprised more intense rainfall than the previous events and therefore produced higher flood levels at Male Road.

Flood producing rainfall is dependent on the intensity and duration relationship of the rainfall with respect to the catchment size and response time. For example, a 20-yr 6 hour storm event has a rainfall intensity of 26.33 mm/hr and would produce 158 mm of rainfall, whereas a 20-yr 48 hour storm event has a rainfall intensity 7.55 mm/hr and would produce 362 mm of rainfall. Yet the 20-yr 6 hour storm would produce a much larger flood peak at Male Road than 20-yr 48 hour event even though the total rainfall depth is significantly less.

The total rainfall depth of different storm events cannot be compared to assess the severity of the rainfall which produces the flooding event. Long duration storm events over many days will only produce the most severe flooding in catchments with areas much larger than those within the MBRC area.

In catchments such as King John Creek, a long duration storm event over many days has the hydrologic impact of completely saturating the catchment, which has the affect of making rural / pervious area behave similar to hardstand / impervious areas. The severity of the flooding event is controlled by the intensity / duration relationship of the rainfall bursts which occur within this long duration storm event.

#### 5.3 Sensitivity to Urbanisation

The sensitivity of flood levels at Male Road with respect to increases in catchment impervious area (development) was assessed using the Tuflow hydraulic model. Three distinct scenarios were modelled for a 180-minute duration large flooding event (~50-yr to 100-yr), namely:

- Existing Conditions the scenario assumes the existing degree of impervious area for both the King John and Lagoon Creek catchments.
- King John Creek Catchment with 100% impervious area this scenario assumes that the Lagoon Creek Catchment is in its current condition.
- Both King John and Lagoon Creek Catchment with 100% impervious area.

Figure 5.1 indicates the location of Male Road with respect to the King John Creek and Lagoon Creek Catchments.

Both these development scenarios are totally hypothetical and should be considered an upper limit which would be never reached. This is because of the following reasons:

- The percentage impervious area of a fully urbanised catchment would never reach 100% due to the requirement for lawns, parks, green spaces, etc.
- These scenarios assume uncontrolled runoff from developed areas, whereas in reality the runoff is controlled by detention basins, etc, as noted previously.

•
Table 5.3 indicates the increase in flood level for both scenarios when compared with the existing conditions.

Scopario	Increase from Existing Flood Level (m)			
Scenario	80 Male Road	110 Male Road	140 Male Road	
King John Creek Catchment at 100% Impervious	0.15	0.16	0.16	
King John Creek and Lagoon Creek Catchments at 100% Impervious	0.15	0.16	0.16	

The results indicate that in a large flooding event (~50 to 100-yr ARI), with the catchment fully impervious and allowing totally uncontrolled runoff that the increase in flood level would only be of the order of 0.15 m at Male Road. As this catchment development is a hypothetical upper limit (which would never occur) and the increase in flood level is not significant, it can be deduced that flood levels at Male Road are not sensitive to development within the catchment. The floodplain of King John Creek at Male Road is very wide and therefore small increases in discharge result in negligible changes in flood level.



# 6. Local Drainage Issues

#### 6.1 Detention Basin

The detention basin at the corner of Male Road and Elof Road drains a proportion of the recent development in the vicinity of Male Road. As previously noted in Section 5.1, detention basins (or similar) are required by MBRC policy to control stormwater discharge from developed areas.

During the recent King John Creek flooding events, the residents of Male Road have noted that the detention basin was close to overtopping (or just overtopping). It is the opinion of the Male Road residents that the detention basin is therefore not operating as intended and / or under capacity, which is contributing to flooding problems at Male Road.

A detailed inspection of the detention basin and / or review of the design capacity has not been undertaken as part of this investigation. However, MBRC has no reason to believe there are any problems with the detention basin and would consider that it is serving its design intent adequately. This is on the basis that the general layout and configuration of the basin is as expected for a local catchment of this scale.

The reason the detention basin has been full of floodwater during the most recent King John Creek flooding events is because of the floodwater backing up from the creek. The detention basin is located within the floodplain of King John Creek so it is expected that it would be susceptible to floodwater ingress when the flood level in the creek is very high.

Detention basins serving suburban developments are designed to control peak flows from the local stormwater drainage catchment, as opposed to flows from the regional creek catchment. Their storage capacity is generally not designed for the addition of backflow from very high water levels in creeks, rivers, lakes, harbours, etc.

In the event that a large short-duration local catchment storm occurred whilst the flood level in King John Creek was also very high, the capacity of the detention basin would most likely be exceeded. However, this would be expected, as the probability of this joint occurrence of a large short-duration storm (local catchment critical) and large long-duration storm (King John Creek critical) is extremely rare and above the current design standards for Australia. Under normal design conditions King John Creek flooding (long duration storm) will not occur at the same time as flooding in the local catchment (short duration storm).

### 6.2 Table Drain outside 118 & 126 Male Road

The table drain which traverses the frontages of 118 & 126 Male Road, drains a very small local catchment. The drain is laid at a very flat grade and experiences ponding in local catchment storm events.

The re-construction of Male Road (including the provision of kerb and channel) would have reduced the contributing catchment area to this table drain by intercepting the runoff and discharging it through the underground piped drainage system for the road. DWCP would consider the road re-construction has reduced the frequency of ponding experienced, but may have slightly changed its location / depth.

To further reduce the ponding experienced there could be merit in re-grading the channel and providing a concrete invert (or similar) and upgrading two driveways. However, this may not result in a dramatic reduction in local ponding.

## 7. Conclusion

Properties of Male Road adjoining King John Creek are subject to regular flooding from the creek. The predominant reason properties of Male Road are subject to regular flooding is because they are low-lying and located within the floodplain of King John Creek.

At the time of subdivision, it is likely that the design standards with respect to flood planning for development were different to current practice. In the past, it was common for flood planning levels to be based on an historical event, rather than the probabilistic techniques used today. Similarly, at the time of subdivision, the tools / technology available to accurately predict flood levels would have been inferior to those used today.

Figure 7.1 indicates a comparison of the contributing factors to flood risk at Male Road. It is apparent that the largest contributing factor is the natural variance in the magnitude of the flooding events.

Another contributing factor which increases flood risk at Male Road is the Bruce Highway. Preliminary modelling results indicate that in a large flooding event (~50 to 100-yr ARI) the impact of the Bruce Highway is to increase upstream flood levels in the order of 0.3 m at Male Road. In a large to extreme flooding event (~1000-yr ARI) this increases to approximately 0.6 m at Male Road. As the calibrated Tuflow hydraulic model of King John Creek is in the process of being completed for the RFD project, it is not possible to report with any certainty how this increase impacts on dwelling flooding at Male Road. Although this afflux is not ideal, it is considered to be consistent with the standard of engineering design that prevailed at the time of the bridge construction.

A blockage analysis for the existing bridge(s) was not undertaken for this report; however it would be expected that flood levels at Male Road would be sensitive to any major blockages of the Bruce Highway bridge(s).

DTMR have indicated they are intending to upgrade the southbound lane in the future. However, other projects will take precedence and these works will not be undertaken before 2019. However, the feasibility of these works from a cost-benefit perspective would need to be confirmed through a detailed hydraulic investigation and cost-benefit analysis. It is possible that residents may still have flooding concerns even if the bridges were to be upgraded.

In the event that DTMR raised the level of the southbound carriageway to match the northbound carriageway (and duplicated the northbound bridge); current modelling indicates that this would reduce levels in a large flooding event (~50 to 100-yr ARI) by 0.13 m. In a large to extreme flooding event (~1000-yr ARI) this would increase flood levels by 0.03 m.

In the event that DTMR raised the level of the southbound carriageway to match the northbound carriageway (and upgraded both bridges to say 60 m span), current modelling indicates that this would reduce levels in a large flooding event (~50 to 100-yr ARI) by 0.24 m. In a large to extreme flooding event (~1000-yr ARI) this would reduce flood levels by 0.49 m.

Catchment development and potential increases in stormwater runoff are controlled by MBRC development policy. Notwithstanding, an assessment was undertaken to test the sensitivity of the Male Road area to uncontrolled catchment development in the King John Creek and Lagoon Creek Catchments. The results indicated that in a large flooding event (~50 to 100-yr ARI) the Male Road area is not sensitive to uncontrolled development, with a hypothetical 100% impervious catchment area only increasing flood levels by 0.15 m in a large flooding event (~50 to 100-yr ARI).



Figure 7.1 - Summary of Male Road Flooding

This was reinforced by the review of the historical flood events, where it was found that there was no correlation with the recent catchment development and an increase in flood peak. The increase in flood peak is a result of the storm events being of greater magnitude than the previous years. In catchments such as King John Creek, a long duration storm event over many days has the hydrologic impact of completely saturating the catchment, which has the affect of making rural / pervious area behave similar to hardstand / impervious areas. The severity of the flooding event is controlled by the intensity / duration relationship of the rainfall bursts which occur within this long duration storm event.

Further sensitivity testing was undertaken on the impact of increasing / decreasing the conveyance of King John Creek in the reach adjacent to Male Road. Results indicated that flood levels were not sensitive to increases / decreases in the creek conveyance at Male Road and thus a potential flood mitigation option of increasing the creek size and removing trees from the riparian zone of the creek / floodplain would show very limited benefit and would not be feasible. The results also indicated that flood levels are not overly sensitive to decreased creek conveyance which could occur through increased vegetation, debris build up, minor siltation, etc.

## 8. Recommendations

Given the findings of this study it is recommended the following be undertaken:

- (a) Formally advise DTMR of bridge maintenance issues (i.e. clearance of minor trees at upstream face) and request consideration for inclusion in their maintenance programme.
- (b) The flood risk of the properties at Male Road (in term of ARI) is fully quantified once the detailed Tuflow model for the RFD has been completed. This would also involve simulating the full range of design events and establishing habitable floor levels for each of the dwellings, to enable a direct comparison with the predicted flood level.
- (c) Following the provision of detailed modelling results, re-visit the impacts of the Bruce Highway Bridge(s).
- (d) As part of the MBRC submission for the Bruce Highway Upgrade Project, include the request for DTMR to give consideration to upgrading the bridges at King John Creek to reduce flood risk.
- (e) The future zoning of these flood affected parcels should be reviewed as part of the preparation of the MBRC Planning Scheme.
- (f) Give consideration to including the upgrade of the table drain outside 118 & 126 Male Road as a future divisional project.
- (g) The flood affected property owners should consider utilising flood resistance and flood resilience measures to help minimise the damage from floodwaters and greatly reduce the timescale for recovery.
  - Flood Resistance these measures are aimed at keeping water out of buildings, or at least minimising the amount that enters by the use of barriers such as door guards to seal entry points; the use of water proof sealants / coating; capping airbricks; etc.
  - Flood Resilience these measures are aimed at minimising the damage when a building is flooded, thereby facilitating the quickest possible recovery. Resilience measures include the use of flood resistant building materials within walls / floors and in other parts of the structure; the raising of electrical wiring above flood levels; etc.

Other measures which could be adopted by the current or future property owners include:

- Raising the dwelling to above a large design flood level.
- Relocate the dwelling to higher ground. This would most likely involve building a raised ground area to relocate the dwelling.
- Flood levees and / or flood walls around the dwelling.



# Moreton Bay Regional Council Upper Burpengary Creek Flood Mitigation Assessment

September 2011



# **Upper Burpengary Creek**

# **Flood Mitigation Assessment**

# **Draft Report**

#### September 2011

#### Notice

This document and its contents have been prepared and are intended solely for Moreton Bay Regional Council for its internal purposes.

#### **Document History**

JOB NUMBER:		DOCUMENT REF: Upper Burpengary Creek Flood Mitigation Assessment Report - Draft				
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## 1. Introduction

### 1.1 Background

Numerous properties within the Burpengary Creek Floodplain experienced significant flooding in the recent 11<sup>th</sup> January 2011 storm event. Some of these properties had flooded in previous large storm events, however for most of the newer properties this was the first time they had experienced flooding.

The predominant areas which experienced significant flooding are outlined below and indicated in Figure 1.1

- Lookout Place
- Hideaway Close
- Mathew Crescent

A preliminary analysis on the magnitude of the 11<sup>th</sup> January event indicated that the Burpengary Creek event was greater than the 1 % annual chance (100-yr Average Recurrence Interval) event and closer to a 0.1 % annual chance (1000-yr ARI) event.

The Regional Flood Database (RFD) preliminary existing flooding extents for the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events are presented in Appendices A.1 and A.2 respectively.

It should be noted that design rainfall return periods are based on statistical information, which in the case for Australia have not been updated since 1987. It is expected that once the design rainfall data has been revised the magnitude of the event could reduce in frequency. For example, the magnitude of a current 1 % annual chance (100-yr ARI) design event may be revised to a 2 % annual chance (50-yr ARI) design event, etc.

### 1.2 Objectives

As part of the response to the 11<sup>th</sup> January flooding, Council undertook to assess the flooding mechanism and identify any cost-effective mitigation options that could be implemented in the short-term (2011 / 2012 financial year) to improve the standard of flood protection to those affected properties.

The primary objective of this study is to recommend flood mitigation option(s) to increase the standard of flood protection (flood immunity) at the affected areas.

The secondary objectives with respective to the recommended option(s) are as follows:

- To ensure the recommended option(s) does not increase flood risk in other areas.
- To ensure the recommended option(s) complies with the budgetary requirement for the flood mitigation works.



- To ensure the recommended option(s) does not adversely impact the local stormwater drainage system.
- To ensure the recommended option(s) is consistent with Council policy / plans and environmental legislation.
- To ensure the recommended option(s) has community acceptance.
- To identify options that could be implemented as future works.

The budget allocated to these works limits the extent of potential options to those which offer strong economic benefit (reduction of flood damage) for minor capital investment. For the purpose of this report, a cost-benefit analysis has not been undertaken as it is considered excessive due to the limited budget for the proposed works.

Long-term options will be considered as part of Councils regional flood mitigation assessments which will commence once the RFD is complete.

#### 1.3 Methodology

The general methodology adopted for this study is as follows:

- Assess the flooding characteristics of the area.
- Identify potential flood mitigation options that would achieve the objectives, in particular the budgetary requirements.
- Undertake modelling to determine the hydraulic impacts of each option.
- Review the hydraulic impacts of each option with respect to the project / design objectives (performance, budget, community acceptance, etc).
- Review design / constructability issues of each option.
- Prioritise the options for current and future works.
- Prepare concept designs and cost estimates.
- Provide Council with recommendations on the options to implement.

#### 1.4 Hydraulic Model

The Tuflow hydraulic modelling software (version 2010-10-AA-w64) was used for this investigation. The model used was a truncated version of that which was developed for Stage 2 of the RFD project. The Stage 2 RFD model contains a 5 m grid and has been verified against the observed records for the 11<sup>th</sup> January 2011 storm event from which the results show a good correlation. The recently approved development "the Hideaway - Stage 3" details were added to the base model to incorporate the new design levels in this area.

Modelling for this investigation has been undertaken for the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events only. The results from the truncated model show good correlation with the Stage 2 RFD model for both these events.

# 2. Lookout Place Flooding

### 2.1 Recent Flooding Experienced

The development in the vicinity of Lookout Place was undertaken circa 2005. Severe flooding has not been experienced at this location since the development was completed, which includes the significant event which occurred in May 2009. The 11<sup>th</sup> January event inundated a number of properties including several which experienced above habitable floor flooding.

The design of the local stormwater drainage system consists of a large high capacity grated inlet pit to capture the major overland flow from the development and discharge it into the creek. This high capacity inlet pit is located on the development side of the creek embankment and would only be utilised once the capacity of the piped drainage system capacity was exceeded.

An opening in the creek embankment was designed immediately on the downside of the high capacity inlet pit. It appears that this opening was designed as a fail safe measure to prevent ponding / flooding if the high capacity grated inlet pit became blocked. Figure 2.1 indicates the high capacity pit and overland flow path through the embankment leading to the creek. Figure 2.2 indicates the locality and major features of the area.



Figure 2.1 – High Capacity Inlet Pit and Overland Flow Path to Creek



During the 11<sup>th</sup> January event, floodwater from Burpengary Creek back flowed through this opening, as well as backing up through the piped drainage system, flooding the adjacent properties.

### 2.2 Flooding Characteristics

A summary of the flooding characteristics resulting from a Burpengary Creek flooding event is indicated below. A flood map indicating the depth of flooding at Lookout Place in the 0.1 % Annual Chance (1000-yr ARI) event is presented in Appendix B.1.

- Properties in the vicinity of Lookout Place have a standard of flood protection (flood immunity) greater than the 1 % annual chance (100-yr ARI) event, with respect to flooding from Burpengary Creek. This means that a 1 % annual chance event in Burpengary Creek would not result in flooding of properties in this vicinity.
- Flooding results for the 0.1 % annual chance (1000-yr ARI) event indicate that it was
  of a similar magnitude to the 11<sup>th</sup> January event.
- The maximum depth of floodwater over the Lookout Place road surface is approximately 1.8 m in the 0.1 % annual chance (1000-yr ARI) event. This occurs in the vicinity of the high capacity inlet pit.
- During the 0.1 % annual chance (1000-yr ARI) event, a peak flow of between 25 m<sup>3</sup>/s and 30 m<sup>3</sup>/s currently enters the Lookout Place area from Burpengary Creek. This includes flow which overtops the creek embankment as well as through the opening and also surcharging from the piped drainage system.
- The flow through the Lookout Place area creates a secondary flow path for Burpengary Creek, which re-joins the creek approximately 1 km further downstream.
- The presence of the opening in the creek embankment would appear to exacerbate flooding from the creek in the vicinity of Lookout Place.
- The greatest depth of property flooding in the 0.1 % annual chance (1000-yr ARI) event of approximately 0.7 m occurs towards the north of Mannikin Street. Reprofiling the grassed raised ground area at the northern end of Mannikin Street could potentially reduce flood levels in this area. A photograph of this area is indicated in Figure 2.3.
  - The peak velocity is generally over 1 m/s within the road corridors, with the maximum being approximately 2 m/s in an isolated location in Moorhen Court.

### 2.3 Flood Mitigation Objectives

Further to Section 1.2, as the properties in Lookout Place already have a standard of protection (flood immunity) above the 1 % annual chance (100-yr ARI) event, the objective is to further minimise the flood risk by investigating whether low cost flood mitigation option(s) could be effectively utilised.



Figure 2.3 – Grassed Area at Northern End of Mannikin Street

### 2.4 Potential Cost-effective Mitigation Options

From review of the flooding characteristics, the potential cost-effective flood mitigation option(s) which would increase the standard of flood protection in the Lookout Place area are as outlined below. The design sketches for some of these options are provided in Appendix B.2 for reference.

- (a) Block off the opening in the creek embankment by filling with an earth material to the level of the adjoining banks.
- (b) Reconfigure the high capacity grated inlet pit to minimise potential blockage from debris.
- (c) Re-grade the grassed area at the northern end of Mannikin Street from the kerb to the open drain to provide a more efficient route for conveyance of overland flow.
- (d) Provide a flap (non-return) valve on the piped drainage system to minimise back flow from Burpengary Creek. The flap valve would prevent the majority of the flow from Burpengary Creek from backing up the piped drainage system.
- (e) Providing a small opening (450 mm diameter) through the blocked off embankment to allow overland flow from the local catchment to enter the creek, should the high capacity inlet become blocked and surcharge.

(f) Creating a small 40 m long low height berm (< 0.15 m high) adjacent the open drain at 129 Facer Road to mitigate any flood level increases from the Lookout Place works.

These options have been grouped into Option L1 and Option L2 for the purposes of identifying potential mitigation solutions.

- Option L1 comprises of (a), (b), (c) and (f), and
- Option L2 comprises of (a), (b), (c), (d), (e) and (f).

The major difference between the two being that Option L2 comprises a flapped valve on the Lookout Place drainage system and Option L1 does not.

#### 2.5 Hydraulic Impacts of Flood Mitigation Options

#### 2.5.1 Option L1

Modelling of Option L1 was undertaken to determine the flooding impacts. As there would be negligible impacts for the 1 % annual chance (100-yr ARI) event, the modelling was only undertaken for the 0.1 % annual chance (1000-yr ARI) event.

The resultant flood depth map is presented in Appendix B.1 along with the flood impact map. The flood impact map indicates the change in flood level (flood afflux) as a result of the option with respect to the existing greater Burpengary Creek system. Flood impacts less than 0.05 m are not described as it is considered outside the accuracy limits for this model.

The general impacts of this option are as follows:

- In the 1 % annual chance (100-yr ARI) event there are negligible changes in flood level as this event is not affected by works at Lookout Place.
- In the 0.1 % annual chance (1000-yr ARI) event there is a significant reduction (up to 0.4 m) in flood level throughout Lookout Place.
- In the 0.1 % annual chance (1000-yr ARI) event there are increases in flood level along Burpengary Creek of up to 0.09 m. The flood level increases level taper out to zero at approximately 1.2 km downstream and 0.6 km upstream of Lookout Place. These increases do not appear to be exacerbating existing above habitable floor property flooding.
- In the 0.1 % annual chance (1000-yr ARI) event there are increases in flood level at Facer Road of up to 0.06 m, however these increases do not appear to be exacerbating existing above habitable floor property flooding and can be offset.

In a flooding event with an annual chance of between 1 % and 0.1 % (100-yr to 1000-yr ARI), the resultant flood depth map is also shown in Appendix B.1. The results indicate that up until the creek bank is overtopped (~23.5 m AHD) there would be a significant improvement in the standard of protection (flood immunity) with no dwellings experiencing

ground floor flooding. The maximum flow within the road corridor would be of the order of  $5 \text{ m}^3$ /s.

During the 0.1 % annual chance (1000-yr ARI) event, the creek embankment would be overtopped and flooding would occur in the Lookout Place area. However, the severity of flooding would be less than currently experienced.

#### 2.5.2 Option L2

Modelling of Option L2 was undertaken to determine the flooding impacts. As there would be negligible impacts for the 1 % annual chance (100-yr ARI) event, the modelling was only undertaken for the 0.1 % annual chance (1000-yr ARI) event.

The resultant flood depth map is presented in Appendix B.1 along with the flood impact map. The flood impact map indicates the change in flood level (flood afflux) as a result of the option with respect to the existing greater Burpengary Creek system.

The general impacts of this option are as follows:

- In the 1 % annual chance (100-yr ARI) event there are negligible changes in flood level as this event is not affected by works at Lookout Place.
- In the 0.1 % annual chance (1000-yr ARI) event there is a significant reduction (up to 0.5 m) in flood level throughout Lookout Place.
- In the 0.1 % annual chance (1000-yr ARI) event there are increases in flood level along Burpengary Creek of up to 0.1 m. The flood level increases level taper out to zero at approximately 1.2 km downstream and 0.6 km upstream of Lookout Place. These increases do not appear to be exacerbating existing above habitable floor property flooding.
- In the 0.1 % annual chance (1000-yr ARI) event there are increases in flood level at Facer Road of up to 0.07 m, however these increases do not appear to be exacerbating existing above habitable floor property flooding and can be offset.

In a flooding event with an annual chance of between 1 % and 0.1 % (100-yr to 1000-yr ARI), the resultant flood depth map is also shown in Appendix B.1. The results indicate that up until the creek bank is overtopped (~23.5 m AHD) there would be a significant improvement in the standard of protection (flood immunity) with no properties experiencing flooding. The maximum flow within the road corridor would be of the order of  $2 \text{ m}^3/\text{s}$ .

During the 0.1 % annual chance (1000-yr ARI) event, the creek embankment would be overtopped and flooding would occur in the Lookout Place area. However, the severity of flooding would be less than currently experienced.

When compared with Option L1, Option L2 would appear to provide the better flood mitigation solution, although this option slightly increases flood levels external to Lookout Place compared to Option L1. The most significant improvement in the standard of protection from Option L2 compared with Option L1 is for flooding events which remain in-channel and do not overtop the creek bank into Lookout Place.

## 3. Hideaway Close Flooding

### 3.1 Recent Flooding Experienced

The development in the vicinity of Hideaway Close was undertaken around the same time as in Lookout Place. Severe flooding had not been experienced here since the development was completed, which includes the significant event which occurred in May 2009. Figure 3.1 indicates the locality and major features of the area.

During the 11<sup>th</sup> January event a number of dwellings experienced above ground floor flooding, which resulted from Burpengary Creek overtopping its banks and flooding the adjacent properties. In this event, floodwater was known to have overtopped the creek banks along the vast majority of the frontage with the Hideaway Close development.

#### 3.2 Flooding Characteristics

A summary of the flooding characteristics resulting from a Burpengary Creek flooding event is indicated below. A flood map indicating the depth of flooding at Hideaway Close in the 0.1 % Annual Chance (1000-yr ARI) event is presented in Appendix C.1.

- Properties in the vicinity of Hideaway Close have a standard of flood protection (flood immunity) greater than the 1 % annual chance (100-yr ARI) event, with respect to flooding from Burpengary Creek. This means that a 1 % annual chance event in Burpengary Creek would not result in flooding of properties in this vicinity.
- Flooding results for the 0.1 % annual chance (1000-yr ARI) event indicate that it was of a similar magnitude to the 11<sup>th</sup> January event.
- The maximum depth of floodwater over the Hideaway Close road surface is approximately 0.6 m in the 0.1 % annual chance (1000-yr ARI) event.
- During the 0.1 % annual chance (1000-yr ARI) event, a secondary flow path develops to the south of the development. This flow path conveys a peak flow of approximately 30 m<sup>3</sup>/s.
- The peak velocity is generally less than 1 m/s within the road corridors, with the maximum being approximately 2 m/s in an isolated location on Hideaway Close.



### 3.3 Flood Mitigation Objectives

Further to Section 1.2, as the properties in Hideaway Close already have a standard of protection (flood immunity) above the 1 % annual chance (100-yr ARI) event, the objective is to further minimise the flood risk by investigating whether low cost flood mitigation option(s) could be effectively utilised.

### 3.4 Potential Cost-effective Mitigation Options

From review of the flooding characteristics, potential cost-effective flood mitigation option(s) which would increase the standard of flood protection in the Hideaway Close area are as outlined below. The design sketch for Option H1 is provided in Appendix C.2 for reference.

- Option H1 Provide a low height levee (< 1 m high) along the creek frontage to prevent the 0.1 % annual chance (1000-yr ARI) flooding event from entering Hideaway Close. This would involve blocking of the secondary flow path which develops in large events south of Hideaway Close.
- Option H2 as per Option H1, but not blocking off the secondary flow path.

At Hideaway Close, there is limited potential to divert flows away from the main channel with the limited budget available for the works. Similarly, the provision of upstream storage would clearly exceed the limited budget available. Increasing the capacity of the channel would lower flood levels, however there would be most likely considerable environmental impacts and costs associated with excavating in the creek. Any of these works would require a more detailed cost-benefit / flood damages study to justify their implementation.

### 3.5 Hydraulic Impacts of Flood Mitigation Options

Modelling of the Hideaway Close options was undertaken to determine the flooding impacts. As there would be negligible impacts for the 1 % annual chance (100-yr ARI) event, the modelling was only undertaken for the 0.1 % annual chance (1000-yr ARI) event.

The scenarios modelled included the following:

- Options H1 + L1
- Options H1 + L2
- Options H2 + L1
- Options H2 + L2

All options result in negligible flooding at Hideaway Close as the levee systems prevent flood ingress. The resultant flood impact maps are presented in Appendix C.1 and indicate the change in flood level (flood afflux) as a result of the option with respect to the

existing greater Burpengary Creek system. Flood impacts less than 0.05 m are not described as it is considered outside the accuracy limits for this model.

The general impacts are as follows:

- The flooding impacts at Hideaway Close are localised such that they are independent of the Lookout Place impacts.
- In the 1 % annual chance (100-yr ARI) event there are negligible changes in flood level as this event it not affected by works at Hideaway Close.
- In the 0.1 % annual chance (1000-yr ARI) event there is a significant reduction (up to 0.7 m) in flood level throughout Hideaway Close for all options.
- In the 0.1 % annual chance (1000-yr ARI) event the maximum increase in flood level in the Mathew Crescent area is as follows:
  - Options H1 + L1 = 0.06 m
  - Options H1 + L2 = 0.06 m
  - Options H2 + L1 = less than 0.05 m (model tolerance)
  - Options H2 + L2 = less than 0.05 m (model tolerance)
- In the 0.1 % annual chance (1000-yr ARI) event, the H2 options result in new flooding of two properties immediately south of Hideaway Close. In the H1 options these properties are flood free.
- In the 0.1 % annual chance (1000-yr ARI) event, the access road to the Hideaway Close development in inundated by up to 0.4 m in the H2 options, meaning the development would be totally isolated by flood waters. In the H1 options this access road is flood free.
- In the 0.1 % annual chance (1000-yr ARI) event, all options result in a reduction of flood level in Burpengary Creek downstream of Hideaway Close. This reduction is greatest in the H1 options

The more appropriate flood mitigation option at Hideaway Close would appear to be Option H1, as it does not create new flooding and also provides flood free access to Hideaway Close in the 0.1 % annual chance (1000-yr ARI) event.

Option H1 increases flood levels in the Mathew Crescent area more than resulting from Option H2. However, this afflux can be reduced, as discussed further in Section 4.

#### 3.6 Impact of the Footbridge

Modelling was undertaken to assess the hydraulic impact of the footbridge which spans Burpengary Creek and provides pedestrian access to Hideaway Close from the north. The assessment was undertaken for the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events. In the 1 % annual chance (100-yr ARI) event the flood level reaches approximately the soffit of the bridge. In the 0.1 % annual chance (1000-yr ARI) event the flood level reaches approximately midway up the bridge beams, but does not over top the bridge. To assess the impacts, the footbridge was removed from the Tuflow model and the flood level results compared with the existing model (with the footbridge included). The results indicate that the impact of the footbridge is negligible in both the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events.

To confirm that Tuflow was modelling the bridge structure accurately, a comparison was undertaken using the HEC-RAS hydraulic model. The results indicate a good correlation between the two models. Figure 3.2 indicates the cross-section through the bridge structure, viewed in the downstream direction as modelled in HEC-RAS. All bridge dimensions were obtained from field survey undertaken for the RFD.



Figure 3.2 – Hideaway Close Footbridge (HEC-RAS representation)

## 4. Mathew Crescent Flooding

#### 4.1 Recent Flooding Experienced

The development in the vicinity of Mathew Crescent is largely rural residential and was constructed prior to Lookout Place and Hideaway Close. Flooding of properties is experienced regularly as development is located on low-lying land within the floodplain. The Burpengary Creek floodplain is wide and flat at this location, with extents of up to 1 km wide.

In the 11<sup>th</sup> January event a number of properties experienced above ground floor flooding, which resulted from Burpengary Creek overtopping its banks and a significant quantity of floodwater spilling out onto the floodplain and into developed areas.

### 4.2 Flooding Characteristics

A summary of the flooding characteristics resulting from a Burpengary Creek flooding event is indicated below. Flood maps indicating the depth of flooding in the vicinity of Mathew Crescent for both the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events are presented in Appendix D.1. Figure 4.1 indicates the locality and major features of the area.

- Numerous properties in the vicinity of Mathew Crescent have a standard of flood protection (flood immunity) less than the 1 % annual chance (100-yr ARI) event, with respect to flooding from Burpengary Creek. This means that a 1 % annual chance event in Burpengary Creek would result in flooding of a number of properties in this vicinity. Smaller flooding events were not simulated as part of this assessment.
- The floodplain is significantly wider at Mathew Crescent when compared with Lookout Place and Hideaway Close; with extents up to 1 km wide.
- The "Downstream Drain" appears to contribute to the flooding of properties situated to the north of Mathew Crescent from Burpengary Creek. The peak flow in the Downstream Drain is approximately 13 m<sup>3</sup>/s in the 1 % annual chance (100-yr ARI); which represents approximately 6 % of the total flow in Burpengary Creek at Hideaway Close. The peak flow in the Downstream Drain is approximately 21 m<sup>3</sup>/s in the 0.1 % annual chance (100-yr ARI); which represents approximatel (100-yr ARI); which represents approximately 7 % of the total flow in Burpengary Creek at Hideaway Close.
- There is a large secondary overland flow path from which breakouts from north of the main creek channel at Hideaway Close and flows to the northern extent of Mathew Crescent. This overland flow path joins a minor tributary of the creek, which crosses Mathew Crescent towards the north-eastern extent. In the 1 % (100-yr ARI) annual chance event the peak flow within this flow path is approximately 16 m<sup>3</sup>/s; which represents approximately 7 % of the total flow in Burpengary Creek at Hideaway Close. In the 0.1 % (1000-yr ARI) annual chance event the peak flow within this flow path is approximately 103 m<sup>3</sup>/s; which represents approximately 103 m<sup>3</sup>/s; which represents approximately 35 % of the total flow in Burpengary Creek at Hideaway Close.





• Mathew Crescent roadway is flooded at two locations in the 1 % annual chance (100-yr ARI) event and completely inundated along its entire length in the 0.1 % annual chance (1000-yr ARI) event.

### 4.3 Flood Mitigation Objectives

Further to Section 1.2, as the properties in Mathew Crescent generally have a standard of protection (flood immunity) below the 1 % annual chance (100-yr ARI) event. The objective is to raise the standard of protection to the 1 % annual chance (100-yr ARI) event, if possible, by investigating whether low cost flood mitigation option(s) could be effectively utilised.

#### 4.4 Potential Cost-effective Mitigation Options

From review of the flooding characteristics, potential cost-effective flood mitigation option(s) which would increase the standard of flood protection (flood immunity) in the Mathew Crescent area are as outlined below:

- Option M1 block the Downstream Drain, allowing flow in one direction only. Local catchment stormwater flows would be able to drain into the creek, however in a large Burpengary Creek flooding event flow would be prevented from flowing towards the Mathew Crescent area. Large culverts with flapped valves on the outlets would be utilised to achieve this purpose. The crest of the embankment crossing the drain would be approximately 18.1 m AHD, which represents the 1 % annual chance (100-yr ARI) flood level plus 0.3 m freeboard. At this level the 0.1 % annual chance (1000-yr ARI) would also be prevented from flowing into the Downstream Drain from Burpengary Creek. The design sketch for this option (Option M1) is provided in Appendix D.2 for reference.
- Option M2 as per Option M1 with the addition of a low-height levee across the creek from Hideaway Close to prevent breakout flows in the 1 % annual chance (100-yr ARI) event. The levee required would be approximately 200 m long and would be generally less than 1 m high, with 0.3 m freeboard. This option would require land acquisition / easements required, however is provided for the purposes of a more complete flood mitigation solution.

Council is also investigating local drainage improvements in the vicinity of the intersection of Rowley Road and Hauton Road. These improvement works will be considered in conjunction with Options M1 and M2 but are not included as part of this report as the flooding issue is with respect to local catchment drainage rather than from Burpengary Creek.

### 4.5 Hydraulic Impacts of Flood Mitigation Options

Modelling of the Mathew Crescent options was undertaken to determine the flooding impacts. Modelling was undertaken for the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events for the following scenarios:

- Options M1 + H1 + L2
- Options M2 + H1 + L2

The resultant flood depth maps are presented in Appendix D.1 along with the flood impact maps. The flood impact maps indicate the change in flood level (flood afflux) as a result of the option with respect to the existing greater Burpengary Creek system. Flood impacts less than 0.05 m are not described as it is considered outside the accuracy limits for this model.

The general impacts are as outlined below and indicated in Table 4.1. It should be noted that the impacts in the 0.1 % annual chance (1000-yr ARI) event are also a result of the Hideaway Close (Option H1) works.

	Average Flood Afflux (m)				
Location	1 % Annu (100-y	al Chance rr ARI)	0.1 % Annual Chance (1000-yr ARI)		
	Option M1+H1+L2	Option M2+H1+L2	Option M1+H1+L2	Option M2+H1+L2	
Mathew Crescent (North)	-0.17	-0.25	-	-	
Mathew Crescent (South)		-	-	-	
Mathew Crescent (South-west)	0.06	-0.12	0.06	-	

Table 4.1 – Mathew Crescent Flood Afflux

Note: Less than 0.05 m (model tolerance) has not been indicated

- In the 1 % annual chance (100-yr ARI) event, Option M1 reduces flood levels in North area quite significantly. However, in the South and South-west areas the flood level increases slightly.
- In the 0.1 % annual chance (1000-yr ARI) event, Option M1 there is no change to flood levels in the North and South areas. However, in the South-west area the flood level increases slightly.
- Option M2 provides Mathew Crescent (North) and Mathew Crescent (South-west) with a 1 % annual chance (100-yr ARI) standard of protection (flood immunity).
- In the 1 % annual chance (100-yr ARI) event, Option M2 prevents flooding in the North and South-west areas. However, in the South area the flood level increases slightly.

• In the 0.1 % annual chance (1000-yr ARI) event, Option M2 slightly reduces flood levels in the North area. In the South area there is no change in flood level and in the South-west area there is a slight increase.

#### 4.6 Impact of the Weir at Mathew Crescent

Modelling was undertaken to assess the hydraulic impacts of the concrete weir, just upstream of Mathew Crescent at the north-eastern extent. The assessment was undertaken for the 1 % annual chance (100-yr ARI) and 0.1 % annual chance (1000-yr ARI) events. The weir was removed from the model (the creek bathymetry adjusted accordingly) and the flood level results compared with the existing model.

The resultant flood impact maps are presented in Appendix E. These maps indicate the change in flood level (flood afflux) with respect to the existing greater Burpengary Creek system.

The results indicate that the removal of the weir lowers upstream flood levels in both the events modelled. In the 0.1 % annual chance (1000-yr ARI) event the reduction in flood level is more significant than in the 1 % annual chance (100-yr ARI) event. In the 1 % annual chance event (100-yr ARI) the reductions are quite localised and the reduction of property flooding is minimal. However, in the 0.1 % annual chance (1000-yr ARI) event the average reduction in flood level is of the order of 0.15 m in the Mathew Crescent (North) area.

### 4.7 Impact of Burpengary Equestrian Centre Access Road

An assessment was undertaken as to the impacts of the Equestrian Centre road access in the 1 % annual chance (100-yr ARI) event and 0.1 % annual chance (1000-yr ARI) events. The access road crosses the tributary of Burpengary Creek approximately 400 m downstream of the weir (discussed in Section 4.6) and is situated in the wider Burpengary Creek floodplain.

In these events the dominant flow at the waterway crossing is from Burpengary Creek (rather than the tributary), meaning that the hydraulic gradient is very flat and the dominant flow direction is approximately parallel to the road alignment. In conjunction with this, the waterway crossing is quite submerged in both these events, with the depth of flow over the road being greater than 3 metres. This results in a very small proportion of the total flow area being obstructed by the structure, resulting in negligible increase to the flood level.

### 4.8 Impact of Development in the Narangba Valley

#### 4.8.1 General

Development in the Narangba Valley has increased steadily over the last decade. Increases in impervious areas such as buildings, roads, footpaths, etc through catchment development will generally increase flood impacts within the catchment, unless controlled. Uncontrolled development will generally increase flood discharges, flood volumes, flood velocities, catchment response time, etc. Development within the Moreton Bay Regional Council (Caboolture District) area is controlled by development policy. The policy requires that the stormwater runoff rates from newly developed areas do not exceed the pre-developed runoff rates and has been in effect for more than 20 years. This is primarily achieved by providing storage facilities such as detention / retention basins and also through the use of infiltration devices to limit the discharge to the pre-developed rate. These control devices are designed for flows up to the 1 % annual chance (100-yr ARI) event in most cases. For events greater than the 1 % annual chance (100-yr ARI) there will be some uncontrolled discharge which may result in a higher flood discharge and flood volume than the pre-developed runoff. This is standard stormwater design practice in Australia and developed countries throughout the world.

In some instances, uncontrolled discharges (i.e. no detention / attenuation) from smaller catchments in lower areas of the greater catchment can be favourable through passing the flow rapidly before the peak of the greater catchment hydrograph arrives, reducing the potential for amplification of the flood peaks.

Figure 4.2 indicates the Narangba Valley area (Young Creek Catchment) and the larger Burpengary Creek Catchment. The catchment area of Young Creek is approximately 6.7 km<sup>2</sup> whereas the total catchment area to the downstream side of Mathew Crescent is approximately 29.2 km<sup>2</sup>, which is significantly larger.

#### 4.8.2 Flood Risk Impacts

Three scenarios were modelled to assess whether development of the Narangba Valley area has contributed to increased flood risk, namely:

- Scenario 1 Narangba Valley completely rural (100 % pervious)
- Scenario 2 Narangba Valley 50 % impervious
- Scenario 3 Narangba Valley 100 % impervious

The areas of Lookout Place and Hideaway Close are outside of Young Creek Catchment, so they are not influenced by any potential flow increases due to development in the Narangba Valley. At Mathew Crescent (south-west and north areas), the flooding is a result of breakout flows from Burpengary Creek in the vicinity of Hideaway Close, consequently these areas are also independent of development in the Narangba Valley Catchment area.

The Mathew Crescent (south area) is downstream of the Young Creek confluence and therefore would receive flows from the Narangba Valley area. However, the dominant mechanism for flooding at this location would be the significantly larger upstream catchment of Burpengary Creek. The results indicate that increased uncontrolled development slightly reduces the flood risk. Conversely, if the Young Creek Catchment was fully pervious the flood risk would slightly increase.

It may be counter intuitive to those without a firm grasp of hydrologic processes that increasing development could reduce flood levels. Increased development will generally increase flood discharges, flood volumes, flood velocities, catchment response time, etc, suggesting that flood levels would also increase. However, each situation is different and depends upon a number of issues including the catchment size; catchment shape; existing land use and development; proposed land use and development; rainfall characteristics; etc.



As Young Creek Catchment is much smaller, the peak flow from this catchment would have passed the Mathew Crescent (south) / Rowley Road area before the larger peak from the upstream Burpengary Creek Catchment has arrived. As a result, the peak flow from the Young Creek Catchment does not influence flooding at this location. The recession limb of the Young Creek Catchment hydrograph has the most influence on flooding because of this timing difference. The greatest influence on the recession limb is the degree of pervious area. As the increased development scenarios have less pervious area than the fully pervious scenario, the resultant impact is a lower recession limb and hence lower flow in Burpengary Creek.

## 5. Further Work

As additional funds are made available, there would be potential to increase the standard of flood protection (flood immunity) in the study area. Currently, properties in both Lookout Place and Hideaway Close have quite a high standard of protection, whereas properties in Mathew Crescent have a standard of protection less than the 1 % annual chance (100-yr ARI) event.

Works which could potentially increase the standard of protection (flood immunity) at Mathew Crescent would include:

- Further levee works to Burpengary Creek. This would involve the construction of levees to the northern embankment of Burpengary Creek to prevent breakout flows into Mathew Crescent.
- Removal of the weir and upgrade of the culvert at Mathew Crescent. This would involve removing the existing concrete weir; upgrading the Mathew Crescent culvert crossing immediately downstream and associated channel works.
- A high capacity floodway to convey the 0.1 % annual chance (1000-yr ARI) event. This floodway would follow the approximate route of the secondary flow path through Mathew Crescent.
- A large upstream detention basin (or similar) in the un-developed catchment upstream of Oakey Flat Road.

A detailed analysis would need to be undertaken in conjunction with the selection of any potential long-term flood mitigation options. The appraisal of all potential long-term options would need to be undertaken in conjunction with a detailed cost-benefit analysis to justify the capital expenditure. The cost-benefit ratio would need to be sufficiently robust to ensure that the works provide strong economic benefit in reducing flood damages.
### 6. Recommendations

The assessment undertaken as part of this study has determined that there are potential cost-effective flood mitigation options that could be implemented to increase the standard of protection (flood immunity) to properties along Burpengary Creek. These options are considered feasible within the context of the modelling limitations.

These options include those listed below, which are also shown in Figure 6.1.

- (a) Lookout Place Option L2
  - Block off the opening in the creek embankment by filling with an earth material to the level of the adjoining banks.
  - Reconfigure the high capacity grated inlet pit to minimise potential blockage from debris.
  - Provide a flap (non-return) valve on the piped drainage system to minimise back flow from Burpengary Creek. The flap valve would prevent the majority of the flow from Burpengary Creek from backing up the piped drainage system.
  - Providing a small opening (450 mm diameter) through the blocked off embankment to allow overland flow from the local catchment to enter the creek, should the high capacity inlet become blocked and surcharge.
  - Re-grade the grassed area at the northern end of Mannikin Street from the kerb to the open drain to provide a more efficient route for conveyance of overland flow.
  - Creating a small 40 m long low height berm (< 0.15 m high) adjacent the open drain at 129 Facer Road to mitigate any flood level increases from the Lookout Place works.
- (b) Hideaway Close Option H1
  - Provide a low height levee (< 1 m high) along the creek frontage to prevent the 0.1 % annual chance (1000-yr ARI) flooding event from entering Hideaway Close. This would involve blocking of the secondary flow path which develops in large events south of Hideaway Close.
- (c) Mathew Crescent Option M2
  - Block the Downstream Drain, allowing flow in one direction only. Large culverts with flapped valves on the outlets would be utilised to achieve this purpose.
  - Provide a 200 m low-height levee across the creek from Hideaway Close. The exact route and extent of the levee will be determined once detailed survey has been undertaken.

Local drainage upgrade works to mitigate local catcment flooding

Option M2 Provide low height levee Exact extents and route to be confirmed following detailed survey

Option L2

Re-grade grassed area to provide more efficient overland flow path

Option L2 \* Block off opening in embankment \* Reconfigure high capacity pit \* Provide flapped valve to grated pit \* Provide small opening in embankment for overland flow

Option L2 Provide low height berm

400

metres

200

0



Option H1 Provide low height levee

Figure 6.1 - Recommended Options

Some of the recommendations will result in minor increases in flood level (less than 0.05 m) at other locations. These minor increases are considered outside the model tolerance.

If a further increase to the standard of protection is required, then the following should be investigated in more detail as potential long term options:

- Further levee works to Burpengary Creek to prevent breakout flows into Mathew Crescent.
- Removal of the weir and upgrade of the culvert at Mathew Crescent.
- A high capacity floodway which follows the approximate route of the secondary flow path through Mathew Crescent.
- A large upstream detention basin in the un-developed catchment upstream of Oakey Flat Road.

# Appendix A.1 - Existing Flooding Extents 1 % Annual Chance (100-yr ARI) Event





# Appendix A.2 - Existing Flooding Extents 0.1 % Annual Chance (1000-yr ARI) Event





# Appendix B.1 - Lookout Place, Flood Impact Mapping of Options

















### Appendix B.2 - Lookout Place, Option Concept Design



# Appendix C.1 - Hideaway Close, Flood Impact Mapping of Options













# Appendix C.2 - Hideaway Close, Option Concept Design



# Appendix D.1 - Mathew Crescent, Flood Impact Mapping of Options






























## Appendix D.2 - Mathew Crescent, Option Concept Design



## Appendix E – Impact of the Weir at Mathew Crescent





